APPENDIX A

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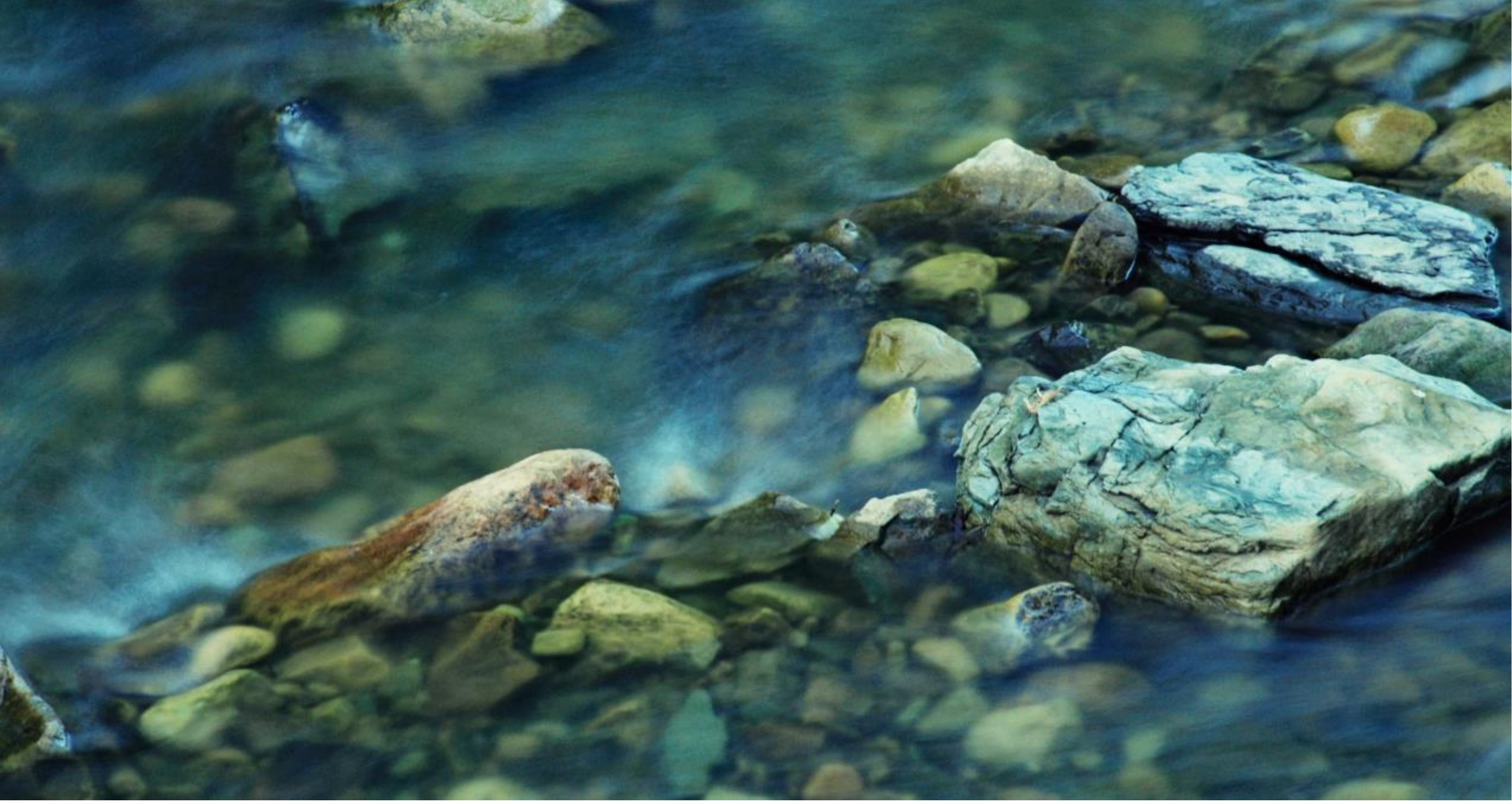
APPENDIX B

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
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Project Number: 180243-02.01

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ABBREVIATIONS

µg/kg	microgram per kilogram
µg/L	microgram per liter
ANOVA	analysis of variance
BP	bioaccumulation potential
City	City of Newport Beach
cy	cubic yard
DU	dredge unit
EC_{50}	median effective concentration
ERED	Environmental Residue-Effects Database
ERL	effects range low
ERM	effects range median
FDA	U.S. Food and Drug Administration
ITM	*Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual*
LC_{50}	median lethal concentration
LCS	laboratory control sample
LNB	Lower Newport Bay
LPC	limiting permissible concentration
MDL	method detection limit
mg/kg	milligram per kilogram
mg/L	milligram per liter
MLLW	mean lower low water
MS	matrix spike
MSD	matrix spike duplicate
NOEC	no observed effect concentration
ODMDS	Ocean Dredged Material Disposal Site
OTM	*Evaluation for Dredged Material Proposed for Ocean Disposal – Testing Manual*
QA/QC	quality assurance/quality control
R/V	research vessel
RL	reporting limit
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SAPR	Sampling and Analysis Program Report
SC-DMMT	Southern California Dredged Material Management Team
SP	solid phase
SPP	suspended particulate phase

SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
TOC	total organic carbon
TRV	toxicity reference value
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

1 Introduction

The City of Newport Beach (City) and U.S. Army Corps of Engineers (USACE) are proposing to conduct dredging within the federal channels in Lower Newport Bay (LNB), California (Figures 1 and 2). Dredging is needed in areas of increased shoaling to improve navigation and maintain federal authorized design depths. The federal channels were most recently dredged between May 2012 and January 2013, at which time dredging to depths of -10 to -17 feet mean lower low water (MLLW) was performed throughout large areas of LNB. Contaminated material was placed at the Port of Long Beach's Middle Harbor Fill Site, and clean material was placed at the U.S. Environmental Protection Agency (USEPA)-designated LA-3 Ocean Dredged Material Disposal Site (ODMDS) (Figure 1). Based on the most recent USACE harbor-wide bathymetric surveys, sedimentation has occurred in many areas of LNB such that dredging is needed within the federal channels to maintain safe navigation. The City is pursuing this program—in partnership with the USACE—to dredge the LNB federal channels to the currently authorized design depths. Sediment from LNB federal channels was characterized to determine suitability for ocean disposal at LA-3 ODMDS (Figure 1). Sediment from the Entrance Channel was also evaluated to determine compatibility for nearshore placement.

Sediment core sampling was conducted within the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel in January 2018. The Sampling and Analysis Program Report (SAPR) was presented to the Southern California Dredged Material Management Team (SC-DMMT) in July 2018. At this meeting, USEPA requested supplemental information to support a suitability determination, including mass loading calculations and a compilation of historical data from Newport Bay. Mass loading calculations and a compilation of historical data were provided to USEPA in April 2019 and are included as part of this updated SAPR.

Newport Channel was not initially included in this sediment characterization program or the previous federal channels investigation in 2009 (Newfields 2009) due to historical contamination and amphipod toxicity in 2003 and 2006 (Weston 2007). During the federal channels sampling in January 2018, exploratory sampling was conducted within Newport Channel and results were cleaner than expected. Based on these results, the City expanded the federal channels characterization to include Newport Channel. The sampling and analysis approach for Newport Channel was presented to the SC-DMMT in June 2018 (Anchor QEA 2018a), and additional sampling was conducted in January 2019. This SAPR summarizes both sediment sampling events and evaluates data results for LNB federal channels, including Newport Channel.

1.1 Project Summary

The July 2018 USACE harbor-wide bathymetry data from LNB shows that dredging is required in multiple areas to achieve authorized design depths (Figure 3). Areas that require the most dredging include the Entrance Channel, Main Channel North, Bay Island, Turning Basin, West Lido, and

Newport Channel. West Lido was not included as part of this sediment characterization or the previous federals channels investigation in 2009 (Newfields 2009) due to historical contamination and amphipod toxicity in 2003 and 2006 (Weston 2007). As previously described, Newport Channel was also not initially included as part of this sediment characterization program. Eleven dredge units (DUs) were identified within the Entrance Channel, Main Channel North, Bay Island, and Turning Basin for sampling and analysis activities (Anchor QEA 2017a). Three DUs were identified within Newport Channel for sampling and analysis activities (Anchor QEA 2018b). For Newport Channel, DU boundaries were finalized in coordination with USEPA based on the results of individual core chemistry. DU boundaries and existing bathymetry are shown in Figure 4.

Dredging is planned within LNB federal channels to design depths ranging from -15 to -20 feet MLLW, plus 2 feet of overdepth allowance (1 foot paid and 1 foot unpaid). The total volume of material proposed for dredging is estimated to be 1,224,300 cubic yards (cy), consisting of 716,430 cy above design depth and 507,870 cy of allowable overdepth. Table 1 summarizes the proposed dredging volumes for LNB federal channels. Proposed dredged material volume estimates were slightly updated from those presented in the Sampling and Analysis Plan (SAP; Anchor QEA 2017a) and sampling and analysis approach for Newport Channel (Anchor QEA 2018a) based on new condition surveys completed by USACE in June 2018, plus 10% contingency to account for sediment accumulation prior to dredging. In addition, some DU boundaries were slightly refined (i.e., removed marina in northwest corner of Turning Basin). Overall, the updated total volume of dredged material is within 10% of the original estimates (1,116,200 cy) presented in the SAP (Anchor QEA 2017a) and sampling and analysis approach for Newport Channel (Anchor QEA 2018a).

Table 1
Proposed Dredging Volumes

Dredge Unit	Dredge Unit Code	Design Depth (feet MLLW)	Estimated Volume to Design Depth (cy)	2-Foot Overdepth Allowance Volume (cy)	Total Volume (cy)	Dredge Unit Area (acres)
Turning Basin	TB	-20	23,100	68,800	91,900[1]	26.5
Main Channel North 1	MCN1	-20	36,600	26,600	63,200	8.2
Main Channel North 2	MCN2	-20	37,600	23,200	60,800	7.2
Main Channel North 3	MCN3	-20	44,600	38,800	83,400	13.8
Main Channel North 4	MCN4	-20	28,300	26,700	55,000	8.9
Main Channel North 5	MCN5	-20	50,200	39,600	89,800	12.9
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	
	4	33° 36.461'	117° 54.409'	-11.3	-17	7.2	6.9	-17.0	BIME-01-T-011018	0 to 3.0	Upper composite	N/A
									BIME-01-M-011018	3.0 to 5.7	Lower composite	
BIME-02	1	33° 36.479'	117° 54.331'	-12.0	-17	7.7	7.0	-17.0	BIME-02-T-011018	0 to 3.0	Archive, upper composite	N/A
									BIME-02-M-011018	3.0 to 5.0	Archive, lower composite	
									BIME-02-Z-011018	5.0 to 5.5	Z layer archive	
	2	33° 36.479'	117° 54.331'	-12.0	-17	6.5	5.5	-17.0	BIME-02-T-011018	0 to 3.0	Upper composite	N/A
									BIME-02-0M-011018	3.0 to 5.0	Lower composite	
	3	33° 36.479'	117° 54.331'	-12.0	-17	6.5	3.1	N/A	N/A	N/A	N/A	Sample discarded
	4	33° 36.479'	117° 54.331'	-12.0	-17	6.5	5.9	-17.0	BIME-02-T-011018	0 to 3.0	Upper composite	N/A
									BIME-02-0M-011018	3.0 to 5.0	Lower composite	
	5	33° 36.479'	117° 54.331'	-12.0	-17	6.5	6.0	-17.0	BIME-02-T-011018	0 to 3.0	Upper composite	N/A
									BIME-02-0M-011018	3.0 to 5.0	Lower composite	
BIME-03	1	33° 36.409'	117° 54.434'	-11.5	-17	9.0	7.7	-17.0	BIME-03-T-011118	0 to 3.0	Archive, upper composite	N/A
									BIME-03-M-011118	3.0 to 5.5	Archive, lower composite	
									BIME-03-Z-011118	5.5 to 6.0	Z layer archive	
	2	33° 36.409'	117° 54.434'	-11.5	-17	7.0	6.6	-17.0	BIME-03-T-011118	0 to 3.0	Upper composite	N/A
									BIME-03-M-011118	3.0 to 5.5	Lower composite	
	3	33° 36.409'	117° 54.434'	-11.5	-17	7.0	6.3	-17.0	BIME-03-T-011118	0 to 3.0	Upper composite	N/A
									BIME-03-M-011118	3.0 to 5.5	Lower composite	
	4	33° 36.409'	117° 54.434'	-11.5	-17	7.0	6.6	-17.0	BIME-03-T-011118	0 to 3.0	Upper composite	N/A
									BIME-03-M-011118	3.0 to 5.5	Lower composite	
BIME-04	1	33° 36.453'	117° 54.375'	-11.5	-17	7.7	7.5	-17.0	BIME-04-T-011118	0 to 3.0	Archive, upper composite	Refusal
									BIME-04-M-011118	3.0 to 5.5	Archive, lower composite	
									BIME-04-Z-011118	5.5 to 6.0	Z layer archive	
	2	33° 36.453'	117° 54.375'	-11.5	-17	7.0	6.5	-17.0	BIME-04-T-011118	0 to 3.0	Upper composite	N/A
									BIME-04-M-011118	3.0 to 5.5	Lower composite	
	3	33° 36.453'	117° 54.375'	-11.5	-17	7.0	6.5	-17.0	BIME-04-T-011118	0 to 3.0	Upper composite	N/A
									BIME-04-M-011118	3.0 to 5.5	Lower composite	
	4	33° 36.453'	117° 54.375'	-11.5	-17	7.0	6.6	-17.0	BIME-04-T-011118	0 to 3.0	Upper composite	N/A
									BIME-04-M-011118	3.0 to 5.5	Lower composite	
BIMW-01	1	33° 36.457'	117° 54.541'	-11.8	-17	8.7	7.6	-17.0	BIMW-01-T-010818	0 to 3.0	Archive, upper composite	N/A
									BIMW-01-M-010818	3.0 to 5.2	Archive, lower composite	
									BIMW-01-Z-010818	5.2 to 5.7	Z layer archive	

Station ID	Attempt	Latitude (Degrees, Decimal Minutes)[1]	Longitude (Degrees Decimal Minutes)[1]	Mudline Elevation (feet MLLW)	Project Depth Plus Allowable Overdepth (feet MLLW)	Estimated Penetration (feet)	Retrieved Core Length (feet)	Depth Analyzed in Composite (feet MLLW)	Sample ID	Sample Interval (feet)	Analysis	Notes
	2	33° 36.457'	117° 54.541'	-11.8	-17	6.2	5.5	-17.0	BIMW-01-T-010818	0 to 3.0	Upper composite	N/A
									BIMW-01-M-010818	3.0 to 5.2	Lower composite	
	3	33° 36.457'	117° 54.541'	-11.8	-17	6.2	5.2	-17.0	BIMW-01-T-010818	0 to 3.0	Upper composite	N/A
									BIMW-01-M-010818	3.0 to 5.2	Lower composite	
	4	33° 36.457'	117° 54.541'	-11.8	-17	6.2	5.7	-17.0	BIMW-01-T-010818	0 to 3.0	Upper composite	N/A
									BIMW-01-M-010818	3.0 to 5.2	Lower composite	
BIMW-02	1	33° 36.473'	117° 54.458'	-11.6	-17	7.8	7.4	-17.0	BIMW-02-T-010918	0 to 3.0	Archive, upper composite	N/A
									BIMW-02-M-010918	3.0 to 5.4	Archive, lower composite	
									BIMW-02-Z-010918	5.4 to 5.9	Z layer archive	
	2	33° 36.473'	117° 54.458'	-11.6	-17	7.0	5.0	-16.6	BIMW-02-T-010918	0 to 3.0	Upper composite	N/A
									BIMW-02-M-010918	3.0 to 5.0	Lower composite	
	3	33° 36.473'	117° 54.458'	-11.6	-17	6.4	6.2	-17.0	BIMW-02-T-010918	0 to 3.0	Upper composite	N/A
									BIMW-02-M-010918	3.0 to 5.4	Lower composite	
	4	33° 36.473'	117° 54.458'	-11.6	-17	6.4	5.3	-16.9	BIMW-02-T-010918	0 to 3.0	Upper composite	N/A
									BIMW-02-M-010918	3.0 to 5.3	Lower composite	
BIMW-03	1	33° 36.447'	117° 54.567'	-11.9	-17	8.1	7.1	-17.0	BIMW-03-T-011018	0 to 3.0	Archive, upper composite	N/A
									BIMW-03-M-011018	3.0 to 5.1	Archive, lower composite	
									BIMW-03-Z-011018	5.1 to 5.6	Z layer archive	
	2	33° 36.447'	117° 54.567'	-11.9	-17	6.1	5.9	-17.0	BIMW-03-T-011018	0 to 3.0	Upper composite	N/A
									BIMW-03-M-011018	3.0 to 5.1	Lower composite	
	3	33° 36.447'	117° 54.567'	-11.9	-17	6.1	5.9	-17.0	BIMW-03-T-011018	0 to 3.0	Upper composite	N/A
									BIMW-03-M-011018	3.0 to 5.1	Lower composite	
	4	33° 36.447'	117° 54.567'	-11.9	-17	6.1	4.9	-16.8	BIMW-03-T-011018	0 to 3.0	Upper composite	N/A
									BIMW-03-M-011018	3.0 to 4.9	Lower composite	
BIMW-04	1	33° 36.433'	117° 54.471'	-12.1	-17	8.4	6.5	-17.0	BIMW-04-T-011018	0 to 3.0	Archive, upper composite	Refusal
									BIMW-04-M-011018	3.0 to 4.9	Archive, lower composite	
									BIMW-04-Z-011018	4.9 to 5.4	Z layer archive	
	2	33° 36.433'	117° 54.471'	-12.1	-17	8.1	6.9	-17.0	BIMW-04-T-011018	0 to 3.0	Upper composite	N/A
									BIMW-04-M-011018	3.0 to 4.9	Lower composite	
	3	33° 36.433'	117° 54.471'	-12.1	-17	6.5	5.7	-17.0	BIMW-04-T-011018	0 to 3.0	Upper composite	N/A
									BIMW-04-M-011018	3.0 to 4.9	Lower composite	
	4	33° 36.433'	117° 54.471'	-12.1	-17	6.4	5.5	-17.0	BIMW-04-T-011018	0 to 3.0	Upper composite	N/A
									BIMW-04-M-011018	3.0 to 4.9	Lower composite	
BIS-01	1	33° 36.398'	117° 54.568'	-11.8	-17	6.7	6.0	-17.0	BIS-01-011118	0 to 5.2	Archive, composite	Refusal
									BIS-01-Z-011118	5.2 to 5.7	Z layer archive	
	2	33° 36.398'	117° 54.568'	-11.8	-17	6.2	5.8	-17.0	BIS-01-011118	0 to 5.2	Composite	N/A
BIS-02	1	33° 36.385'	117° 54.481'	-11.9	-17	7.1	6.9	-17.0	BIS-02-011118	0 to 5.1	Archive, composite	N/A
									BIS-02-Z-011118	5.1 to 5.6	Z layer archive	
	2	33° 36.385'	117° 54.481'	-11.9	-17	6.6	5.1	-17.0	BIS-02-011118	0 to 5.1	Composite	N/A
BIS-03	1	33° 36.376'	117° 54.602'	-11.6	-17	7.4	6.6	-17.0	BIS-03-011118	0 to 5.4	Archive, composite	N/A
									BIS-03-Z-011118	5.4 to 5.9	Z layer archive	
	2	33° 36.376'	117° 54.602'	-11.6	-17	6.9	6.1	-17.0	BIS-03-011118	0 to 5.4	Composite	N/A
BIS-04	1	33° 36.357'	117° 54.532'	-11.8	-17	7.2	6.8	-17.0	BIS-04-011118	0 to 5.2	Archive, composite	N/A
									BIS-04-Z-011118	5.2 to 5.7	Z layer archive	
	2	33° 36.357'	117° 54.532'	-11.8	-17	6.7	5.4	-17.0	BIS-04-011118	0 to 5.2	Composite	N/A
EC-01	1	33° 35.737'	117° 52.786'	-18.0	-22	3.0	2.7	-20.7	EC-01-011718	0 to 2.7	Archive, grain size, composite	Refusal
	2	33° 35.737'	117° 52.786'	-18.0	-22	3.7	3.3	-21.3	EC-01-011718	0 to 3.3	Composite	Refusal
	3	33° 35.737'	117° 52.786'	-18.0	-22	4.3	3.3	-21.3	EC-01-011718	0 to 3.3	Composite	Refusal

Station ID	Attempt	Latitude (Degrees, Decimal Minutes)[1]	Longitude (Degrees Decimal Minutes)[1]	Mudline Elevation (feet MLLW)	Project Depth Plus Allowable Overdepth (feet MLLW)	Estimated Penetration (feet)	Retrieved Core Length (feet)	Depth Analyzed in Composite (feet MLLW)	Sample ID	Sample Interval (feet)	Analysis	Notes
EC-02	1	33° 35.638'	117° 52.752'	-10.1	-22	1.0	0.0	N/A	N/A	N/A	N/A	Refusal; sample washed out
	2	33° 35.638'	117° 52.752'	-10.1	-22	2.0	1.8	-11.9	EC-02-011718	0 to 1.8	Composite	Refusal
	3	33° 35.638'	117° 52.752'	-10.1	-22	2.0	1.6	-11.7	EC-02-011718	0 to 1.6	Composite	Refusal
	4	33° 35.638'	117° 52.752'	-10.1	-22	2.5	2.2	-12.3	EC-02-011718	0 to 2.2	Archive, grain size, composite	Refusal
EC-03	1	33° 35.535'	117° 52.715'	-14.9	-22	3.5	2.5	-17.4	EC-03-11718	0 to 2.5	Archive, grain size, composite	Refusal; core tube bent
	2	33° 35.535'	117° 52.715'	-14.9	-22	2.5	1.6	-16.5	EC-03-11718	0 to 1.6	Composite	Refusal; core tube cracked (liner intact)
	3	33° 35.535'	117° 52.715'	-14.9	-22	2.5	1.6	-16.5	EC-03-11718	0 to 1.6	Composite	Refusal
EC-04	1	33° 35.430'	117° 52.687'	-16.6	-22	NR	6.1	-22.0	EC-04-011718	0 to 5.4	Archive, grain size, composite	Refusal; core tube bent
									EC-04-Z-011718	5.4 to 5.9	Z layer archive	
	2	33° 35.430'	117° 52.687'	-16.6	-22	3.0	1.5	-18.1	EC-04-011718	0 to 1.5	Composite	Refusal
	3	33° 35.430'	117° 52.687'	-16.6	-22	3.0	1.6	-18.2	EC-04-011718	0 to 1.6	Composite	Refusal
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NC1-01	1	33° 36.547'	117° 55.450'	-12.3	-17	3.3	2.2	N/A	N/A	N/A	N/A	Refusal; core tube bent; sample discarded
	2	33° 36.550'	117° 55.458'	-12.3	-17	2.8	2.4	N/A	N/A	N/A	N/A	Refusal; sample discarded
	3	33° 36.549'	117° 55.451'	-12.7	-17	10.0	3.2	-15.9	NC1-01-012319	0 to 3.2	Chemistry	Refusal
									NC1-01-Z-012319	2.6 to 3.2	Archive of bottom 0.5 feet[2]	
NC1-02	1	33° 36.537'	117° 55.371'	-12.4	-17	10.0	6.6	-17.5[3]	NC1-02-012319	0 to 5.1[3]	Chemistry	N/A
									NC1-02-Z-012319	5.1 to 5.6[4]	Z layer archive	
	2	33° 36.548'	117° 55.371'	-12.9	-17	10.0	4.8	N/A	N/A	N/A	N/A	Sample discarded
NC1-03	1	33° 36.526'	117° 55.277'	-11.4	-17	5.0	3.4	-14.8	NC1-03-012319	0 to 3.4	Composite	Refusal
	2	33° 36.527'	117° 55.277'	-11.2	-17	5.0	2.6	N/A	N/A	N/A	N/A	Refusal; sample discarded
	3	33° 36.527'	117° 55.278'	-11.2	-17	5.0	3.6	-14.8	NC1-03-012319	0 to 3.6	Chemistry, composite	Refusal
									NC1-03-Z-012319	3.1 to 3.6	Archive of bottom 0.5 feet[2]	
NC1-04	1	33° 36.512'	117° 55.171'	-11.2	-17	6.0	3.8	-15.0	NC1-04-012319	0 to 3.8	Chemistry, composite	Refusal
									NC1-04-Z-012319	3.3 to 3.8	Archive of bottom 0.5 feet[2]	
	2	33° 36.513'	117° 55.173'	-11.3	-17	6.0	3.6	-14.9	NC1-04-012319	0 to 3.6	Composite	N/A
NC2-01	1	33° 36.496'	117° 55.076'	-10.0	-17	4.9	2.6	-12.6	NC2-01-012419	0 to 2.6	Composite	Refusal
	2	33° 36.496'	117° 55.077'	-10.4	-17	5.3	2.5	-12.9	NC2-01-012419	0 to 2.5	Chemistry, composite	Refusal; core tube bent
									NC2-01-Z-012419	2.0 to 2.5	Archive of bottom 0.5 feet[2]	
	3	33° 36.495'	117° 55.078'	-10.3	-17	4.4	2.3	N/A	N/A	N/A	N/A	Refusal; core tube bent; sample discarded
NC2-02	1	33° 36.490'	117° 55.013'	-11.1	-17	6.6	3.7	-14.8	NC2-02-012419	0 to 3.7	Composite	Refusal
	2	33° 36.490'	117° 55.013'	-11.0	-17	7.8	3.7	-14.7	NC2-02-012419	0 to 3.7	Chemistry, composite	Refusal
									NC2-02-Z-012419	3.2 to 3.7	Archive of bottom 0.5 feet[2]	
	3	33° 36.491'	117° 55.014'	-11.0	-17	7.2	3.0	N/A	N/A	N/A	N/A	Refusal; sample discarded
NC2-03	1	33° 36.473'	117° 54.972'	-11.6	-17	6.7	3.3	-14.9	NC2-03-012419	0 to 3.3	Composite	Refusal
	2	33° 36.474'	117° 54.972'	-11.4	-17	8.6	3.0	N/A	N/A	N/A	N/A	Refusal; sample discarded
	3	33° 36.474'	117° 54.972'	-11.2	-17	7.3	4.7	-15.9	NC2-03-012419	0 to 4.7	Chemistry, composite	Refusal
									NC2-03-Z-012419	4.2 to 4.7	Archive of bottom 0.5 feet[2]	
NC2-04	1	33° 36.480'	117° 54.904'	-10.7	-17	7.2	4.5	-15.2	NC2-04-012219	0 to 4.5	Chemistry, composite	Refusal; slightly moved due to vessel
									NC2-04-Z-012219	4.0 to 4.5	Archive of bottom 0.5 feet[2]	
	2	33° 36.481'	117° 54.904'	-10.6	-17	8.0	4.0	N/A	N/A	N/A	N/A	Sample discarded
	3	33° 36.481'	117° 54.904'	-10.5	-17	8.0	4.3	-14.8	NC2-04-012219	0 to 4.3	Composite	Refusal

Station ID	Attempt	Latitude (Degrees, Decimal Minutes)[1]	Longitude (Degrees Decimal Minutes)[1]	Mudline Elevation (feet MLLW)	Project Depth Plus Allowable Overdepth (feet MLLW)	Estimated Penetration (feet)	Retrieved Core Length (feet)	Depth Analyzed in Composite (feet MLLW)	Sample ID	Sample Interval (feet)	Analysis	Notes
NC3-01	1	33° 36.485'	117° 54.835'	-10.7	-17	7.8	3.4	N/A	N/A	N/A	N/A	Refusal; sample discarded
	2	33° 36.485'	117° 54.836'	-10.8	-17	7.6	4.9	-15.7	NC3-01-012219	0 to 4.9	Chemistry, composite	Refusal
									NC3-01-Z-012219	4.4 to 4.9	Archive of bottom 0.5 feet[2]	
	3	33° 36.486'	117° 54.835'	-10.8	-17	8.0	4.1	-14.9	NC3-01-012219	0 to 4.1	Composite	Refusal
NC3-02	1	33° 36.478'	117° 54.763'	-10.9	-17	8.6	6.3	-17.0	NC3-02-012219	0 to 6.1	Chemistry, composite	N/A
									NC3-02-Z-012219	6.1 to 6.3	Z layer archive	
	2	33° 36.479'	117° 54.764'	-10.9	-17	9.0	6.1	-17.0	NC3-02-012219	0 to 6.1	Composite	N/A
NC3-03	1	33° 36.494'	117° 54.685'	-10.1	-17	7.6	2.8	N/A	N/A	N/A	N/A	Refusal; sample discarded
	2	33° 36.494'	117° 54.685'	-10.1	-17	7.6	5.6	-15.7	NC3-03-012219	0 to 5.6	Chemistry, composite	Refusal
									NC3-03-Z-012219	5.1 to 5.6	Archive of bottom 0.5 feet[2]	
	3	33° 36.494'	117° 54.686'	-10.1	-17	7.8	4.4	-14.5	NC3-03-012219	0 to 4.4	Composite	Refusal
NC3-04	1	33° 36.499'	117° 54.596'	-10.6	-17	4.9	0.0	N/A	N/A	N/A	N/A	Refusal; core tube bent; no recovery
	2	33° 36.499'	117° 54.596'	-11.1	-17	7.6	4.5	-15.6	NC3-04-012319	0 to 4.5	Chemistry, composite	Refusal
									NC3-04-Z-012319	4.0 to 4.5	Archive of bottom 0.5 feet[2]	
	3	33° 36.499'	117° 54.597'	-11.2	-17	8	3.6	-14.8	NC3-04-012319	0 to 3.6	Composite	Refusal
	4	33° 36.499'	117° 54.597'	-11.1	-17	7.8	3.4	N/A	N/A	N/A	N/A	Sample discarded

Notes:
1. Based on North American Datum 1983
2. Z layer depth was not achieved; archived bottom 0.5 foot.
3. Additional 0.5 foot beyond overdepth inadvertently retained in composite sample.
4. Z-layer sample inadvertently collected 0.5 foot below actual Z-layer.

Table 3
Sediment Sample Compositing Scheme and Testing Strategy for Sediment Cores from January 2018 Sampling Event

Dredge Unit	Composite Sample ID	Core ID	Archive	Grain Size Sieve Analysis, Hydrometer Analysis, and Atterberg Limits[1]	Sediment Chemistry	Tier III Biological Testing[2]
Turning Basin	TB-COMP	TB-01 TB-02 TB-03 TB-04 TB-05	Individual cores and Z-layers	N/A	Composite	Composite
Main Channel North 1	MCN1-COMP-T	MCN1-01-T MCN1-02-T MCN1-03-T MCN1-04-T	Individual cores and Z-layers	N/A	Composite	Composite
Main Channel North 2	MCN2-COMP-T	MCN2-01-T MCN2-02-T MCN2-03-T MCN2-04-T	Individual cores and Z-layers	N/A	Composite	Composite
Main Channel North 3	MCN3-COMP	MCN3-01 MCN3-02 MCN3-03 MCN3-04	Individual cores and Z-layers	N/A	Composite	Composite
Main Channel North 4	MCN4-COMP	MCN4-01 MCN4-02 MCN4-03 MCN4-04	Individual cores and Z layers	N/A	Composite	Composite
Main Channel North 5	MCN5-COMP	MCN5-01 MCN5-02 MCN5-03 MCN5-04	Individual cores and Z-layers	N/A	Composite	Composite
Bay Island North	BIN-COMP-T	BIN-01-T BIN-02-T BIN-03-T BIN-04-T BIN-05-T	Individual cores and Z-layers	N/A	Composite	Composite

Dredge Unit	Composite Sample ID	Core ID	Archive	Grain Size Sieve Analysis, Hydrometer Analysis, and Atterberg Limits[1]	Sediment Chemistry	Tier III Biological Testing[2]
Bay Island Middle East	BIME-COMP-T (upper interval)	BIME-01-T BIME-02-T BIME-03-T BIME-04-T	Upper core intervals (mudline to 3 feet below the mudline)	N/A	Upper composite	Based on sediment chemistry results, upper and lower composites were combined for biological testing
	BIME-COMP-M (lower interval)	BIME-01-M BIME-02-M BIME-03-M BIME-04-M	Lower core intervals (3 feet below the mudline to design depth plus overdepth allowance) and Z-layers	N/A	Lower composite	
Bay Island Middle West	BIMW-COMP-T (upper interval	BIMW-01-T BIMW-02-T BIMW-03-T BIMW-04-T	Upper core intervals (mudline to 3 feet below the mudline)	N/A	Upper composite	Based on sediment chemistry results, upper and lower composites were combined for biological testing
	BIMW-COMP-M (lower interval)	BIMW-01-M BIMW-02-M BIMW-03-M BIMW-04-M	Lower core intervals (3 feet below the mudline to design depth plus overdepth allowance) and Z-layers	N/A	Lower composite	
Bay Island South	BIS-COMP	BIS-01 BIS-02 BIS-03 BIS-04	Individual cores and Z-layers	N/A	Composite	Composite
Entrance Channel	EC-COMP	EC-01 EC-02 EC-03 EC-04	Individual cores and Z-layers	Grain size on individual cores or core intervals if stratification observed; Atterberg limits and hydrometer analysis on fine-grained intervals	Composite	Composite
N/A	LA-3 ODMDS Reference	N/A	N/A	N/A	Yes	Yes (SP and BP testing only)

Notes:
1. Compatibility analysis for nearshore placement
2. Biological testing for ocean disposal

Table 4
Sediment Sample Compositing Scheme and Testing Strategy for Sediment Cores from January 2019 Sampling Event

Dredge Unit	Composite Sample ID	Core ID	Archive	Sediment Chemistry	Tier III Biological Testing[1]
Newport Channel 1	N/A	NC1-01 NC1-02	Individual Z-layers	Individual cores	N/A
Newport Channel 2	NC2-COMP	NC1-03 NC1-04 NC2-01 NC2-02 NC2-03 NC2-04	Individual Z-layers	Individual cores and composite	Composite
Newport Channel 3	NC3-COMP	NC3-01 NC3-02 NC3-03 NC3-04	Individual Z-layers	Individual cores and composite	Composite
N/A	LA-3 ODMDS Reference	N/A	N/A	Yes	Yes (SP and BP testing only)

Note:
1. Biological testing for ocean disposal

2.1.1.3 Sediment Core Sampling and Handling

All sediment samples were placed into jars appropriate for physical and chemical analyses. Biological testing samples were placed into clean food-grade polyethylene bags. Physical, chemical, and biological samples were stored in coolers with ice and delivered to the appropriate laboratories for analysis. Chemistry samples were delivered to Eurofins Calscience, Inc., located in Garden Grove, California. Biological testing samples were delivered to Enthalpy Analytical (formerly Nautilus Environmental), in San Diego, California. Grain size sieve analysis samples were stored at ambient temperatures and delivered to Smith-Emery Laboratories in Los Angeles, California. Proper chain-of-custody procedures were followed.

2.1.2 Reference and Site Water Sampling

Reference sediment and site water was collected for both sediment core sampling events. Reference sediment was collected on January 6, 2018, and February 12, 2019. Site water was collected on January 8 and 17, 2018, and January 24, 2019. Reference material was collected by Seaventures Inc., at the LA-3 ODMDS reference site using a pipe dredge. Site water was collected from LNB using a Van Dorn bottle and transferred to low-density polyethylene cubitainers.

2.1.3 Nearshore Receiver Site Grab Sampling

Nearshore receiver site surface sediment grab samples were collected as part of the City's Regional General Permit 54 sediment characterization program on February 2 and March 8, 2018 (Anchor QEA 2018b). Grab samples were collected at 32 stations along four transects perpendicular to the shore. Stations were positioned at 6-foot increments in elevation from 12 to -30 feet MLLW. Based on a request from the City, four additional stations were sampled at an elevation of -36 feet MLLW. The deeper sampling locations were included due to potential health and safety concerns with material placement near existing piers.[1] Grab sampling locations are shown in Figure 17. Station coordinates and mudline elevation for each station are summarized in Table 5. Field logs are provided in Appendix A.

Grab samples above the water line were collected using a stainless-steel scoop. Grab samples below the water line were collected using a stainless-steel scoop by wading out into the water or using a petite Ponar grab sampler deployed from Anchor QEA's sampling vessel. A 1-liter subsample of each grab was collected for grain size analysis and placed in a zip-top bag. Grain size samples were stored in coolers at ambient temperature and delivered to Smith-Emery Laboratories, located in Los Angeles, California. Proper chain-of-custody procedures were followed.

Table 5
Station Coordinates and Mudline Elevations for Each Station from Nearshore Receiver Site

Transect	Station ID	Latitude (Degrees, Decimal Minutes)[1]	Longitude (Degrees Decimal Minutes)[1]	Mudline Elevation (feet MLLW)	Sample ID	Analysis
A	A-01	33˚ 36.386'	117˚ 55.610'	12	A-01-020218	Grain size
	A-02	33˚ 36.358'	117˚ 55.622'	6	A-02-020218	Grain size
	A-03	33˚ 36.338'	117˚ 55.630'	0	A-03-020218	Grain size
	A-04	33˚ 36.329'	117˚ 55.633'	-6	A-04-020218	Grain size
	A-05	33˚ 36.250'	117˚ 55.680'	-12	A-05-030718	Grain size
	A-06	33˚ 36.232'	117˚ 55.676'	-18	A-06-030718	Grain size
	A-07	33˚ 36.201'	117˚ 55.686'	-24	A-07-030718	Grain size
	A-08	33˚ 36.179'	117˚ 55.703'	-30	A-08-030718	Grain size
	A-09	33˚ 36.148'	117˚ 55.71'	-36	A-09-030718	Grain size
B	B-01	33˚ 36.228'	117˚ 54.934'	12	B-01-020218	Grain size
	B-02	33˚ 36.224'	117˚ 54.935'	6	B-02-020218	Grain size
	B-03	33˚ 36.206'	117˚ 54.935'	0	B-03-020218	Grain size
	B-04	33˚ 36.198'	117˚ 54.948'	-6	B-04-020218	Grain size

[1] Percent fines of deeper stations were within the range of the other elevations and, therefore, did not affect the overall grain size envelope.

Transect	Station ID	Latitude (Degrees, Decimal Minutes)[1]	Longitude (Degrees Decimal Minutes)[1]	Mudline Elevation (feet MLLW)	Sample ID	Analysis
B	B-05	33˚ 36.172'	117˚ 54.995'	-12	B-05-030718	Grain size
	B-06	33˚ 36.157'	117˚ 54.994'	-18	B-06-030718	Grain size
	B-07	33˚ 36.130'	117˚ 55.004'	-24	B-07-030718	Grain size
	B-08	33˚ 36.113'	117˚ 55.012'	-30	B-08-030718	Grain size
	B-09	33˚ 36.068'	117˚ 55.018'	-36	B-09-030718	Grain size
C	C-01	33˚ 36.054'	117˚ 54.160'	12	C-01-020218	Grain size
	C-02	33˚ 36.049'	117˚ 54.164'	6	C-02-020218	Grain size
	C-03	33˚ 36.038'	117˚ 54.170'	0	C-03-020218	Grain size
	C-04	33˚ 36.032'	117˚ 54.171'	-6	C-04-020218	Grain size
	C-05	33˚ 35.998'	117˚ 54.182'	-12	C-05-020219	Grain size
	C-06	33˚ 35.974'	117˚ 54.190'	-18	C-06-020220	Grain size
	C-07	33˚ 35.946'	117˚ 54.205'	-24	C-07-020221	Grain size
	C-08	33˚ 35.922'	117˚ 54.215'	-30	C-08-020222	Grain size
	C-09	33˚ 35.893'	117˚ 54.222'	-36	C-09-030718	Grain size
D	D-01	33˚ 35.839'	117˚ 53.516'	12	D-01-020218	Grain size
	D-02	33˚ 36.831'	117˚ 53.519'	6	D-02-020218	Grain size
	D-03	33˚ 35.823'	117˚ 53.523'	0	D-03-020218	Grain size
	D-04	33˚ 35.818'	117˚ 53. 525'	-6	D-04-020218	Grain size
	D-05	33˚ 35.775'	117˚ 53.546'	-12	D-05-030718	Grain size
	D-06	33˚ 35.748'	117˚ 53.550'	-18	D-06-030718	Grain size
	D-07	33˚ 35.737'	117˚ 53.559'	-24	D-07-030718	Grain size
	D-08	33˚ 35.700'	117˚ 53.563'	-30	D-08-030718	Grain size
	D-09	33˚ 35.664'	117˚ 53.569'	-36	D-09-030718	Grain size

Note:
1. Based on North American Datum 1983

2.2 Physical and Chemical Analyses of Sediment

Physical and chemical analyses of sediment in this testing program were selected to determine the suitability of proposed dredged material for ocean disposal or nearshore placement. Composite samples, individual cores from Newport Channel, and reference sediment were submitted for analysis of total solids, grain size, total organic carbon (TOC), metals, PAHs, PCB congeners, organochlorine pesticides, organotins, and pyrethroids. Based on composite sample results, archives from individual cores were analyzed for mercury, PCB, and DDTs to further delineate the extent of contamination (Table 6). Based on individual core sample results from Newport Channel, composite samples were created for physical and chemical analyses and biological testing. PCBs included the Southern

California Coastal Water Research Project list of 41 congeners used for the Bight '13 Regional Monitoring Program, which is the same list used in Southern California Total Maximum Daily Loads and recommended by USEPA for dredge material evaluations in Southern California.

All analytical methods used followed USEPA, Standard Method, or ASTM International protocols. Analytical methods and target method detection limits (MDLs) and reporting limits (RLs) are presented in Table 7 of the SAP (Anchor QEA 2017a). Results of chemical analyses were compared to effects range low (ERL) and effects range median (ERM) values developed by Long et al. (1995). In addition, mercury concentrations were compared to the USEPA-recommended threshold of 1 milligram per kilogram (mg/kg).

Table 6
Summary of Analysis Performed on Individual Core Archive Samples

Dredge Unit	Individual Core Chemistry
Turning Basin	Mercury, PCBs
Main Channel North 1	Mercury, DDTs
Main Channel North 2	Mercury, DDTs,
Main Channel North 3	Mercury, DDTs
Main Channel North 4	DDTs
Main Channel North 5	N/A
Bay Island North	DDTs
Bay Island Middle East	DDTs
Bay Island Middle West	DDTs
Bay Island South	DDTs
Entrance Channel	N/A

2.3 Biological Testing

Biological testing was conducted to determine suitability of proposed dredged material for ocean disposal at the USEPA-designated LA-3 ODMDS. Testing included two solid phase (SP), three suspended particulate phase (SPP), and two bioaccumulation potential (BP) tests, as specified in Table 7. All testing was performed by Enthalpy Analytical (formerly Nautilus Environmental). In January 2018, reference sediment and 11 composite samples from the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel were submitted for testing. In January 2019, reference sediment and two composite samples from Newport Channel were submitted for testing. Control samples were tested with each species to evaluate test acceptability. All testing was performed in accordance with OTM (USEPA/USACE 1991) guidelines. Test methods, conditions, and acceptability criteria are presented in the SAP (Anchor QEA 2017a).

Table 7
Summary of Biological Testing Performed on Composite Sediment Samples

Test Type	Organism		Reference Sediment	Control Material	Reference Toxicant Test
	Type	Taxon			
SP	Amphipod	*Ampelisca abdita*	LA-3 ODMDS	Native or clean sediment	Cadmium chloride and ammonium chloride
	Polychaete	*Neanthes arenaceodentata*	LA-3 ODMDS	Native or clean sediment	Cadmium chloride
SPP	Bivalve larvae	*Mytilus galloprovincialis*	N/A	Filtered seawater	Ammonium chloride
	Inland silverside fish	*Menidia beryllina*	N/A	Filtered seawater	Copper chloride
	Mysid shrimp	*Americamysis bahia*	N/A	Filtered seawater	Copper chloride
BP	Clam	*Macoma nasuta*	LA-3 ODMDS	Native or clean sediment	N/A
	Polychaete	*Nereis virens*	LA-3 ODMDS	Native or clean sediment	NA

Interstitial ammonia concentrations were measured on project sediments prior to testing. Ammonia concentrations in composite samples from Bay Island North (21.7 milligrams per liter [mg/L]), Bay Island Middle East (26.1 mg/L), Bay Island Middle West (27.8 mg/L), and Bay Island South (26.1 mg/L) were at levels of potential concern for the amphipod SP test (greater than 15 mg/L; USACE et al. 2001). Test sediments were purged to reduce the ammonia concentrations prior to testing by performing daily seawater exchanges per ITM guidance (USEPA/USACE 1998). The test was initiated following 5 days of acclimation when interstitial ammonia concentrations were reduced to 14.0, 17.2, 18.2, and 19.2 mg/L, respectively. In addition, a water-only ammonia reference toxicant test was conducted with the amphipod test to evaluate the contribution of elevated ammonia concentrations on test organism survival. An ammonia reference toxicant test was also run with the bivalve larval development bioassay due to the sensitivity of *Mytilus galloprovincialis* to elevated ammonia concentrations.

2.4 Chemical Analysis of Tissue Residues

Chemical analysis of tissue residues was conducted to determine the bioaccumulation of sediment contaminants. Based on results of sediment chemistry, a subset of chemicals was approved by USEPA for analysis (Appendix B). Tissue samples were analyzed for lipids, mercury, dibutyltin, DDTs, and PCBs (Table 8). Due to the high percentage of sand (98.12%) and low concentrations of contaminants (all concentrations less than the ERL), tissue analysis was not required for the Entrance Channel. Composite samples from each replicate were analyzed separately. Analytical methods and target MDLs and RLs for tissues (reported in wet weight) are presented in Table 7 of the SAP (Anchor QEA 2017a).

Table 8
Summary of Analysis Performed on Tissue Samples

Dredge Unit	Tissue Analysis
Time Zero (T0)	Lipids, Mercury, Dibutyltin, DDTs, PCBs
LA3-REF	Lipids, Mercury, Dibutyltin, DDTs, PCBs
Turning Basin	Lipids, Mercury, Dibutyltin, DDTs, PCBs
Main Channel North 1	Lipids, Mercury, DDTs, PCBs
Main Channel North 2	Lipids, Mercury, DDTs, PCBs
Main Channel North 3	Lipids, Mercury, DDTs, PCBs
Main Channel North 4	Lipids, Mercury, DDTs, PCBs
Main Channel North 5	Lipids, Mercury, DDTs, PCBs
Bay Island North	Lipids, Mercury, DDTs, PCBs
Bay Island Middle East	Lipids, Mercury, DDTs, PCBs
Bay Island Middle West	Lipids, Mercury, DDTs, PCBs
Bay Island South	Lipids, Mercury, DDTs
Entrance Channel	N/A
Newport Channel 2	Lipids, Mercury
Newport Channel 3	Lipids, Mercury

Results of chemical analysis of tissue residues were initially compared against applicable U.S. Food and Drug Administration (FDA) action levels for poisonous or deleterious substances in fish and shellfish for human food, when such levels have been set. In the absence of action levels, or if tissue contaminant concentrations were less than action levels, results were statistically compared to tissue concentrations of organisms exposed to reference sediment in accordance with Section 13.3 of the OTM (USEPA/USACE 1991). Tissue organic chemical concentrations were normalized to lipid concentrations prior to analysis. Data were log-transformed if necessary and assessed for normality using the Shapiro-Wilk test. Homogeneity of variance was assessed using Levene's test. Normally or log-normally distributed data were evaluated using analysis of variance (ANOVA) and Dunnett's multiple comparison tests (if applicable). Non-normally distributed data were assessed using the non-parametric Wilcoxon/Kruskal-Wallis tests and non-parametric Wilcoxon multiple comparisons method (if applicable).

No statistical analysis was performed on chemistry data if both project area data and reference data were non-detects or if the mean concentration of the project area sample was less than the mean concentration in the reference sample or the time zero sample. For situations in which all replicates from the reference area were non-detect and detection limits were identical for each replicate within an analyte group, estimated data values were calculated based on a symmetrical breakdown of the data range and in such a way that the mean of the estimates centered around a value one-half of the detection limit. This statistical manipulation of data was required to generate means and variances needed to compare project area data to reference data.

If tissue concentrations of organisms exposed to test sediment were statistically elevated compared to organisms exposed to reference sediment, a weight-of-evidence approach was used. This approach included a comparison to 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 (µg/kg), with the highest concentration measured in the Turning Basin. Tributyltin concentrations were lower, ranging from non- detect to 6.8 µg/kg. Bifenthrin, cyfluthrin, cypermethrin, fluvalinate, and permethrin were measured in at least one composite sample. Several PAHs were detected in composite samples at low concentrations (less than ERL values). Total DDTs exceeded the ERM value in all samples, except the Entrance Channel. Total chlordane exceeded the ERM value in all samples, except the Entrance Channel and Main Channel North 1. Total PCBs exceeded the ERM in the Turning Basin.

Table 9
Results of Physical and Chemical Analyses for Composite Samples from January 2018 Sampling Event

Chemical	ERL	ERM	LA3-REF-010618	TB-COMP-011218	MCN1-COMP-T-011518	MCN2-COMP-T-011618	MCN3-COMP-011918	MCN4-COMP-011918	MCN5-COMP-011818	BIN-COMP-T-011718	BIME-COMP-T-011218	BIME-COMP-M-011218	BIMW-COMP-T-011018	BIMW-COMP-M-011018	BIS-COMP-011218	EC-COMP-011718
Sample Date			1/6/2018	1/12/2018	1/15/2018	1/16/2018	1/19/2018	1/19/2018	1/18/2018	1/17/2018	1/12/2018	1/12/2018	1/10/2018	1/10/2018	1/12/2018	1/18/2018
Matrix			SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
Conventional Parameters (%)																
Total organic carbon	--	--	**2.7**	**1.9**	0.038 U	**0.98**	**1.1 J**	0.032 U	**1.1 J**	**0.66 J**	**1.7**	**1.4**	**1.5**	**1.2**	**1.7**	**0.089 J**
Total solids	--	--	**52.3**	**45.1**	**45.5**	**48.8**	**52.3**	**54.8**	**54.7**	**51.9**	**49.2**	**53.7**	**48.9**	**52.9**	**47.5**	**82.4**
Grain Size (%)																
Gravel (>2 mm)	--	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sand (2.00 mm - 1.00 mm)	--	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**0.27**
Sand, coarse	--	--	**2.28**	0.01 U	0.01 U	0.01 U	**2.8**	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**3.94**
Sand, medium	--	--	**2.44**	0.01 U	0.01 U	**0.22**	**14.85**	**0.64**	**0.092**	**4.14**	**0.01**	0.01 U	0.01 U	**0.02**	0.01 U	**28.92**
Sand, fine	--	--	**5.91**	**7.18**	**4.88**	**6.69**	**6.59**	**10.91**	**5.53**	**13.35**	**1.38**	0.01 U	**2.42**	**5.35**	**0.05**	**56.93**
Sand, very fine	--	--	**12.59**	**10.5**	**3.27**	**7.24**	**7.18**	**14.36**	**9.87**	**8.91**	**10.9**	**1.8**	**7.45**	**8.97**	**8.91**	**8.06**
Silt	--	--	**67.65**	**56.62**	**65.9**	**61.09**	**49.46**	**54.86**	**64.18**	**53.67**	**63.19**	**71.53**	**66.83**	**62.2**	**65.65**	**1.32**
Clay, <5 micron	--	--	**9.14**	**25.7**	**25.94**	**24.76**	**19.12**	**19.23**	**20.33**	**19.98**	**24.53**	**26.67**	**23.29**	**23.47**	**25.4**	**0.55**
Metals (mg/kg)																
Arsenic	8.2	70	**5.27**	**10**	**10.6**	**9.58**	**8.07**	**7.04**	**8.17**	**7.28**	**8.95**	**9.42**	**8.82**	**8.46**	**10.2**	**1.8**
Cadmium	1.2	9.6	**0.824**	**1.41**	**1.7**	**1.94**	**1.74**	**1.85**	**2**	**1.71**	**2.19**	**2.67**	**2.21**	**2.09**	**2.31**	**0.274**
Chromium	81	370	**38.5**	**45.2**	**47.6**	**42.5**	**39.3**	**37.3**	**39.6**	**34.3**	**41.7**	**43**	**43.1**	**41.7**	**41.7**	**6.41**
Copper	34	270	**21**	**127**	**83.7**	**64.1**	**52.1**	**39.9**	**48**	**46.3**	**55.2**	**45.3**	**54.1**	**51.4**	**55.2**	**3.22**
Lead	46.7	218	**9.54**	**85.8**	**50**	**46.8**	**37.3**	**40.4**	**41.6**	**38.9**	**40.2**	**45.2**	**44.4**	**55.5**	**41.3**	**2.47**
Mercury	0.15	0.71	**0.0494**	**3.64**	**1.18**	**1.04**	**0.797**	**0.181**	**0.205**	**0.431**	**0.142**	**0.69**	**0.153**	**0.658**	**0.233**	**0.0125 J**
Nickel	20.9	51.6	**21.6**	**26.6**	**30.3**	**27.5**	**23.7**	**23.5**	**25.4**	**22.8**	**27**	**29.7**	**28.3**	**26.9**	**28.8**	**3.87**
Selenium	--	--	**1.42**	**0.798**	**2.02**	**1.5**	**1.1**	**1.13**	**1.58**	**0.695**	**1.35**	**1.27**	**1.53**	**1.19**	**1.65**	**0.205**
Silver	1	3.7	**0.245**	**0.301**	**0.317**	**0.43**	**0.299**	**0.267**	**0.324**	**0.275**	**0.299**	**0.358**	**0.335**	**0.375**	**0.295**	0.038 U
Zinc	150	410	**82.9**	**208**	**251**	**169**	**143**	**132**	**155**	**144**	**173**	**149**	**174**	**165**	**171**	**17.1**
Organometallic Compounds (µg/kg)																
Butyltin (n-Butyltin)	--	--	2.6 U	3 U	2.9 U	2.8 U	2.6 U	2.4 U	2.5 U	2.7 U	2.8 U	2.6 U	2.8 U	2.6 U	2.9 U	0.83 U
Dibutyltin	--	--	1.4 U	**40**	**22**	**26**	**16**	**22**	**31**	**21**	**3.1 J**	1.4 U	**8.1**	**6.7**	**16**	0.44 U
Tetrabutyltin	--	--	1.4 U	1.6 U	1.6 U	1.5 U	1.4 U	1.3 U	1.3 U	1.4 U	1.5 U	1.4 U	1.5 U	1.4 U	1.6 U	0.45 U
Tributyltin	--	--	2.8 U	**6.8**	3.2 U	3 U	2.8 U	2.6 U	2.6 U	2.9 U	3 U	2.8 U	3 UJ	2.8 U	3.1 U	0.89 U
PAHs (µg/kg)																
1-Methylnaphthalene	--	--	4.4 U	5.2 U	5.1 U	4.7 U	4.4 U	4.2 U	4.2 U	4.4 U	4.7 U	4.3 U	4.8 U	4.4 U	4.9 U	2.8 U
2-Methylnaphthalene	70	670	4.4 U	5.2 U	5.1 U	4.7 U	4.4 U	4.2 U	4.2 U	4.4 U	4.7 U	4.3 U	4.8 U	4.4 U	4.9 U	2.8 U
Acenaphthene	16	500	4.5 U	5.2 U	5.1 U	4.8 U	4.5 U	4.3 U	4.3 U	4.5 U	4.8 U	4.3 U	4.8 U	4.4 U	5 U	2.8 U
Acenaphthylene	44	640	3.4 U	**8.1 J**	3.9 U	3.6 U	3.4 U	3.2 U	3.2 U	3.4 U	3.6 U	3.3 U	3.7 U	3.4 U	3.8 U	2.1 U
Anthracene	85.3	1,100	6.6 U	**19 J**	7.6 U	**7.6 J**	6.6 U	6.3 U	6.3 U	6.6 U	7 U	6.4 U	7.1 U	6.5 U	7.3 U	4.2 U
Benzo(a)anthracene	261	1,600	**7.4 J**	**50**	**17 J**	**16 J**	**14 J**	**17 J**	**18 J**	**16 J**	**16 J**	**14 J**	**16 J**	**17 J**	**22**	2.6 U
Benzo(a)pyrene	430	1,600	**7.9 J**	**130**	**32**	**31**	**24**	**28**	**30**	**25**	**25**	**19**	**25**	**26**	**33**	2.2 U
Benzo(b)fluoranthene	--	--	**8.7 J**	**180**	**43**	**37**	**31**	**34**	**38**	**30**	**33**	**28**	**30**	**35**	**43**	3.3 U
Benzo(g,h,i)perylene	--	--	**11 J**	**120**	**39**	**33**	**22**	**26**	**29**	**30**	**32**	**23**	**34**	**31**	**38**	1.8 U
Benzo(k)fluoranthene	--	--	**6.2 J**	**140**	**30**	**31**	**25**	**31**	**31**	**27**	**23**	**20**	**28**	**28**	**36**	3.3 U
Chrysene	384	2,800	**7.4 J**	**74**	**23**	**21**	**19 J**	**24**	**26**	**22**	**23**	**18 J**	**23**	**22**	**29**	2.7 U
Dibenzo(a,h)anthracene	63.4	260	3.7 U	**32**	**12 J**	**5.7 J**	**7.1 J**	**7 J**	**7.4 J**	**7.7 J**	**8.2 J**	**4.6 J**	**8.1 J**	**7.7 J**	**11 J**	2.3 U
Fluoranthene	600	5,100	**14 J**	**77**	**25**	**25**	**20**	**30**	**29**	**25**	**25**	**20**	**25**	**25**	**34**	2.2 U
Fluorene	19	540	5.9 U	6.9 U	6.8 U	6.4 U	5.9 U	5.6 U	5.7 U	5.9 U	6.3 U	5.8 U	6.4 U	5.9 U	6.6 U	3.7 U

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

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

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

Notes:
All non-detect results are reported at the MDL.
Totals are calculated as the sum of all detected results (U=0). If all results are not detected, the highest limit value is reported as the sum.
Gamma chlordane and trans-chlordane are synonymous and refer to CAS RN 5103-74-2.
Total chlordane is the sum of cis-chlordane, trans-chlordane, cis-nonachlor, trans-nonachlor, and oxychlordane.
Total DDx is the sum of 4,4'-DDD, 4,4'-DDE, 4,4'-DDT 2,4'-DDD, 2,4'-DDE, and 2,4'-DDT.
Total HPAH (9 of 17) is the sum of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthenes, benzo(k)fluoranthenes, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-c,d)pyrene, and pyrene (if analyzed).
Total LPAH (8 of 17) is the sum of 1-methylnaphthalene, 2-methylnapthalene, acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthrene (if analyzed).
Total PCB congeners is the sum of all PCB congeners listed in this table.
Detected concentration is greater than ERL screening level
Detected concentration is greater than ERM screening level
Bold: detected result
Italicized: non-detected concentration is above one or more identified screening levels
J: estimated value
R: rejected
U: compound analyzed but not detected above detection limit

3.1.2 Individual Core Archive Samples from January 2018 Sampling Event

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

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

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

Chemical	ERL	ERM	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			1/12/2018	1/12/2018	1/12/2018	1/12/2018	1/12/2018	1/12/2018	1/15/2018	1/15/2018	1/15/2018	1/15/2018	1/15/2018	1/15/2018	1/15/2018	1/16/2018	1/19/2018	1/19/2018	1/19/2018	1/19/2018	1/19/2018	1/18/2018	1/18/2018
Matrix			SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
Conventional Parameters (%)																							
Total solids	--	--	**57.2**	**57.3**	**51.7**	**43.1**	**44.2**	**52.3**	**43**	**51.1**	**42.8**	**46.6**	**40.4**	**44.7**	**50.6**	**48.1**	**52.1**	**51.4**	**50**	**63.7**	**58.8**	**55.3**	**54.8**
Metals (mg/kg)																							
Mercury	0.15	0.71	**2.54**	**2.72**	**5**	**0.776**	**1.4**	**3.37**	**1.66**	**1.41**	**0.525**	**0.547**	**1.67**	**0.603**	**2.2**	**0.775**	**1.15**	**1.57**	**0.4**	**0.088**	--	--	--
Pesticides (µg/kg)																							
2,4'-DDD (o,p'-DDD)	--	--	--	--	--	--	--	--	**2.2 J**	**5.9**	**3.1**	**4.1**	**7.4**	**4.4**	**2.5**	**4.6**	**7.1**	**4.8**	**4.2**	**1.4 J**	**5.3**	**4.3**	**3.2**
2,4'-DDE (o,p'-DDE)	--	--	--	--	--	--	--	--	**3.3 J**	**5.2**	**4.7**	**6.5**	**9.2**	**6.6**	**3.5 J**	**9.5**	**8.7**	**8.5**	**9.4**	**1.7 J**	**6.6**	**10**	**4.1**
2,4'-DDT (o,p'-DDT)	--	--	--	--	--	--	--	--	0.73 U	0.62 U	0.73 U	0.68 U	0.77 U	0.7 U	0.62 U	0.65 U	0.6 U	0.61 U	0.62 U	0.49 U	0.54 U	0.57 U	0.57 U
4,4'-DDD (p,p'-DDD)	2	20	--	--	--	--	--	--	**6.9**	**35**	**15**	**18**	**40**	**17 J**	**14**	**22**	**37**	**30**	**16 J**	**3.7**	**27**	**15 J**	**12 J**
4,4'-DDE (p,p'-DDE)	2.2	27	--	--	--	--	--	--	**50**	**34**	**63**	**64**	**54**	**81**	**24**	**97**	**57**	**55**	**66**	**18**	**85**	**76**	**67**
4,4'-DDT (p,p'-DDT)	1	7	--	--	--	--	--	--	**8.2**	**4.7**	**5.1 J**	**5**	**7.7**	**6.1**	**4.4**	**7.4**	**5**	**5.7**	**5.4**	**1.1 J**	**4.5**	**2.4**	**1.8**
Total DDx (U = 0)	1.58	46.1	--	--	--	--	--	--	**70.6 J**	**84.8**	**90.9 J**	**97.6**	**118**	**115.1 J**	**48.4 J**	**141**	**115**	**104**	**101 J**	**25.9 J**	**128**	**107.7 J**	**88.1 J**
PCB Congeners (µg/kg)																							
PCB-018	--	--	**5.1**	**3**	**25**	**1.2**	**2.8**	**2.7**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-028	--	--	**5.7**	**4.6**	**29**	**3.1**	**3**	**5.9**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-037	--	--	0.11 U	0.11 U	**4.2**	0.14 U	0.14 U	0.12 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-044	--	--	**7**	**5.2**	**24**	**2.3**	**3**	**5.9**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-049	--	--	**4.3**	**3.5**	**24**	**2.8**	**2.6**	**5.2**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-052	--	--	**9.4**	**6.3**	**32**	**3.7**	**4.4**	**6.9**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-066	--	--	**9.7**	**8.8**	**43**	**5.2**	**4.8**	**9.8**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-070	--	--	**9.7**	**6**	**31**	**2.8**	**3.3**	**6.8**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-074	--	--	**4.8**	**3.9**	**15**	**2.1**	**1.9**	**4**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-077	--	--	**1.5**	0.2 U	**3.2**	**1.6**	0.26 U	**1.6**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-081	--	--	0.16 U	0.16 U	0.17 U	0.21 U	0.2 U	0.17 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-087	--	--	**7.4**	**4**	**5.2**	**2.6**	**2.2**	**4.7**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-099	--	--	**7.2**	**5.5**	**16**	**4.4**	**3.9**	**6.6**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-101	--	--	**16**	**9.6**	**23**	**7.2**	**5.6**	**12**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-105	--	--	**8**	**3.9**	**7.8**	**2.4**	**1.8**	**5.8**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-110	--	--	**15**	**9.3**	**21**	**6.5**	**5**	**12**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-114	--	--	0.13 U	0.13 U	0.14 U	0.17 U	0.17 U	0.14 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-118	--	--	**15**	**9.7**	**20**	**5.9**	**4**	**11**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-119	--	--	0.11 U	0.11 U	0.12 U	0.14 U	0.14 U	0.12 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-123	--	--	0.13 U	0.13 U	0.14 U	0.17 U	0.16 U	0.14 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-126	--	--	0.096 U	0.095 U	0.11 U	0.13 U	0.12 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-128	--	--	**3.8**	0.21 U	**2**	**1.7**	0.27 U	**2.9**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-132/153	--	--	**17**	**10**	**18**	**9.8**	**6.4**	**15**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-138/158	--	--	**18**	**10**	**14**	**8.9**	**5.7**	**14**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-149	--	--	**11**	**7.2**	**9.9**	**6**	**3.6**	**9.4**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-151	--	--	**4.2**	**2.7**	**3.5**	**2.5**	**1.4**	**3.2**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-156	--	--	**2.1**	**1.2**	**1.8**	0.18 U	0.17 U	**2**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-157	--	--	0.15 U	0.15 U	0.16 U	0.2 U	0.19 U	0.16 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-167	--	--	0.23 U	0.23 U	0.26 U	0.31 U	0.3 U	0.25 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-168	--	--	0.25 U	0.25 U	0.28 U	0.33 U	0.32 U	0.27 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-169	--	--	**2**	**1**	**0.95**	0.15 U	0.15 U	**1.5**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-170	--	--	**6.1**	**3.8**	**4.1**	**3.1**	**1.9**	**5.5**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-177	--	--	**2.7**	**2**	**2.6**	**2.2**	0.26 U	**2.5**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-180	--	--	**15**	**6.5**	**8.8**	**6.6**	**3.7**	**12**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-183	--	--	**3.7**	**1.6**	**2**	**2.1**	**0.93**	**2.6**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-187	--	--	**9.3**	**4.1**	**6**	**4.8**	**2.6**	**6.6**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-189	--	--	0.11 U	0.11 U	0.12 U	0.15 U	0.14 U	0.12 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-194	--	--	**7.1**	**2.5**	**2.8**	**2.3**	0.17 U	**4.3**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-201	--	--	**1.8**	0.059 U	0.066 U	0.079 U	0.077 U	**0.66**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-206	--	--	**9.6**	**2.1**	**3**	**1.7**	0.26 U	**3.6**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congener (U = 0)	22.7	180	**239**	**138**	**403**	**106**	**74.5**	**187**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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

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

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

Detected concentration is greater than ERL screening level

Detected concentration is greater than ERM screening level

Bold: detected result

J: estimated value

U: compound analyzed but not detected above detection limit

3.1.3 Individual Core Samples from January 2019 Sampling Event

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

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

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

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

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

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

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

		Sample ID	NC1-01-012319	NC1-02-012319	NC1-03-012319	NC1-04-012319	NC2-01-012419	NC2-02-012419	NC2-03-012419	NC2-04-012219	NC3-01-012219	NC3-02-012219	NC3-03-012219	NC3-04-012319
		Sample Date	1/23/2019	1/23/2019	1/23/2019	1/23/2019	1/24/2019	1/24/2019	1/24/2019	1/22/2019	1/22/2019	1/22/2019	1/22/2019	1/23/2019
		Matrix	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
Chemical	**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	ERL	ERM	NC1-01-012319 1/23/2019 SE	NC1-02-012319 1/23/2019 SE	NC1-03-012319 1/23/2019 SE	NC1-04-012319 1/23/2019 SE	NC2-01-012419 1/24/2019 SE	NC2-02-012419 1/24/2019 SE	NC2-03-012419 1/24/2019 SE	NC2-04-012219 1/22/2019 SE	NC3-01-012219 1/22/2019 SE	NC3-02-012219 1/22/2019 SE	NC3-03-012219 1/22/2019 SE	NC3-04-012319 1/23/2019 SE
PCB-167	--	--	0.23 U	0.22 U	0.2 U	0.22 U	0.21 U	0.23 U	0.19 U	0.22 U	0.19 U	0.21 U	0.17 U	0.17 U
PCB-168	--	--	0.25 U	0.24 U	0.21 U	0.24 U	**3.7**	**5.6**	**3.3**	0.24 U	0.21 U	0.23 U	0.18 U	0.18 U
PCB-169	--	--	0.12 U	0.11 U	0.098 U	0.11 U	0.1 U	0.11 U	0.092 U	0.11 U	0.094 U	0.1 U	0.084 U	0.081 U
PCB-170	--	--	**0.86**	0.19 U	0.17 U	0.19 U	0.18 U	0.19 U	0.16 U	0.19 U	0.16 U	0.18 U	0.14 U	0.14 U
PCB-177	--	--	**0.8**	0.2 U	0.18 U	0.2 U	0.19 U	**1.2**	0.17 U	0.2 U	0.17 U	0.19 U	0.15 U	0.15 U
PCB-180	--	--	**2.2**	**1.7**	**1.7**	0.15 U	**1.8**	**4.2**	**1.6**	0.16 U	**0.66**	0.15 U	0.12 U	0.11 U
PCB-183	--	--	**0.62**	**0.36**	0.14 U	0.16 U	0.15 U	0.16 U	0.13 U	0.16 U	0.14 U	**0.29 J**	0.12 U	0.12 U
PCB-187	--	--	**1.8**	**1.1**	**0.99**	**1.2**	**1.7**	**1.8**	**1.7**	0.17 U	**0.43**	**0.47**	0.13 U	0.13 U
PCB-189	--	--	0.11 U	0.11 U	0.096 U	0.11 U	0.1 U	0.11 U	0.091 U	0.11 U	0.093 U	0.1 U	0.083 U	0.08 U
PCB-194	--	--	0.13 U	0.12 U	0.11 U	0.12 U	0.12 U	0.13 U	0.1 U	0.12 U	0.11 U	0.12 U	0.095 U	0.092 U
PCB-201	--	--	0.06 U	0.057 U	0.051 U	0.057 U	0.054 U	0.059 U	0.048 U	0.058 U	0.049 U	0.054 U	0.044 U	0.042 U
PCB-206	--	--	0.2 U	**0.69**	0.17 U	0.19 U	0.18 U	0.2 U	0.16 U	0.2 U	0.17 U	0.18 U	0.15 U	0.14 U
Total PCB Congener (U = 0)	22.7	180	**41.68**	**26.84**	**10.23**	**3.6**	**13.5**	**18.9**	**8.3**	**3.55**	**6.5 J**	**4.53 J**	**1.07**	**1.45 J**

Notes:
All non-detect results are reported at the MDL.
Totals are calculated as the sum of all detected results (U=0). If all results are not detected, the highest limit value is reported as the sum.
Gamma chlordane and trans-chlordane are synonymous and refer to CAS RN 5103-74-2.
Total chlordane is the sum of cis-chlordane, trans-chlordane, cis-nonachlor, trans-nonachlor, and oxychlordane.
Total DDx is the sum of 4,4'-DDD, 4,4'-DDE, 4,4'-DDT 2,4'-DDD, 2,4'-DDE, and 2,4'-DDT.
Total HPAH (9 of 17) is the sum of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthenes, benzo(k)fluoranthenes, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-c,d)pyrene, and pyrene (if analyzed).
Total LPAH (8 of 17) is the sum of 1-methylnaphthalene, 2-methylnapthalene, acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthrene (if analyzed).
Total PCB congeners is the sum of all PCB congeners listed in this table.
Detected concentration is greater than ERL screening level
Detected concentration is greater than ERM screening level
Bold: detected result
Italicized: non-detected concentration is above one or more identified screening levels
J: estimated value
U: compound analyzed but not detected above detection limit

3.1.4 *Reference and Composite Sediment from January 2019 Sampling Event*

Results of physical and chemical analyses of reference and composite sediment samples from Newport Channel are presented in Table 12. All results are expressed in dry weight unless otherwise indicated.

3.1.4.1 LA-3 ODMDS Reference

Reference sediment results were consistent with the previous reference sample collected in January 2018. Grain size consisted primarily of fines (silt and clay), totaling 82.9%. TOC was measured at a concentration of 2.2%.

Metals, PAHs, pesticides, and PCBs were detected in reference sediment. All metals concentrations were less than ERL values, except nickel. All PAH and PCB concentrations were less than ERL values. One DDT derivative (4,4′-DDE) and total DDTs exceeded ERL values. All concentrations were less than ERM values. Organotins and pyrethroids were not detected in reference sediment.

3.1.4.2 Composite Sediment

Composite sediment from Newport Channel consisted primarily of fines (81.9% and 85.2% silt and clay). TOC was 1.6% and 0.45%.

Metals, organotins, pyrethroids, PAHs, pesticides, and PCBs were detected in composite sediment. All metals were less than the ERM value. Dibutyltin was detected in both samples (13 and 6.6 µg/kg). Bifenthrin was detected in both samples. Several PAHs were detected in composite samples at low concentrations (less than ERL values). Total DDTs were less than the ERM value in both samples. Total PCBs were less than the ERM value in both samples.

Table 12
Results of Physical and Chemical Analyses for Composite Samples from January 2019 Sampling Event

Chemical	Sample ID Sample Date[1] Matrix		LA3-REF-021219 2/12/2019 SE	NC2-COMP 2/25/2019 SE	NC3-COMP 2/25/2019 SE
	ERL	ERM			
Conventional Parameters (%)					
Total organic carbon	--	--	**2.2**	**1.6**	**0.45**
Total solids	--	--	**48.1**	**65.3**	**73.1**
Grain Size (%)					
Gravel (>2 mm)	--	--	0.01 U	0.01 U	0.01 U
Sand (2.00 mm - 1.00 mm)	--	--	0.01 U	0.01 U	0.01 U
Sand, coarse	--	--	0.01 U	0.01 U	0.01 U
Sand, medium	--	--	**0.037**	0.01 U	0.01 U

Chemical	Sample ID Sample Date[1] Matrix ERL	ERM	LA3-REF-021219 2/12/2019 SE	NC2-COMP 2/25/2019 SE	NC3-COMP 2/25/2019 SE
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 ERL	ERM	LA3-REF-021219 2/12/2019 SE	NC2-COMP 2/25/2019 SE	NC3-COMP 2/25/2019 SE
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 UJ	0.75 U
Nonachlor, cis-	--	--	0.54 U	0.39 U	0.35 U
Nonachlor, trans-	--	--	0.56 U	0.41 U	0.36 U
Oxychlordane	--	--	0.56 U	0.41 U	0.36 U
Toxaphene	--	--	19 U	14 U	12 U
Total Chlordane (U = 0)	0.5	6	*1.8 U*	*1.4 U*	*1.2 U*
Total DDx (U = 0)	1.58	46.1	**24.9 J**	**21**	**17.9**
Pyrethroids (µg/kg)					
Allethrin	--	--	0.52 U	0.38 U	0.34 U
Bifenthrin	--	--	0.62 U	**1.1**	**0.69**
Cyfluthrin	--	--	0.52 U	0.38 U	0.34 U
Cypermethrin	--	--	0.52 U	0.38 U	0.34 U
Deltamethrin/Tralomethrin	--	--	0.52 U	0.38 U	0.34 U
Fenpropathrin	--	--	0.52 U	0.38 U	0.34 U
Fenvalerate	--	--	0.52 U	0.38 U	0.34 U
Fluvalinate	--	--	0.52 U	0.38 U	0.34 U
Lambda-cyhalothrin	--	--	0.52 U	0.38 U	0.34 U
Permethrin	--	--	1 U	0.77 U	0.68 U

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-methylnapthalene, acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthrene (if analyzed).
Total PCB congeners is the sum of all PCB congeners listed in this table.
Detected concentration is greater than ERL screening level
Bold: detected result
Italicized: non-detected concentration is above one or more identified screening levels
J: estimated value
U: compound analyzed but not detected above detection limit
1. Based on composite date

3.1.5 Grain Size Compatibility for Nearshore Placement

Individual sediment cores from the Entrance Channel and grab samples from the nearshore receiver site were analyzed for grain size to determine compatibility for nearshore placement. Grain size was determined by sieve analysis. Grain size results for the Entrance Channel and receiver site are presented in Tables 13 and 14, respectively. Raw data for the analysis are presented in the laboratory reports in Appendix C.

Individual cores from the Entrance Channel consisted of 1.1% to 8.9% fines. Sediments were classified as poorly graded sand (SP) or poorly graded sand with silt (SP-SM). Individual grabs from the receiver site consisted of 0.2% to 21.3% fines. Sediments were classified as poorly graded sand (SP), poorly graded sand with silt (SP-SM), or silty sand (SM).

A grain size envelope was developed based on the information in Table 14 using the coarsest and finest gradation curves from the receiver site. Figure 22 illustrates the grain size envelope, represented as the shaded area falling between the coarsest and finest gradation curves from the receiver site. Source material samples were plotted against the grain size envelope to determine compatibility. A comparison of individual cores from the Entrance Channel to the grain size envelope is presented in Figure 23. The grain size distributions for the Entrance Channel fit within the grain size envelope. Percent fines of all stations were within 10% of the finest receiver site sample.

Table 13
Grain Size Results for Entrance Channel

Dredge Unit	Sample ID	Percent Fines[1] Individual Samples	Percent Fines[1] Weighted-Average	Percent Fines[1] Grain Size Envelope[2]
Entrance Channel	EC-01-011718	8.9	3.3	0.2 to 21.3
	EC-02-011718	1.1		
	EC-03-011718	2.7		
	EC-04-011718	1.7		

Notes:
1. Percent passing #200 sieve (less than 0.074 mm)
2. Coarsest and finest gradation curves from the receiver site

Table 14
Grain Size Results for Receiver Site

Transect	Sample ID	Elevation (feet MLLW)	Percent Fines[1]
A	A-01-020218	12	0.8
	A-02-020218	6	0.9
	A-03-020218	0	0.9
	A-04-020218	-6	1.1
	A-05-030718	-12	2.4
	A-06-030718	-18	5.8
	A-07-030718	-24	9.5
	A-08-030718	-30	21.3
	A-09-030718	-36	15.7
B	B-01-020218	12	0.6
	B-02-020218	6	0.7
	B-03-020218	0	0.8
	B-04-020218	-6	0.8
	B-05-030718	-12	5.1
	B-06-030718	-18	6.5
	B-07-030718	-24	6.7
	B-08-030718	-30	11.9
	B-09-030718	-36	21.2
C	C-01-020218	12	0.8
	C-02-020218	6	0.4
	C-03-020218	0	0.7
	C-04-020218	-6	1.1
	C-05-030718	-12	2.5

Transect	Sample ID	Elevation (feet MLLW)	Percent Fines[1]
C	C-06-030718	-18	6.0
	C-07-030718	-24	9.8
	C-08-030718	-30	9.0
	C-09-030718	-36	8.9
D	D-01-020218	12	0.2
	D-02-020218	6	0.3
	D-03-020218	0	0.9
	D-04-020218	-6	1.8
	D-05-030718	-12	1.3
	D-06-030718	-18	6.6
	D-07-030718	-24	6.7
	D-08-030718	-30	3.6
	D-09-030718	-36	3.5
Minimum (Coarsest Limit)			0.2
Maximum (Finest Limit)			21.3

Note:
1. Percent passing #200 sieve (less than 0.074 mm)

3.2 Biological Testing

Biological test results for LNB federal channels sediment are presented below. Testing was performed for both the January 2018 and January 2019 sampling events. January 2018 included the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel. January 2019 included Newport Channel. The laboratory reports, including detailed results and raw data, are provided in Appendix D.

3.2.1 Solid Phase Testing

3.2.1.1 Amphipod Mortality Bioassay

Results of the 10-day amphipod SP tests are summarized in Table 15.

Testing for the January 2018 sampling event was performed in two batches. Mean survival in the controls were 98% and 97%, which met control acceptability criterion. Mean survival in the reference (LA3-REF) was 94%. Survival results in federal channels sediment were compared to survival in the reference to determine suitability for ocean disposal. Mean survival in composite samples ranged from 83% to 99% (Table 15). Lowest survival was measured at Bay Island South; however, an outlier was identified using the Grubbs' test. With the outlier removed, survival was 93.75%. All sample results were within 20% of the reference, indicating that test sediments from the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel are not acutely toxic to marine amphipods.

Testing for the January 2019 sampling event was performed in one batch. Mean survival in the control was 95%, which met control acceptability criterion. Mean survival in the reference (LA3-REF) was 100%. Survival results in Newport Channel sediment were compared to survival in the reference to determine suitability for ocean disposal. Mean survival in composite samples was 94% and 97% (Table 15). Both sample results were within 20% of the reference, indicating that test sediments from Newport Channel are not acutely toxic to marine amphipods.

Table 15
Summary of Solid Phase Test Results Using *Ampelisca abdita*

Treatment	Percent Survival in Test Replicates					Mean Survival (%)	Meets LPC for Ocean Disposal
	Rep A	Rep B	Rep C	Rep D	Rep E		
January 2018 Sampling Event – Batch 1							
Control	100	100	100	95	95	98	N/A
LA3-REF	100	100	100	80	90	94	N/A
TB-COMP	95	100	100	100	100	99	Yes
MCN1-COMP-T	100	95	100	100	95	98	Yes
MCN2-COMP-T	100	100	95	95	100	98	Yes
MCN3-COMP	95	100	100	100	100	99	Yes
MCN4-COMP	95	95	95	90	85	92	Yes
January 2018 Sampling Event – Batch 2							
Control	95	100	100	90	100	97	N/A
MCN5-COMP	90	100	100	85	100	95	Yes
EC-COMP	90	95	95	95	100	95	Yes
BIME-COMP-T-M	100	90	100	100	80	94	Yes
BIMW-COMP-T-M	100	95	100	100	95	98	Yes
BIN-COMP-T	100	90	85	100	100	95	Yes
BIS-COMP	95	95	40[1]	90	95	83	Yes
January 2019 Sampling Event							
Control	100	100	95	90	90	95	N/A
LA3-REF	100	100	100	100	100	100	N/A
NC2-COMP	95	95	100	95	100	**97**	Yes
NC3-COMP	90	95	95	90	100	**94**	Yes

Note:
Bold: value is significantly less than the reference ($p < 0.05$)
LPC: limiting permissible concentration
1. Replicate C identified as an outlier (40% survival) using Grubbs' test. Low survival possibly due to no/low aeration on Day 4.

3.2.1.2 Polychaete Mortality Bioassay

Results of the 10-day polychaete SP test are summarized in Table 16.

Testing for the January 2018 sampling event was performed in two batches. Mean survival in the controls were 100% for both batches, which met control acceptability criterion. Mean survival in the reference (LA3-REF) was 100%. Survival results in federal channels sediment were compared to survival in the reference to determine suitability for ocean disposal. Mean survival in composite samples ranged from 92% to 100% (Table 16). All sample results were within 10% of the reference, indicating that test sediments from the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel are not acutely toxic to marine polychaetes.

Testing for the January 2019 sampling event was performed in one batch. Mean survival in the control was 100%, which met acceptability criterion. Mean survival in the reference (LA3-REF) was 96%. Survival results in Newport Channel sediment were compared to survival in the reference to determine suitability for ocean disposal. Mean survival was 96% for both composite samples (Table 16). Both sample results were within 10% of the reference, indicating that test sediments from Newport Channel are not acutely toxic to marine polychaetes.

Table 16
Summary of Solid Phase Test Results Using *Neanthes arenaceodentata*

Treatment	Percent Survival in Test Replicates					Mean Survival (%)	Meets LPC for Ocean Disposal
	Rep A	Rep B	Rep C	Rep D	Rep E		
January 2018 Sampling Event – Batch 1							
Control	100	100	100	100	100	100	N/A
LA3-REF	100	100	100	100	100	100	N/A
TB-COMP	100	100	100	100	100	100	Yes
MCN1-COMP-T	100	100	100	100	100	100	Yes
MCN2-COMP-T	100	100	100	100	100	100	Yes
MCN3-COMP	100	100	100	100	100	100	Yes
MCN4-COMP	100	100	100	100	100	100	Yes
January 2018 Sampling Event – Batch 2							
Control	100	100	100	100	100	100	N/A
MCN5-COMP	100	100	100	100	100	100	Yes
EC-COMP	100	80	80	100	100	92	Yes
BIME-COMP-T-M	100	100	100	100	100	100	Yes
BIMW-COMP-T-M	100	100	100	100	100	100	Yes
BIN-COMP-T	80	100	100	100	100	96	Yes
BIS-COMP	100	100	100	100	100	100	Yes

Treatment	Percent Survival in Test Replicates					Mean Survival (%)	Meets LPC for Ocean Disposal
	Rep A	Rep B	Rep C	Rep D	Rep E		
January 2019 Sampling Event							
Control	100	100	100	100	100	100	N/A
LA3-REF	100	100	100	100	80	96	N/A
NC2-COMP	100	100	80	100	100	96	Yes
NC3-COMP	100	100	80	100	100	96	Yes

Note:
LPC: limiting permissible concentration

3.2.2 Suspended Particulate Phase Testing

3.2.2.1 Bivalve Larval Development Bioassay

Results for the 48-hour bivalve larval SPP test are summarized in Table 17.

Testing for the January 2018 sampling event was performed in six batches. Mean normal development in the laboratory controls ranged from 96.2% to 99.3%, and mean survival ranged from 91.8% to 98.1%. All control acceptability criteria were met. Mean normal development in the site water controls ranged from 97.5% to 98.7%, and mean survival ranged from 88.6% to 99.6%. In the 100% elutriate treatments, mean normal development ranged from 0% to 99.3%, and mean survival ranged from 76.5% to 98.4%. The median effective concentration (EC_{50}) ranged from 73.4% to greater than 100%, and the median lethal concentration (LC_{50}) was greater than 100% for all samples. Based on these results, samples from Turning Basin, Bay Island North, Entrance Channel, and Main Channel 1, 2, and 5 are not toxic to bivalve larvae, and further assessment is required for samples from Bay Island Middle East and West, Bay Island South, and Main Channel North 3 and 4. The effect on the development of *M. galloprovincialis* exposed to elutriate from Bay Island Middle East and West, Bay Island South, and Main Channel North 3 and 4 was not unexpected due to the elevated ammonia concentrations measured in these samples. As described in Section 2.3, ammonia reference toxicant tests were run with the bivalve larval development bioassay due to the sensitivity of *M. galloprovincialis* to elevated ammonia concentrations. Ammonia concentrations in the 100% elutriate treatments from Bay Island Middle East and West, Bay Island South, and Main Channel North 3 and 4 (3.8 to 10.5 mg/L) exceeded the no observed effect concentration (NOEC) in the associated ammonia reference toxicant tests (3.5 and 4.0 mg/L), indicating that ammonia likely contributed to the observed toxicity in these samples.

Testing for the January 2019 sampling event was performed in one batch. Mean normal development in the laboratory control was 97.0% and mean survival was 94.1%. All control acceptability criteria were met. Mean normal development in the site water control was 97.6%, and mean survival was 97.3%. In the 100% elutriate treatments, mean normal development was 97.1% and 97.2%, and mean survival was 97.5% and 97.7%. The EC_{50} and LC_{50} were greater than 100% for both samples. Based on these results, samples from Newport Channel are not toxic to bivalve larvae.

Results were further analyzed using a water column toxicity mixing model (i.e., STFATE) to determine whether sediment from Bay Island Middle East and West, Bay Island South, and Main Channel North 3 and 4 meets limiting permissible concentration (LPC) requirements for ocean disposal. Results of STFATE modeling are presented separately in Section 3.3.

Table 17
Summary of Suspended Particulate Phase Test Results Using *Mytilus galloprovincialis*

Sample ID	Treatment (%)	Mean Normal Development (%)	Standard Deviation (%)	EC_{50} (%)	Mean Survival (%)	Standard Deviation (%)	LC_{50} (%)	Meets LPC for Ocean Disposal
January 2018 Sampling Event – Batch 1								
Laboratory Control	N/A	96.2	1.3	N/A	97.6	5.5	N/A	N/A
Site Water Control	N/A	97.1	1.5	N/A	99.6	1.0	N/A	N/A
BIMW-COMP-T-M	1	96.2	2.1	75.9	98.4	3.5	>100	Requires further assessment[1]
	10	96.7	1.2		98.1	2.0		
	50	97.3	2.0		93.8	8.2		
	100	**3.4**	1.9		**86.6**	7.7		
BIME-COMP-T-M	1	97.1	1.1	74.4	96.0	4.5	>100	Requires further assessment[1]
	10	97.1	1.6		99.1	1.2		
	50	93.5	1.9		85.8	7.6		
	100	**1.0**	1.2		90.4	8.5		
January 2018 Sampling Event – Batch 2								
Laboratory Control	N/A	96.6	0.9	N/A	98.1	2.4	N/A	N/A
Site Water Control	N/A	95.8	0.5	N/A	97.4	4.4	N/A	N/A
TB-COMP	1	96.9	1.2	>100	98.7	1.9	>100	Yes
	10	96.2	1.1		100	0.0		
	50	94.8	1.0		92.8	9.0		
	100	96.0	1.9		98.4	2.8		
BIS-COMP	1	97.5	0.9	75.0	98.4	2.3	>100	Requires further assessment[1]
	10	97.1	1.2		96.7	7.4		
	50	96.9	1.3		91.1	8.6		
	100	**0.0**	0.0		**76.5**	9.4		
January 2018 Sampling Event – Batch 3								
Laboratory Control	N/A	97.5	2.4	N/A	91.8	5.4	N/A	N/A

Sample ID	Treatment (%)	Mean Normal Development (%)	Standard Deviation (%)	EC_{50} (%)	Mean Survival (%)	Standard Deviation (%)	LC_{50} (%)	Meets LPC for Ocean Disposal
Site Water Control	N/A	97.5	1.9	N/A	94.1	5.2	N/A	N/A
MCN1-COMP-T	1	96.5	1.4	> 100	94.3	5.2	> 100	Yes
	10	96.8	1.2		93.9	5.6		
	50	98.0	2.0		86.2	8.8		
	100	96.7	3.3		87.2	4.4		
MCN2-COMP-T	1	97.1	1.0	>100	82.4	8.9	>100	Yes
	10	97.8	2.0		84.9	11.6		
	50	98.1	1.0		82.6	5.6		
	100	96.7	2.1		85.1	7.7		
January 2018 Sampling Event – Batch 4								
Laboratory Control	N/A	97.0	0.7	N/A	97.8	3.5	N/A	N/A
Site Water Control	N/A	98.0	1.0	N/A	88.6	8.3	N/A	N/A
BIN-COMP-T	1	97.8	0.6	>100	96.4	3.6	>100	Yes
	10	96.9	2.2		**84.5**	6.5		
	50	95.2	3.6		88.6	9.8		
	100	**52.7**	7.6		**81.2**	15		
EC-COMP	1	97.4	1.2	>100	**88.4**	6.7	>100	Yes
	10	98.0	1.2		90.9	7.8		
	50	97.1	1.4		**85.5**	9.1		
	100	97.2	1.3		**83.2**	1.5		
January 2018 Sampling Event – Batch 5								
Laboratory Control	N/A	99.2	0.9	N/A	95.7	4.2	N/A	N/A
Site Water Control	N/A	98.0	0.9	N/A	94.6	2.7	N/A	N/A
MCN3-COMP	**1**	98.9	0.9	73.4	97.2	3.9	>100	Requires further assessment[1]
	10	98.6	1.2		94.0	6.4		
	50	**90.2**	7.6		94.5	6.0		
	100	**3.9**	2.6		**77.6**	8.0		
MCN4-COMP	**1**	98.8	0.8	77.2	95.1	4.5	>100	Requires further assessment[1]
	10	98.9	0.9		98.9	2.5		
	50	**94.1**	3.3		97.3	4.8		
	100	**12.4**	3.1		89.3	4.5		
January 2018 Sampling Event – Batch 6								
Laboratory Control	N/A	99.3	0.4	N/A	93.1	7.9	N/A	N/A
Site Water Control	N/A	98.7	1.1	N/A	97.2	4.2	N/A	N/A

Sample ID	Treatment (%)	Mean Normal Development (%)	Standard Deviation (%)	EC_{50} (%)	Mean Survival (%)	Standard Deviation (%)	LC_{50} (%)	Meets LPC for Ocean Disposal
MCN5-COMP	1	99.0	1.1	>100	93.4	4.6	>100	Yes
	10	99.0	0.7		96.1	5.7		
	50	98.6	1.0		89.8	6.4		
	100	99.3	0.8		95.1	7.6		
January 2019 Sampling Event								
Laboratory Control	N/A	97.0	2.0	N/A	94.1	10.0	N/A	N/A
Site Water Control	N/A	97.6	1.3	N/A	97.3	1.1	N/A	N/A
NC2-COMP	1	95.8	1.6	>100	96.9	4.0	>100	Yes
	10	96.0	12		96.9	3.0		
	50	96.8	1.3		96.7	5.1		
	100	97.1	1.0		97.7	2.3		
NC3-COMP	1	97.3	0.9	>100	88.4	8.9	>100	Yes
	10	96.3	1.8		96.2	5.3		
	50	97.5	1.5		99.5	1.1		
	100	97.2	0.4		97.5	2.5		

Notes:

Bold: value is significantly less than the laboratory control ($P < 0.05$)

1. STFATE modeling was required to estimate whether disposal of sediment at the LA-3 ODMDS would negatively impact aquatic life.

3.2.2.2 Mysid Shrimp Bioassay

Results for the 96-hour mysid shrimp SPP test are summarized in Table 18.

Testing for the January 2018 sampling event was performed in five batches. Mean survival in the laboratory controls ranged from 96% to 100%, which met control acceptability criterion. Mean survival in the site water controls ranged from 96% to 100%. Mean survival in the 100% elutriate treatments ranged from 94% to 100%. The LC_{50} was greater than 100% for all samples. Based on these results, sediments from the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel are not toxic to mysid shrimp and meet LPC requirements for ocean disposal.

Testing for the January 2019 sampling event was performed in one batch. Mean survival in the laboratory control was 100%, which met control acceptability criterion. Mean survival in the site water control was 98%. Mean survival in the 100% elutriate treatments was 98% for both composite samples. The LC_{50} was greater than 100% for both samples. Based on these results, sediments from Newport Channel are not toxic to mysid shrimp and meet LPC requirements for ocean disposal.

Table 18
Summary of Suspended Particulate Phase Test Results Using *Americamysis bahia*

Sample ID	Treatment (%)	Mean Survival (%)	Standard Deviation (%)	LC_{50} (%)	Meets LPC for Ocean Disposal
January 2018 Sampling Event – Batch 1					
Laboratory Control	N/A	96	8.9	N/A	N/A
Site Water Control	N/A	100	0.0	N/A	N/A
BIMW-COMP-T-M	10	98	4.5	>100	Yes
	50	98	4.5		
	100	98	4.5		
BIME-COMP-T-M	10	94	8.9	>100	Yes
	50	92.5	10		
	100	95	5.8		
January 2018 Sampling Event – Batch 2					
Laboratory Control	N/A	100	0.0	N/A	N/A
Site Water Control	N/A	100	0.0	N/A	N/A
TB-COMP	10	96	5.5	>100	Yes
	50	96	5.5		
	100	94	5.5		
BIS-COMP	10	96	5.5	>100	Yes
	50	98	4.5		
	100	100	0.0		
January 2018 Sampling Event – Batch 3					
Laboratory Control	N/A	98	4.5	N/A	N/A
Site Water Control	N/A	96	5.5	N/A	N/A
MCN1-COMP-T	10	100	0.0	>100	Yes
	50	98	4.5		
	100	96	5.5		
MCN2-COMP-T	10	100	0.0	>100	Yes
	50	100	0.0		
	100	96	5.5		
January 2018 Sampling Event – Batch 4					
Laboratory Control	N/A	98	4.5	N/A	N/A
Site Water Control	N/A	100	0.0	N/A	N/A
BIN-COMP-T	10	96	5.5	>100	Yes
	50	100	0.0		
	100	94	8.9		
EC-COMP	10	96	5.5	>100	Yes
	50	100	0.0		

Sample ID	Treatment (%)	Mean Survival (%)	Standard Deviation (%)	LC_{50} (%)	Meets LPC for Ocean Disposal
	100	96	5.5		
January 2018 Sampling Event – Batch 5					
Laboratory Control	N/A	98	4.5	N/A	N/A
Site Water Control	N/A	96	5.5	N/A	N/A
MCN3-COMP	10	98	4.5	>100	Yes
	50	94	8.9		
	100	98	4.5		
MCN4-COMP	10	96	5.5	>100	Yes
	50	96	5.5		
	100	98	4.5		
MCN5-COMP	10	98	4.5	>100	Yes
	50	96	5.5		
	100	98	4.5		
January 2019 Sampling Event					
Laboratory Control	N/A	100	0.0	N/A	N/A
Site Water Control	N/A	98	4.5	N/A	N/A
NC2-COMP	10	98	4.5	>100	Yes
	50	98	4.5		
	100	98	4.5		
NC3-COMP	10	98	4.5	>100	Yes
	50	100	0.0		
	100	98	4.5		

3.2.2.3 Juvenile Fish Bioassay

Results for the 96-hour juvenile fish SPP test are summarized in Table 19.

Testing for the January 2018 sampling event was performed in six batches. Mean survival in the laboratory controls ranged from 96% to 100%, which met control acceptability criteria. Mean survival in the site water controls ranged from 90% to 100%. Mean survival in the 100% elutriate treatments ranged from 86% to 100%. The LC_{50} was greater than 100% for all samples. Based on these results, sediments from the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel are not toxic to juvenile fish and meet LPC requirements for ocean disposal.

Testing for the January 2019 sampling event was performed in one batch. Mean survival in the laboratory control was 88%. Survival in the laboratory control was slightly less than control acceptability criteria of 90%; therefore, results were conservatively compared to the site water control

(94%). Mean survival in the 100% elutriate treatments was 86% and 90%. The LC_{50} was greater than 100% for both samples. Based on these results, sediments from Newport Channel are not toxic to juvenile fish and meet LPC requirements for ocean disposal.

Table 19
Summary of Suspended Particulate Phase Test Results Using *Menidia beryllina*

Sample ID	Treatment (%)	Mean Survival (%)	Standard Deviation (%)	LC_{50} (%)	Meets LPC for Ocean Disposal
January 2018 Sampling Event – Batch 1					
Laboratory Control	N/A	100	0.0	N/A	N/A
Site Water Control	N/A	100	0.0	N/A	N/A
BIMW-COMP-T-M	10	98	4.5	>100	Yes
	50	100	0.0		
	100	96	5.5		
BIME-COMP-T-M	10	100	0.0	>100	Yes
	50	96	5.5		
	100	98	4.5		
January 2018 Sampling Event – Batch 2					
Laboratory Control	N/A	98	4.5	N/A	N/A
Site Water Control	N/A	98	4.5	N/A	N/A
TB-COMP	10	100	0.0	>100	Yes
	50	98	4.5		
	100	100	0.0		
BIS-COMP	10	98	4.5	>100	Yes
	50	98	4.5		
	100	96	4.5		
January 2018 Sampling Event – Batch 3					
Laboratory Control	N/A	100	0.0	N/A	N/A
Site Water Control	N/A	100	0.0	N/A	N/A
MCN1-COMP-T	10	96	5.5	>100	Yes
	50	98	4.5		
	100	94	5.5		
MCN2-COMP-T	10	98	4.5	>100	Yes
	50	96	8.9		
	100	100	0.0		
January 2018 Sampling Event – Batch 4					
Laboratory Control	N/A	98	4.5	N/A	N/A
Site Water Control	N/A	100	0.0	N/A	N/A

Sample ID	Treatment (%)	Mean Survival (%)	Standard Deviation (%)	LC_{50} (%)	Meets LPC for Ocean Disposal
BIN-COMP-T	10	100	0.0	>100	Yes
	50	94	8.9		
	100	92	8.4		
EC-COMP	10	100	0.0	>100	Yes
	50	100	0.0		
	100	98	4.5		
January 2018 Sampling Event – Batch 5					
Laboratory Control	N/A	96	5.5	N/A	N/A
Site Water Control	N/A	98	4.5	N/A	N/A
MCN3-COMP	10	98	4.5	>100	Yes
	50	92	11.0		
	100	86	11.0		
MCN4-COMP	10	92	4.8	>100	Yes
	50	94	5.5		
	100	100	0.0		
January 2018 Sampling Event – Batch 6					
Laboratory Control	N/A	100	0.0	N/A	N/A
Site Water Control	N/A	90	12.0	N/A	N/A
MCN5-COMP	10	90	10.0	>100	Yes
	50	94	8.9		
	100	94	8.9		
January 2019 Sampling Event					
Laboratory Control	N/A	88	11.0	N/A	N/A
Site Water Control	N/A	94	5.5	N/A	N/A
NC2-COMP	10	88	8.4	>100	Yes
	50	82	27.0		
	100	86	26.0		
NC3-COMP	10	**78**	15.0	>100	Yes
	50	98	4.5		
	100	90	0.0		

Note:
Bold: Value is significantly less than the site water control ($P < 0.05$).

3.2.3 Bioaccumulation Potential Testing

Test results for the 28-day BP tests are presented below. Following the 28-day exposure, organisms were placed into clean seawater for 24 hours to allow organisms to depurate the test sediment. After this purging process, tissues were shipped frozen to Eurofins Calscience, Inc., for chemical analysis. Tissue chemistry results are presented separately in Section 3.4.

3.2.3.1 Bivalve Bioaccumulation Test

Test results for the 28-day bivalve BP test are presented in Table 20. For the January 2018 sampling event, mean survival in the control and reference sediment was 96.8% and 97.6%, respectively. Mean survival in composite samples ranged from 95.2% to 99.2%. For the January 2019 sampling event, mean survival in the control and reference sediment was 98.0% and 98.7%, respectively. Mean survival in composite samples was 98.0% and 96.7%. For both sampling events, sufficient tissue mass was available at test completion for chemical analysis.

Table 20
Summary of Bioaccumulation Potential Test Results Using *Macoma nasuta*

Treatment	Mean Survival (%)	Standard Deviation (%)
January 2018 Sampling Event		
Control	96.8	3.3
LA3-REF	97.6	3.6
TB-COMP	99.2	1.8
MCN1-COMP-T	96.8	3.3
MCN2-COMP-T	96.0	4.9
MCN3-COMP	99.2	1.8
MCN4-COMP	99.2	1.8
MCN5-COMP	95.2	6.6
EC-COMP	96.0	4.0
BIME-COMP-T-M	95.2	5.2
BIMW-COMP-T-M	98.4	2.2
BIN-COMP-T	97.6	2.2
BIS-COMP	98.4	2.2
January 2019 Sampling Event		
Control	98.0	1.8
LA3-REF	98.7	1.8
NC2-COMP	98.0	1.8
NC3-COMP	96.7	3.3

3.2.3.2 Polychaete Bioaccumulation Test

Test results for the 28-day polychaete BP test are presented in Table 21. For the January 2018 sampling event, mean survival in the control and reference sediment was 100% and 98%, respectively. Mean survival in composite samples ranged from 90% to 100%. For the January 2019 sampling event, mean survival in the control and reference sediment was 90% and 92%, respectively. Mean survival in composite samples ranged from 66% to 76%. Although survival was somewhat reduced, sufficient tissue mass was available at test completion for chemical analysis; therefore, test acceptability criteria were met (see Section 4.3).

Table 21
Summary of Bioaccumulation Potential Test Results Using *Nereis virens*

Treatment	Mean Survival (%)	Standard Deviation (%)
January 2018 Sampling Event		
Control	100	0.0
LA3-REF	98	4.5
TB-COMP	100	0.0
MCN1-COMP-T	90	0.0
MCN2-COMP-T	100	0.0
MCN3-COMP	100	0.0
MCN4-COMP	98	4.5
MCN5-COMP	98	4.5
EC-COMP	100	0.0
BIME-COMP-T-M	100	0.0
BIMW-COMP-T-M	98	4.5
BIN-COMP-T	98	4.5
BIC-COMP	100	0.0
January 2019 Sampling Event		
Control	90	7.1
LA3-REF	92	11.0
NC2-COMP	66	17.0
NC3-COMP	76	15.0

3.3 Prediction of Water Column Toxicity During Disposal

STFATE is a data modeling tool used to evaluate the suitability of proposed dredged material for placement at an ODMDS. The model simulates the movement of disposed material through the water column to the ocean bottom and then as it becomes resuspended by the current. The model uses 0.01 of the LC_{50} or EC_{50} value to determine compliance with the LPC. The lowest endpoint value from bioassay testing was used in the model to provide the most conservative estimate of water column effects resulting from disposal activities. The EC_{50} value of Main Channel North 3 in the bivalve larval development test was calculated to be 73.4%; therefore, the toxicity criterion, or LPC, used in the model was 0.734%. Although ammonia likely contributed to the observed toxicity in this sample and is not a contaminant of concern, STFATE modeling was performed to demonstrate LPC compliance. The guidance states that the concentration of dredged material must be less than 0.01 times the LC_{50} or EC_{50} after 4 hours within the disposal site and at all times outside the disposal site.

The input parameters for LA-3 ODMDS are listed in Table 22; complete results are included in Appendix E. Physical characteristics of sediment from Main Channel North 3 were used as inputs to the model. Site-specific input parameters used were derived from the *Final* Environmental *Impact* Statement: *Proposed Site Designation of the LA-3 Ocean Dredged Material Disposal Site off Newport Bay, Orange County, California* (USEPA/USACE 2005).

Table 22
STFATE Model Input Parameters

Parameter	Units	LA-3 ODMDS Value
Site Description		
Number of Grid Points (left to right + z direction)	--	61
Number of Grid Points (top to bottom + x direction)	--	61
Grid Spacing (left to right)	feet	400
Grid Spacing (top to bottom)	feet	400
Water Depth Within Disposal Boundary	feet	1,600
Roughness Height at Bottom of Disposal Site	feet	0.005[1]
Bottom Slope (x-direction)	degrees	0[1]
Bottom Slope (z-direction)	degrees	0[1]
Number of Points in Density Profile	--	2
Density at Point One (depth = 0 feet)	grams/cubic centimeter	1.0247
Density at Point Three (depth = 1,600 feet)	grams/cubic centimeter	1.0282
Velocity		
Type of Velocity Profile	--	2-point velocity profile for constant depth
X-Direction Velocity (depth = 59 feet)	feet/second	0.85
Z-Direction Velocity (depth = 59 feet)	feet/second	0.85
X-Direction Velocity (depth = 950 feet)	feet/second	-0.12
Z-Direction Velocity (depth = 950 feet)	feet/second	-0.12
Disposal Operation		
Disposal Point Top of Grid	feet	12,000
Disposal Point Left Edge of Grid	feet	12,000
Dumping Over Depression	--	No

Parameter	Units	LA-3 ODMDS Value
Solid Fraction Volume Concentration	--	Gravel = 0.0, Sand = 0.151, Silt = 0.238, Clay = 0.089
Volume of Each Layer	cy	2,000
Length of Disposal Vessel Bin	feet	200
Width of Disposal Vessel Bin	feet	50
Pre-Disposal Draft	feet	14
Post-Disposal Draft	feet	5
Duration	seconds	14,400
Long-Term Time Step for Diffusion	seconds	3,600
Time to Empty Vessel	seconds	30
Location of Upper Left Corner of Disposal Site (distance from top edge)	feet	9,000
Location of Upper Left Corner of Disposal Site (distance from left edge)	feet	9,000
Location of Lower Right Corner of Disposal Site (distance from top edge)	feet	15,000
Location of Lower Right Corner of Disposal Site (distance from left edge)	feet	15,000
Coefficients		
Settling Coefficient	--	0.000[1]
Apparent Mass Coefficient	--	1.000[1]
Drag Coefficient	--	0.500[1]
Form Drag for Collapsing Cloud	--	1.000[1]
Skin Friction for Collapsing Cloud	--	0.010[1]
Drag for an Ellipsoidal Wedge	--	0.100[1]
Drag for a Plate	--	1.000[1]
Friction Between Cloud and Bottom	--	0.010[1]
4/3 Law Horizontal Diffusion Dissipation Factor	--	0.001[1]
Unstratified Water Vertical Diffusion Coefficient	--	0.0250[1]
Cloud/Ambient Density Gradient Ratio	--	0.250[1]
Turbulent Thermal Entrainment	--	0.235[1]
Entrainment in Collapse	--	0.100[1]
Stripping Factor	--	0.003[1]

Note:
1. Model default value

Modeled concentrations were compared to the LPC, established by regulatory requirements as no more than 1% of the EC_{50} (0.734%). After 4 hours, the dredged material plume moved outside the disposal boundary and the maximum predicted water column concentration on the entire grid was 0.000314%. The maximum concentration outside the disposal site boundary at any time was 0.00136%.

Based on STFATE modeling results, sediment from the federal channels meets the LPC requirements for ocean disposal.

3.4 Chemical Analysis of Tissue Residues

Sediment bioaccumulation tests were conducted using a bivalve (*M. nasuta*) and a polychaete (*N. virens*). Chemical analysis of tissue residues was conducted to determine the BP of sediment contaminants. Based on results of sediment chemistry, a subset of chemicals was selected for analysis that included mercury, dibutyltin, DDTs, and PCBs (Table 8). Due to the high percentage of sand (98.1%) and low concentrations of contaminants (all concentrations less than the ERL), tissue analysis was not required for the Entrance Channel. The data evaluation consisted of comparing tissue burdens to the following:

- FDA action levels
- Reference sediment tissue burdens
- TRVs from the ERED (USACE 2018)

Testing was performed for both the January 2018 and January 2019 sampling events. January 2018 included the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel. Results of chemical analysis of bivalve and polychaete tissue residues for the January 2018 sampling event are presented in Tables 23 and 24, respectively. January 2019 included Newport Channel. Results of the January 2019 sampling event are presented in Tables 25 and 26, respectively. All results are expressed in wet weight. MDLs, RLs, and raw data for the analyses are provided in the laboratory reports in Appendix C.

Table 23

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

Chemical	Location ID	Time Zero	LA3-REF	LA3-REF	LA3-REF	LA3-REF	LA3-REF	TB	TB	TB	TB	TB	MCN1	MCN1	MCN1	MCN1	MCN1	MCN2	MCN2	MCN2
	Sample ID	T0-A-MACOMA-012418	LA3-REF-A-MACOMA-022218	LA3-REF-B-MACOMA-022218	LA3-REF-C-MACOMA-022218	LA3-REF-D-MACOMA-022218	LA3-REF-E-MACOMA-022218	TB-COMP-A-MACOMA-022218	TB-COMP-B-MACOMA-022218	TB-COMP-C-MACOMA-022218	TB-COMP-D-MACOMA-022218	TB-COMP-E-MACOMA-022218	MCN1-COMP-T-A-MACOMA-022218	MCN1-COMP-T-B-MACOMA-022218	MCN1-COMP-T-C-MACOMA-022218	MCN1-COMP-T-D-MACOMA-022218	MCN1-COMP-T-E-MACOMA-022218	MCN2-COMP-T-A-MACOMA-022218	MCN2-COMP-T-B-MACOMA-022218	MCN2-COMP-T-C-MACOMA-022218
	Sample Date	1/24/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018
	Matrix	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
	FDA Action Level																			
Conventional Parameters (%)																				
Lipids	--	**0.32**	**0.38**	**0.4**	**0.44**	**0.38**	**0.31**	**0.33**	**0.37**	**0.43**	**0.44**	**0.31**	**0.44**	**0.66**	**0.49**	**0.32**	**0.37**	**0.36**	**0.47**	**0.34**
Metals (mg/kg)																				
Mercury	1[1]	**0.00698 J**	**0.00612 J**	**0.00432 J**	**0.00357 J**	**0.00375 J**	**0.00501 J**	**0.0482**	**0.0391**	**0.0464**	**0.0372**	**0.0362**	**0.0156**	**0.0194**	**0.0181**	**0.0111**	**0.0227**	**0.012**	**0.0206**	**0.0192**
Organometallic Compounds (µg/kg)																				
Dibutyltin	--	0.72 U	0.72 U	0.72 U	0.74 U	0.75 U	0.74 U	**4.5**	**3.9**	**5.2**	**3.1**	0.75 U	--	--	--	--	--	--	--	--
Pesticides (µg/kg)																				
2,4'-DDD (o,p'-DDD)	--	0.29 U	0.29 U	0.28 U	0.29 U	0.28 U	0.29 U	0.29 U	0.28 U	0.28 U	0.29 U	0.28 U	0.29 U	**0.58 J**	**0.43 J**	0.28 U	**0.53 J**	**0.78 J**	**0.78 J**	**0.38 J**
2,4'-DDE (o,p'-DDE)	5,000[2]	0.99 U	1 U	**1.4 J**	0.99 U	0.99 U	0.99 U	1 U	0.98 U	0.99 U	1 U	0.99 U	1 U	**1.1 J**	**1.2 J**	0.98 U	1 U	**1.3 J**	**1.7 J**	1 U
2,4'-DDT (o,p'-DDT)	5,000[2]	0.31 U	0.32 U	0.31 U	0.31 U	0.31 U	0.31 U	0.32 U	0.31 U	0.31 U	0.32 U	0.31 U	0.32 U	0.32 U	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.32 U
4,4'-DDD (p,p'-DDD)	--	0.5 U	0.51 U	0.5 U	0.5 U	**0.54 J**	0.5 U	**0.76 J**	**2.7**	**1.7**	**2.3**	**1.9**	**8.1**	**12**	**9.6**	**1.8**	**7.4**	**13**	**18**	**7.4**
4,4'-DDE (p,p'-DDE)	5,000[2]	0.44 U	**5.1**	**4.1**	**5.1**	**4.3**	**2.9**	**4.3**	**9.5**	**6.3**	**10**	**7.8**	**16**	**23**	**18**	**4.8**	**14**	**25**	**29**	**17**
4,4'-DDT (p,p'-DDT)	5,000[2]	0.44 U	0.44 U	0.43 U	0.44 U	0.44 U	0.44 U	0.44 U	0.43 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.43 U	0.44 U	0.44 U	0.44 U	0.44 U
Total DDx (U = 0)	5,000[2]	0.99 U	**5.1**	**5.5 J**	**5.1**	**4.84 J**	**2.9**	**5.06 J**	**12.2**	**8**	**12.3**	**9.7**	**24.1**	**36.68 J**	**29.23 J**	**6.6**	**21.93 J**	**40.08 J**	**49.48 J**	**24.78 J**
PCB Congeners (µg/kg)																				
PCB-018	--	0.071 U	0.072 U	0.07 U	0.071 U	0.071 U	0.071 U	**0.59**	**0.37**	**0.81**	**0.33**	**0.63**	0.072 U	**0.43**	0.07 U	0.07 U	0.072 U	0.072 U	0.071 U	0.071 U
PCB-028	--	0.034 U	0.034 U	0.033 U	0.034 U	0.033 U	0.034 U	**1.9**	**1.6**	**2.2**	**1.6**	**1.6**	**0.48**	**0.71**	**0.94**	**0.68**	**0.75**	**0.76**	**0.57**	**0.69**
PCB-037	--	0.06 U	0.061 U	0.06 U	0.06 U	0.06 U	0.06 U	0.061 U	0.06 U	0.06 U	0.061 U	0.06 U	0.061 U	0.061 U	0.06 U	0.06 U	0.061 U	0.061 U	0.06 U	0.061 U
PCB-044	--	0.087 U	0.088 U	0.086 U	0.087 U	0.086 U	0.087 U	0.088 U	0.086 U	**0.66**	0.087 U	0.086 U	0.088 U	0.087 U	0.086 U	0.086 U	0.088 U	0.088 U	0.086 U	0.087 U
PCB-049	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	**0.68**	**1.2**	**1**	**1.3**	**1.1**	**0.43**	**0.73**	**0.6**	0.11 U	**0.37**	**0.43**	**0.4**	**0.39**
PCB-052	--	0.063 U	0.063 U	0.062 U	0.063 U	0.062 U	0.063 U	**1.8**	**1.5**	**2.3**	**1.9**	**1.5**	**0.59**	**0.95**	**0.78**	**0.59**	**0.55**	**0.65**	**0.54**	**0.71**
PCB-066	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**2.6**	**2.5**	**3.4**	**2.7**	**2.5**	**0.86**	**1.2**	**1.1**	**0.83**	**0.86**	**0.95**	**0.7**	**0.68**
PCB-070	--	0.06 U	0.06 U	0.059 U	0.06 U	0.059 U	0.06 U	**1.9**	**1.8**	**2.5**	**1.8**	**1.8**	**0.49**	**0.72**	**0.65**	**0.44**	**0.46**	**0.62**	**0.45**	**0.51**
PCB-074	--	0.087 U	0.088 U	0.086 U	0.087 U	0.086 U	0.087 U	**1.2**	**1.1**	**1.5**	**1.1**	**1.1**	**0.35**	**0.52**	**0.43**	**0.35**	**0.38**	**0.39**	**0.29**	**0.34**
PCB-077	--	0.078 U	0.078 U	0.077 U	0.078 U	0.077 U	0.078 U	0.078 U	0.077 U	0.077 U	**0.3**	**0.29**	0.079 U	0.078 U	0.077 U	0.077 U	0.078 U	0.078 U	0.077 U	0.078 U
PCB-081	--	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
PCB-087	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	**0.51**	**0.6**	**0.8**	**0.66**	**0.63**	**0.42**	**0.57**	**0.52**	**0.29**	**0.39**	**0.43**	**0.39**	**0.39**
PCB-099	--	0.061 U	0.061 U	0.06 U	0.061 U	0.06 U	0.061 U	**1.4**	**1.2**	**1.8**	**1.5**	**1.2**	**0.67**	**0.9**	**0.74**	**0.53**	**0.54**	**0.69**	**0.58**	**0.62**
PCB-101	--	0.098 U	0.099 U	0.097 U	0.098 U	0.097 U	0.098 U	**2**	**2.1**	**2.7**	**2**	**2**	**0.93**	**1.2**	**1.1**	**0.82**	**0.96**	**1.2**	**0.87**	**0.84**
PCB-105	--	0.055 U	0.055 U	0.054 U	0.055 U	0.054 U	0.055 U	**0.65**	**0.61**	**0.88**	**0.67**	**0.66**	**0.38**	**0.43**	**0.35**	**0.35**	**0.28**	**0.31**	**0.25**	**0.21**
PCB-110	--	0.046 U	0.046 U	0.045 U	0.046 U	0.046 U	0.046 U	**1.8**	**1.9**	**2.5**	**1.9**	**1.8**	**0.82**	**1.1**	**0.92**	**0.8**	**0.77**	**0.98**	**0.75**	**0.85**
PCB-114	--	0.082 U	0.083 U	0.081 U	0.082 U	0.082 U	0.082 U	0.083 U	0.081 U	0.082 U	0.082 U	0.082 U	0.083 U	0.082 U	0.081 U	0.081 U	0.083 U	0.083 U	0.082 U	0.082 U
PCB-118	--	0.084 U	0.085 U	**0.19 J**	0.084 U	**0.21**	0.084 U	**1.6**	**1.7**	**2.2**	**1.8**	**1.6**	**0.62**	**0.9**	**0.88**	**0.66**	**0.64**	**0.8**	**0.62**	**0.65**
PCB-119	--	0.094 U	0.095 U	0.094 U	0.094 U	0.094 U	0.094 U	0.095 U	0.094 U	0.094 U	0.095 U	0.094 U	0.096 U	0.095 U	0.094 U	0.094 U	0.095 U	0.095 U	0.094 U	0.095 U
PCB-123	--	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	0.11 U	0.11 U	0.1 U	0.1 U
PCB-126	--	0.08 U	0.081 U	0.079 U	0.08 U	0.08 U	0.08 U	0.081 U	0.079 U	0.08 U	0.08 U	0.08 U	0.081 U	0.08 U	0.079 U	0.079 U	0.081 U	0.081 U	0.08 U	0.08 U
PCB-128	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.28**	0.1 U	**0.36**	**0.25**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
PCB-132/153	--	0.17 U	**0.3 J**	**0.25 J**	**0.33 J**	**0.42**	**0.21 J**	**1.6**	**1.5**	**2.1**	**1.7**	**1.6**	**1**	**1.4**	**1.2**	**0.97**	**0.98**	**1.4**	**1**	**1.1**
PCB-138/158	--	0.094 U	0.095 U	**0.26 J**	0.094 U	**0.2 J**	0.094 U	**1.2**	**1.2**	**1.7**	**1.3**	**1.2**	**0.8**	**1.2**	**1**	**0.66**	**0.84**	**1**	**0.86**	**0.9**
PCB-149	--	0.098 U	0.099 U	0.097 U	0.098 U	0.097 U	0.098 U	**1**	**1**	**1.4**	**1**	**0.92**	**0.81**	**0.91**	**0.82**	**0.72**	**0.68**	**0.79**	**0.69**	**0.74**
PCB-151	--	0.067 U	0.068 U	0.067 U	0.067 U	0.067 U	0.067 U	**0.32**	**0.28**	**0.4**	**0.3**	**0.4**	**0.23**	**0.37**	**0.2**	0.067 U	**0.22**	**0.3**	**0.23**	**0.22**
PCB-156	--	0.058 U	0.058 U	0.057 U	0.058 U	0.057 U	0.058 U	0.058 U	0.057 U	0.057 U	0.058 U	0.057 U	0.058 U	0.058 U	0.057 U	0.057 U	0.058 U	0.058 U	0.057 U	0.058 U
PCB-157	--	0.052 U	0.053 U	0.052 U	0.052 U	0.052 U	0.052 U	0.053 U	0.052 U	0.052 U	0.053 U	0.052 U	0.053 U	0.053 U	0.052 U	0.052 U	0.053 U	0.053 U	0.052 U	0.053 U
PCB-167	--	0.062 U	0.062 U	0.061 U	0.062 U	0.061 U	0.062 U	0.062 U	0.061 U	0.061 U	0.062 U	0.061 U	0.063 U	0.062 U	0.061 U	0.061 U	0.062 U	0.062 U	0.061 U	0.062 U
PCB-168	--	0.049 U	0.049 U	0.048 U	0.049 U	0.048 U	0.049 U	0.049 U	0.048 U	0.048 U	0.049 U	0.048 U	0.049 U	0.049 U	0.048 U	0.048 U	0.049 U	0.049 U	0.048 U	0.049 U

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

Chemical	Location ID	Time Zero	LA3-REF	LA3-REF	LA3-REF	LA3-REF	LA3-REF	TB	TB	TB	TB	TB	MCN1	MCN1	MCN1	MCN1	MCN1	MCN2	MCN2	MCN2
	Sample ID	T0-A-MACOMA-012418	LA3-REF-A-MACOMA-022218	LA3-REF-B-MACOMA-022218	LA3-REF-C-MACOMA-022218	LA3-REF-D-MACOMA-022218	LA3-REF-E-MACOMA-022218	TB-COMP-A-MACOMA-022218	TB-COMP-B-MACOMA-022218	TB-COMP-C-MACOMA-022218	TB-COMP-D-MACOMA-022218	TB-COMP-E-MACOMA-022218	MCN1-COMP-T-A-MACOMA-022218	MCN1-COMP-T-B-MACOMA-022218	MCN1-COMP-T-C-MACOMA-022218	MCN1-COMP-T-D-MACOMA-022218	MCN1-COMP-T-E-MACOMA-022218	MCN2-COMP-T-A-MACOMA-022218	MCN2-COMP-T-B-MACOMA-022218	MCN2-COMP-T-C-MACOMA-022218
	Sample Date	1/24/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018
	Matrix	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
	FDA Action Level																			
PCB-169	--	0.061 U	0.062 U	0.06 U	0.061 U	0.061 U	0.061 U	0.062 U	0.06 U	0.061 U	0.061 U	0.061 U	0.062 U	0.061 U	0.06 U	0.06 U	0.062 U	0.062 U	0.061 U	0.061 U
PCB-170	--	0.063 U	0.064 U	0.063 U	0.063 U	0.063 U	0.063 U	0.064 U	0.063 U	**0.26**	0.064 U	0.063 U	0.064 U	0.064 U	0.063 U	0.063 U	0.064 U	0.064 U	0.063 U	0.064 U
PCB-177	--	0.087 U	0.088 U	0.086 U	0.087 U	0.087 U	0.087 U	0.088 U	0.086 U	0.087 U	0.088 U	0.087 U	0.088 U	0.088 U	0.086 U	0.086 U	0.088 U	0.088 U	0.087 U	0.088 U
PCB-180	--	0.042 U	0.042 U	0.042 U	0.042 U	0.042 U	0.042 U	**0.43**	0.042 U	0.042 U	0.042 U	0.042 U	0.043 U	0.042 U	0.042 U	0.042 U	0.042 U	0.042 U	0.042 U	0.042 U
PCB-183	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	**0.34**	0.11 U	**0.37**	**0.26**	**0.32**	0.11 U	**0.25**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
PCB-187	--	0.084 U	0.085 U	0.083 U	0.084 U	0.084 U	0.084 U	**0.58**	**0.46**	**0.69**	**0.57**	**0.73**	**0.46**	**0.57**	**0.42**	**0.28**	**0.4**	**0.35**	**0.26**	**0.33**
PCB-189	--	0.061 U	0.062 U	0.06 U	0.061 U	0.061 U	0.061 U	0.062 U	0.06 U	0.061 U	0.061 U	0.061 U	0.062 U	0.061 U	0.06 U	0.06 U	0.062 U	0.062 U	0.061 U	0.061 U
PCB-194	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
PCB-201	--	0.097 U	0.098 U	0.096 U	0.097 U	0.096 U	0.097 U	0.098 U	0.096 U	0.096 U	0.097 U	0.096 U	0.098 U	0.097 U	0.096 U	0.096 U	0.098 U	0.098 U	0.096 U	0.097 U
PCB-206	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Total PCB Congener (U = 0)	2,000[3]	0.19 U	**0.3 J**	**0.7 J**	**0.33 J**	**0.83 J**	**0.21 J**	**24.38**	**22.62**	**32.53**	**24.94**	**23.58**	**10.34**	**15.06**	**12.65**	**8.97**	**10.07**	**12.05**	**9.45**	**10.17**

Table 23

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

	Location ID	MCN2	MCN2	MCN3	MCN3	MCN3	MCN3	MCN3	MCN4	MCN4	MCN4	MCN4	MCN4	MCN5	MCN5	MCN5	MCN5	MCN5	BIN	BIN
	Sample ID	MCN2-COMP-T-D-MACOMA-022218	MCN2-COMP-T-E-MACOMA-022218	MCN3-COMP-A-MACOMA-022218	MCN3-COMP-B-MACOMA-022218	MCN3-COMP-C-MACOMA-022218	MCN3-COMP-D-MACOMA-022218	MCN3-COMP-E-MACOMA-022218	MCN4-COMP-A-MACOMA-022218	MCN4-COMP-B-MACOMA-022218	MCN4-COMP-C-MACOMA-022218	MCN4-COMP-D-MACOMA-022218	MCN4-COMP-E-MACOMA-022218	MCN5-COMP-A-MACOMA-022218	MCN5-COMP-B-MACOMA-022218	MCN5-COMP-C-MACOMA-022218	MCN5-COMP-D-MACOMA-022218	MCN5-COMP-E-MACOMA-022218	BIN-COMP-T-A-MACOMA-022218	BIN-COMP-T-B-MACOMA-022218
	Sample Date	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018
	Matrix	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Chemical	FDA Action Level																			
Conventional Parameters (%)																				
Lipids	--	**0.61**	**0.7**	**0.4**	**0.4**	**0.56**	**0.43**	**0.36**	**0.44**	**0.54**	**0.35**	**0.36**	**0.36**	**0.34**	**0.53**	**0.5**	**0.35**	**0.33**	**0.29**	**0.61**
Metals (mg/kg)																				
Mercury	1[1]	**0.0147**	**0.0165**	**0.00713 J**	**0.00996**	**0.0107**	**0.0125**	**0.00927 J**	0.00352 U	0.00367 U	**0.00469 J**	0.00336 U	**0.00357 J**	**0.00542 J**	**0.00369 J**	**0.00498 J**	**0.00405 J**	**0.00446 J**	0.00367 U	0.00342 U
Organometallic Compounds (µg/kg)																				
Dibutyltin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pesticides (µg/kg)																				
2,4'-DDD (o,p'-DDD)	--	**1.3**	**1.3**	**1.9**	**2.1**	**1.5**	**0.73 J**	**0.9 J**	**0.78 J**	**1.5**	**0.77 J**	**0.77 J**	**1.7**	**0.76 J**	**0.93 J**	**0.68 J**	**0.42 J**	0.29 U	0.29 U	**1.4**
2,4'-DDE (o,p'-DDE)	5,000[2]	**2.2**	**3.3**	**1.3 J**	**2.4**	**2.2**	0.99 U	**1.2 J**	**1.2 J**	**2.1**	**1.1 J**	**1.2 J**	**1.6 J**	1 U	**1.6 J**	**1.7 J**	**1.6 J**	1 U	1 U	**5.6**
2,4'-DDT (o,p'-DDT)	5,000[2]	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.31 U	**0.36 J**	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.32 U	0.32 U	0.32 U	0.31 U	0.32 U	0.32 U	0.32 U
4,4'-DDD (p,p'-DDD)	--	**21**	**28**	**16**	**23**	**21**	**12**	**10**	**11**	**15 J**	**11**	**10**	**16 J**	**5.9**	**9.2**	**8.8**	**6.2**	**3.9**	**4.9**	**20**
4,4'-DDE (p,p'-DDE)	5,000[2]	**37**	**53**	**22**	**34**	**35**	**19**	**20**	**35**	**50**	**32**	**30**	**31**	**25**	**39**	**36**	**25**	**15**	**23**	**68**
4,4'-DDT (p,p'-DDT)	5,000[2]	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U
Total DDx (U = 0)	5,000[2]	**61.5**	**85.6**	**41.2 J**	**61.5**	**59.7**	**31.73 J**	**32.46 J**	**47.98 J**	**68.6 J**	**44.87 J**	**41.97 J**	**50.3 J**	**31.66 J**	**50.73 J**	**47.18 J**	**33.22 J**	**18.9**	**27.9**	**95**
PCB Congeners (µg/kg)																				
PCB-018	--	0.071 U	0.071 U	0.071 U	0.072 U	0.071 U	0.071 U	0.071 U	0.071 U	0.071 U	0.071 U	0.072 U	0.072 U	0.071 U	0.072 U	0.072 U	0.071 U	0.071 U	0.071 U	0.072 U
PCB-028	--	**0.66**	**0.98**	0.034 U	**0.38**	**0.47**	0.034 U	**0.36**	0.034 U	0.033 U	0.034 U	0.034 U	0.034 U	0.034 U	0.034 U	0.034 U	0.034 U	0.034 U	0.034 U	0.034 U
PCB-037	--	0.06 U	0.06 U	0.061 U	0.061 U	0.06 U	0.06 U	0.061 U	0.06 U	0.06 U	0.061 U	0.061 U	0.061 U	0.061 U	0.061 U	0.061 U	0.06 U	0.061 U	0.061 U	0.061 U
PCB-044	--	0.087 U	0.087 U	0.087 U	0.088 U	0.087 U	0.087 U	0.087 U	0.087 U	0.086 U	0.087 U	0.088 U	0.088 U	0.087 U	0.088 U	0.088 U	0.087 U	0.087 U	0.087 U	0.088 U
PCB-049	--	**0.68**	**0.88**	**0.33**	**0.44**	**0.44**	**0.27**	**0.23**	**0.26**	**0.3**	**0.25**	**0.2 J**	**0.25**	0.11 U	**0.27**	**0.21**	**0.19 J**	0.11 U	0.11 U	**0.31**
PCB-052	--	**0.93**	**1**	**0.55**	**0.5**	**0.62**	**0.59**	**0.47**	**0.51**	**0.51**	**0.4**	**0.46**	**0.41**	**0.27**	**0.26**	**0.32**	**0.3**	**0.3**	**0.31**	**0.42**
PCB-066	--	**0.98**	**1.3**	**0.56**	**0.75**	**0.72**	**0.71**	**0.56**	**0.35**	**0.41**	**0.47**	**0.42**	**0.44**	**0.38**	**0.45**	**0.35**	**0.49**	**0.31**	**0.42**	**0.52**
PCB-070	--	**0.62**	**0.9**	**0.45**	**0.39**	**0.45**	**0.45**	**0.44**	**0.38**	**0.35**	**0.38**	**0.33**	**0.25**	**0.27**	**0.27**	**0.35**	**0.21**	**0.24**	**0.27**	**0.32**
PCB-074	--	**0.45**	**0.54**	**0.28**	**0.29**	**0.31**	**0.38**	**0.24**	**0.26**	**0.25**	**0.21**	**0.25**	0.088 U	0.087 U	**0.28**	0.088 U	**0.23**	**0.22**	0.087 U	0.088 U
PCB-077	--	0.078 U	0.078 U	0.078 U	0.079 U	0.078 U	0.078 U	0.078 U	0.078 U	0.077 U	0.078 U	0.079 U	0.079 U	0.078 U	0.079 U	0.078 U	0.078 U	0.078 U	0.078 U	0.079 U
PCB-081	--	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
PCB-087	--	**0.57**	**0.92**	**0.46**	**0.49**	**0.46**	**0.49**	**0.35**	**0.63**	**0.54**	**0.45**	**0.36**	**0.46**	**0.53**	**0.49**	**0.43**	**0.44**	**0.31**	**0.28**	**0.79**
PCB-099	--	**0.76**	**1.1**	**0.53**	**0.5**	**0.6**	**0.59**	**0.46**	**0.4**	**0.41**	**0.38**	**0.21**	**0.29**	**0.43**	**0.38**	**0.31**	**0.3**	**0.29**	**0.28**	**0.46**
PCB-101	--	**1.2**	**1.6**	**0.71**	**0.97**	**0.86**	**0.9**	**0.76**	**0.53**	**0.63**	**0.64**	**0.51**	**0.66**	**0.45**	**0.59**	**0.61**	**0.5**	**0.47**	**0.5**	**0.73**
PCB-105	--	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.054 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U
PCB-110	--	**1**	**1.5**	**0.76**	**0.73**	**0.72**	**0.74**	**0.63**	**0.63**	**0.61**	**0.58**	**0.5**	**0.51**	**0.49**	**0.54**	**0.55**	**0.49**	**0.42**	**0.45**	**0.67**
PCB-114	--	0.082 U	0.082 U	0.082 U	0.083 U	0.082 U	0.082 U	0.082 U	0.082 U	0.082 U	0.082 U	0.083 U	0.083 U	0.082 U	0.083 U	0.083 U	0.082 U	0.082 U	0.082 U	0.083 U
PCB-118	--	**0.87**	**1.2**	**0.62**	**0.65**	**0.63**	**0.72**	**0.6**	**0.47**	**0.39**	**0.51**	**0.45**	**0.48**	**0.38**	**0.49**	**0.38**	**0.44**	**0.36**	**0.34**	**0.58**
PCB-119	--	0.094 U	0.094 U	0.095 U	0.096 U	0.094 U	0.094 U	0.095 U	0.094 U	0.094 U	0.095 U	0.096 U	0.096 U	0.095 U	0.096 U	0.095 U	0.094 U	0.095 U	0.095 U	0.096 U
PCB-123	--	0.1 U	0.1 U	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.11 U	0.11 U	0.1 U	0.11 U	0.11 U	0.1 U	0.1 U	0.1 U	0.11 U
PCB-126	--	0.08 U	0.08 U	0.08 U	0.081 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.081 U	0.081 U	0.08 U	0.081 U	0.081 U	0.08 U	0.08 U	0.08 U	0.081 U
PCB-128	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
PCB-132/153	--	**1.3**	**1.9**	**1**	**1.1**	**1.2**	**1.1**	**0.86**	**0.89**	**0.76**	**0.79**	**0.73**	**0.76**	**0.73**	**0.87**	**0.74**	**0.59**	**0.72**	**0.58**	**0.92**
PCB-138/158	--	**1.1**	**1.4**	**0.73**	**0.86**	**0.91**	**0.85**	**0.71**	**0.74**	**0.7**	**0.72**	**0.6**	**0.65**	**0.62**	**0.83**	**0.62**	**0.57**	**0.53**	**0.62**	**0.74**
PCB-149	--	**1**	**1.4**	**0.72**	**0.6**	**0.75**	**0.83**	**0.6**	**0.59**	**0.57**	**0.62**	**0.48**	**0.7**	**0.64**	**0.63**	**0.47**	**0.51**	**0.48**	**0.58**	**0.65**
PCB-151	--	**0.27**	**0.37**	**0.26**	0.068 U	**0.22**	**0.24**	**0.22**	0.067 U	**0.25**	0.068 U	0.068 U	0.068 U	0.068 U	0.068 U	0.068 U	0.067 U	0.068 U	0.068 U	0.068 U
PCB-156	--	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.057 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U
PCB-157	--	0.052 U	0.052 U	0.053 U	0.053 U	0.052 U	0.052 U	0.053 U	0.052 U	0.052 U	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	0.052 U	0.053 U	0.053 U	0.053 U
PCB-167	--	0.062 U	0.062 U	0.062 U	0.063 U	0.062 U	0.062 U	0.062 U	0.062 U	0.061 U	0.062 U	0.063 U	0.063 U	0.062 U	0.063 U	0.062 U	0.062 U	0.062 U	0.062 U	0.063 U
PCB-168	--	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.048 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U

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

	Location ID	MCN2	MCN2	MCN3	MCN3	MCN3	MCN3	MCN3	MCN4	MCN4	MCN4	MCN4	MCN4	MCN5	MCN5	MCN5	MCN5	MCN5	BIN	BIN
	Sample ID	MCN2-COMP-T-D-MACOMA-022218	MCN2-COMP-T-E-MACOMA-022218	MCN3-COMP-A-MACOMA-022218	MCN3-COMP-B-MACOMA-022218	MCN3-COMP-C-MACOMA-022218	MCN3-COMP-D-MACOMA-022218	MCN3-COMP-E-MACOMA-022218	MCN4-COMP-A-MACOMA-022218	MCN4-COMP-B-MACOMA-022218	MCN4-COMP-C-MACOMA-022218	MCN4-COMP-D-MACOMA-022218	MCN4-COMP-E-MACOMA-022218	MCN5-COMP-A-MACOMA-022218	MCN5-COMP-B-MACOMA-022218	MCN5-COMP-C-MACOMA-022218	MCN5-COMP-D-MACOMA-022218	MCN5-COMP-E-MACOMA-022218	BIN-COMP-T-A-MACOMA-022218	BIN-COMP-T-B-MACOMA-022218
	Sample Date	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018
	Matrix	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Chemical	FDA Action Level																			
PCB-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
Chemical	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 / Sample ID / Sample Date / Matrix / FDA Action Level	BIN BIN-COMP-T-C-MACOMA-022218 2/22/2018 TBIO	BIN BIN-COMP-T-D-MACOMA-022218 2/22/2018 TBIO	BIN BIN-COMP-T-E-MACOMA-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-A-MACOMA-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-B-MACOMA-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-C-MACOMA-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-D-MACOMA-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-E-MACOMA-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-A-MACOMA-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-B-MACOMA-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-C-MACOMA-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-D-MACOMA-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-E-MACOMA-022218 2/22/2018 TBIO	BIS BIS-COMP-A-MACOMA-022218 2/22/2018 TBIO	BIS BIS-COMP-B-MACOMA-022218 2/22/2018 TBIO	BIS BIS-COMP-C-MACOMA-022218 2/22/2018 TBIO	BIS BIS-COMP-D-MACOMA-022218 2/22/2018 TBIO	BIS BIS-COMP-E-MACOMA-022218 2/22/2018 TBIO
PCB-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 / Sample ID / Sample Date / Matrix / FDA Action Level	Time Zero	LA3-REF	LA3-REF	LA3-REF	LA3-REF	LA3-REF	TB	TB	TB	TB	TB	MCN1	MCN1	MCN1	MCN1	MCN1	MCN2	MCN2	MCN2
	Sample ID	T0-A-NEREIS-012418	LA3-REF-A-NEREIS-022218	LA3-REF-B-NEREIS-022218	LA3-REF-C-NEREIS-022218	LA3-REF-D-NEREIS-022218	LA3-REF-E-NEREIS-022218	TB-COMP-A-NEREIS-022218	TB-COMP-B-NEREIS-022218	TB-COMP-C-NEREIS-022218	TB-COMP-D-NEREIS-022218	TB-COMP-E-NEREIS-022218	MCN1-COMP-T-A-NEREIS-022218	MCN1-COMP-T-B-NEREIS-022218	MCN1-COMP-T-C-NEREIS-022218	MCN1-COMP-T-D-NEREIS-022218	MCN1-COMP-T-E-NEREIS-022218	MCN2-COMP-T-A-NEREIS-022218	MCN2-COMP-T-B-NEREIS-022218	MCN2-COMP-T-C-NEREIS-022218
	Sample Date	1/24/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018
	Matrix	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Chemical	**FDA Action Level**																			
Conventional Parameters (%)																				
Lipids	--	**0.61**	**1.1**	**0.74**	**1.1**	**0.92**	**0.75**	**0.46**	**0.52**	**0.55**	**0.71**	**0.71**	**0.79**	**0.69**	**0.93**	**0.82**	**0.62**	**0.72**	**0.9**	**0.81**
Metals (mg/kg)																				
Mercury	1[1]	**0.0218**	**0.0121**	**0.00973**	**0.00562 J**	**0.0374**	**0.0186**	**0.0164 J**	**0.0187**	**0.0163**	**0.0149**	**0.0124**	**0.012**	**0.0143**	**0.0215**	**0.0301**	**0.0118**	**0.027**	**0.0263**	**0.0242**
Organometallic Compounds (µg/kg)																				
Dibutyltin	--	0.73 U	0.72 U	0.74 U	0.72 U	0.72 U	0.72 U	0.74 U	0.72 U	0.74 U	0.72 U	0.73 U	--	--	--	--	--	--	--	--
Pesticides (µg/kg)																				
2,4'-DDD (o,p'-DDD)	--	0.29 U	0.29 U	0.28 U	0.28 U	0.29 U	0.29 U	0.34 U	0.28 U	0.28 U	0.29 U	0.29 U	0.29 U	0.28 U	0.28 U	0.29 U	0.29 U	0.28 U	0.28 U	0.29 U
2,4'-DDE (o,p'-DDE)	5,000[2]	**2 J**	1 U	0.98 U	**1.9 J**	1 U	**1.2 J**	1.2 U	0.98 U	0.97 U	0.99 U	1 U	**1.3 J**	**1 J**	0.98 U	**1.5 J**	**1.1 J**	**2.7**	**1.6 J**	**2.7**
2,4'-DDT (o,p'-DDT)	5,000[2]	0.32 U	0.32 U	0.31 U	0.31 U	0.32 U	0.32 U	0.37 U	0.31 U	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.31 U	0.31 U
4,4'-DDD (p,p'-DDD)	--	0.51 U	0.51 U	0.5 U	0.5 U	0.51 U	**1.7**	**5.1**	**4.3**	**5.7**	**6**	**5.4**	**5.9**	**9.6**	**5.7**	**9.5**	**10**	**15**	**23**	**20**
4,4'-DDE (p,p'-DDE)	5,000[2]	**1.8**	**0.98 J**	**1.6**	**1.2**	**1.2**	**2.6**	**3.7**	**3.5**	**4.2**	**4.2**	**2.5**	**5.8**	**6.4**	**4.5**	**6.8**	**4.4**	**6.6**	**9.8**	**8.7**
4,4'-DDT (p,p'-DDT)	5,000[2]	0.44 U	0.44 U	0.43 U	0.43 U	**0.78 J**	0.44 U	0.51 U	0.43 U	0.43 U	0.44 U	0.44 U	0.45 U	0.43 U	0.43 U	0.44 U	0.45 U	0.43 U	0.43 U	0.44 U
Total DDx (U = 0)	5,000[2]	**3.8 J**	**0.98 J**	**1.6**	**3.1 J**	**1.98 J**	**5.5 J**	**8.8**	**7.8**	**9.9**	**10.2**	**7.9**	**13 J**	**17 J**	**10.2**	**17.8 J**	**15.5 J**	**24.3**	**34.4 J**	**31.4**
PCB Congeners (µg/kg)																				
PCB-018	--	0.072 U	0.072 U	0.07 U	0.07 U	0.072 U	0.072 U	**0.64**	**0.74**	**0.82**	**0.61**	**0.77**	**0.22**	**0.25**	0.07 U	**0.23**	**0.24**	0.07 U	0.07 U	0.071 U
PCB-028	--	0.034 U	0.034 U	0.033 U	0.033 U	0.034 U	0.034 U	**0.75**	**0.89**	**1.2**	**0.73**	**0.91**	0.034 U	0.033 U	**0.28**	0.034 U	0.034 U	**0.23**	0.033 U	0.034 U
PCB-037	--	0.061 U	0.061 U	0.06 U	0.06 U	0.061 U	0.061 U	0.071 U	0.06 U	0.059 U	0.06 U	0.061 U	0.062 U	0.06 U	0.06 U	0.061 U	0.062 U	0.059 U	0.06 U	0.06 U
PCB-044	--	0.088 U	0.088 U	0.086 U	0.086 U	0.088 U	0.088 U	**0.69**	**0.75**	**0.74**	**0.74**	**0.81**	0.089 U	**0.33**	0.086 U	0.088 U	0.089 U	0.085 U	**0.27**	0.087 U
PCB-049	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	**0.66**	**0.68**	**0.83**	**0.71**	**0.86**	**0.23**	**0.44**	**0.35**	**0.33**	**0.37**	**0.33**	**0.28**	**0.25**
PCB-052	--	0.063 U	0.063 U	0.062 U	0.062 U	0.063 U	0.063 U	**1.8**	**2**	**2.6**	**2.2**	**2.5**	**0.85**	**1.2**	**0.7**	**0.72**	**0.67**	**0.86**	**0.97**	**0.77**
PCB-066	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**1.2**	**1.3**	**1.5**	**1.4**	**1.7**	**0.5**	**0.83**	**0.64**	**0.43**	**0.89**	**0.54**	**0.78**	**0.49**
PCB-070	--	0.06 U	0.06 U	0.059 U	0.059 U	0.06 U	0.06 U	**0.43**	**0.3**	**0.55**	**0.37**	**0.5**	0.061 U	**0.26**	0.059 U	0.06 U	0.061 U	0.058 U	0.059 U	0.06 U
PCB-074	--	0.088 U	0.088 U	0.086 U	0.086 U	0.088 U	0.088 U	**0.38**	**0.46**	**0.48**	**0.45**	**0.53**	**0.21**	**0.3**	0.086 U	**0.22**	**0.21**	**0.21**	**0.26**	0.087 U
PCB-077	--	0.078 U	0.078 U	0.077 U	0.077 U	0.078 U	0.078 U	**0.24**	0.077 U	0.076 U	0.078 U	**0.32**	0.079 U	0.077 U	0.077 U	0.078 U	0.079 U	0.076 U	0.077 U	0.078 U
PCB-081	--	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.14 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
PCB-087	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U	0.11 U	0.11 U	**0.26**	0.11 U	0.11 U	**0.24**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
PCB-099	--	**0.24**	0.061 U	0.06 U	0.06 U	0.061 U	0.061 U	**0.86**	**0.99**	**1**	**1**	**1.2**	**0.61**	**0.72**	**0.6**	**0.48**	**0.73**	**0.42**	**0.62**	**0.52**
PCB-101	--	**0.31**	**0.3**	0.097 U	0.097 U	0.099 U	**0.28**	**1.7**	**1.8**	**2**	**2**	**2.2**	**0.93**	**1.3**	**1**	**1**	**1.1**	**0.87**	**1.1**	**0.85**
PCB-105	--	0.055 U	0.055 U	0.054 U	0.054 U	0.055 U	0.055 U	0.064 U	0.054 U	0.054 U	0.055 U	0.055 U	0.056 U	**0.41**	**0.38**	**0.45**	**0.42**	**0.26**	**0.38**	**0.35**
PCB-110	--	0.046 U	0.046 U	0.045 U	0.045 U	0.046 U	0.046 U	**1.2**	**1.2**	**1.7**	**1.5**	**1.7**	**0.78**	**0.89**	**0.62**	**0.58**	**0.68**	**0.51**	**0.83**	**0.58**
PCB-114	--	0.083 U	0.083 U	0.081 U	0.081 U	0.083 U	0.083 U	0.096 U	0.081 U	0.08 U	0.082 U	0.083 U	0.084 U	0.081 U	0.081 U	0.083 U	0.084 U	0.08 U	0.081 U	0.082 U
PCB-118	--	**0.26**	**0.24**	0.083 U	0.083 U	0.085 U	0.085 U	**0.92**	**0.96**	**1.2**	**1.1**	**1.2**	**0.51**	**0.66**	**0.56**	**0.57**	**0.58**	**0.47**	**0.66**	**0.39**
PCB-119	--	0.095 U	0.095 U	0.094 U	0.094 U	0.095 U	0.095 U	0.11 U	0.094 U	0.093 U	0.094 U	0.095 U	0.096 U	0.094 U	0.094 U	0.095 U	0.096 U	0.093 U	0.094 U	0.094 U
PCB-123	--	0.11 U	0.11 U	0.1 U	0.1 U	0.11 U	0.11 U	0.12 U	0.1 U	0.1 U	0.1 U	0.11 U	0.11 U	0.1 U	0.1 U	0.11 U	0.11 U	0.1 U	0.1 U	0.1 U
PCB-126	--	0.081 U	0.081 U	0.079 U	0.079 U	0.081 U	0.081 U	0.094 U	0.079 U	0.078 U	0.08 U	0.081 U	0.082 U	0.079 U	0.079 U	0.081 U	0.082 U	0.078 U	0.079 U	0.08 U
PCB-128	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.12 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
PCB-132/153	--	**1.1**	**1.1**	**0.73**	**0.81**	**0.7**	**0.99**	**2.2**	**2.1**	**2.3**	**2.4**	**2.6**	**1.8**	**2.1**	**1.7**	**1.9**	**2.1**	**1.6**	**2**	**1.6**
PCB-138/158	--	**0.84**	**0.75**	**0.54**	**0.56**	**0.46**	**0.56**	**1.5**	**1.6**	**1.8**	**1.8**	**1.9**	**1.2**	**1.7**	**1.3**	**1.4**	**1.5**	**1**	**1.5**	**1.2**
PCB-149	--	**0.38**	**0.39**	**0.3**	**0.35**	0.099 U	**0.31**	**1.2**	**1.3**	**1.3**	**1.4**	**1.4**	**1.2**	**1.2**	**0.95**	**0.97**	**1.1**	**0.86**	**1.2**	**0.95**
PCB-151	--	0.068 U	0.068 U	0.067 U	0.067 U	0.068 U	0.068 U	**0.38**	0.067 U	**0.43**	**0.47**	**0.4**	0.069 U	**0.31**	**0.26**	**0.3**	**0.43**	**0.23**	**0.36**	**0.3**
PCB-156	--	0.058 U	0.058 U	0.057 U	0.057 U	0.058 U	0.058 U	0.068 U	0.057 U	0.056 U	0.058 U	0.058 U	0.059 U	0.057 U	0.057 U	0.058 U	0.059 U	0.056 U	0.057 U	0.058 U
PCB-157	--	0.053 U	0.053 U	0.052 U	0.052 U	0.053 U	0.053 U	0.061 U	0.052 U	0.051 U	0.052 U	0.053 U	0.053 U	0.052 U	0.052 U	0.053 U	0.053 U	0.051 U	0.052 U	0.052 U
PCB-167	--	0.062 U	0.062 U	0.061 U	0.061 U	0.062 U	0.062 U	0.073 U	0.061 U	0.06 U	0.062 U	0.062 U	0.063 U	0.061 U	0.061 U	0.062 U	0.063 U	0.06 U	0.061 U	0.062 U
PCB-168	--	0.049 U	0.049 U	0.048 U	0.048 U	0.049 U	0.049 U	0.057 U	0.048 U	0.048 U	0.049 U	0.049 U	0.05 U	0.048 U	0.048 U	0.049 U	0.05 U	0.048 U	0.048 U	0.049 U
PCB-169	--	0.062 U	0.062 U	0.06 U	0.06 U	0.062 U	0.062 U	0.072 U	0.06 U	0.06 U	0.061 U	0.062 U	0.062 U	0.06 U	0.06 U	0.062 U	0.062 U	0.06 U	0.06 U	0.061 U
PCB-170	--	**0.29**	0.064 U	0.063 U	0.063 U	0.064 U	**0.22**	**0.3**	**0.44**	**0.5**	0.063 U	**0.42**	**0.34**	0.063 U	**0.33**	**0.32**	**0.44**	**0.32**	**0.39**	0.063 U
PCB-177	--	0.088 U	0.088 U	0.086 U	0.086 U	0.088 U	0.088 U	0.1 U	**0.23**	**0.28**	0.087 U	0.088 U	0.089 U	0.086 U	0.086 U	0.088 U	0.089 U	**0.24**	0.086 U	0.087 U
PCB-180	--	0.042 U	0.042 U	0.042 U	0.042 U	0.042 U	0.042 U	0.049 U	0.042 U	0.041 U	0.042 U	0.042 U	0.043 U	0.042 U	**0.69**	0.042 U	0.043 U	**0.64**	**0.85**	**0.61**
PCB-183	--	**0.26**	**0.21**	0.11 U	0.11 U	0.11 U	**0.24**	**0.29**	**0.29**	**0.31**	**0.33**	**0.43**	**0.21**	**0.4**	**0.32**	**0.29**	**0.32**	**0.24**	**0.31**	**0.2 J**
PCB-187	--	**0.57**	**0.55**	**0.35**	**0.32**	**0.31**	**0.48**	**0.8**	**0.77**	**0.97**	**0.83**	**0.78**	**0.67**	**0.79**	**0.65**	**0.68**	**0.79**	**0.6**	**0.88**	**0.59**
PCB-189	--	0.062 U	0.062 U	0.06 U	0.06 U	0.062 U	0.062 U	0.072 U	0.06 U	0.06 U	0.061 U	0.062 U	0.062 U	0.06 U	0.06 U	0.062 U	0.062 U	0.06 U	0.06 U	0.061 U
PCB-194	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	**0.34**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
PCB-201	--	0.098 U	0.098 U	0.096 U	0.096 U	0.098 U	0.098 U	0.11 U	0.096 U	0.095 U	0.097 U	0.098 U	0.099 U	0.096 U	0.096 U	0.098 U	0.099 U	0.095 U	0.096 U	0.097 U
PCB-206	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.23 U	**0.29**	**0.27**	**0.29**	0.19 U	0.2 U	0.19 U	**0.22**	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U

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

	Location ID	Time Zero	LA3-REF	LA3-REF	LA3-REF	LA3-REF	LA3-REF	TB	TB	TB	TB	TB	MCN1	MCN1	MCN1	MCN1	MCN1	MCN2	MCN2	MCN2
	Sample ID	T0-A-NEREIS-012418	LA3-REF-A-NEREIS-022218	LA3-REF-B-NEREIS-022218	LA3-REF-C-NEREIS-022218	LA3-REF-D-NEREIS-022218	LA3-REF-E-NEREIS-022218	TB-COMP-A-NEREIS-022218	TB-COMP-B-NEREIS-022218	TB-COMP-C-NEREIS-022218	TB-COMP-D-NEREIS-022218	TB-COMP-E-NEREIS-022218	MCN1-COMP-T-A-NEREIS-022218	MCN1-COMP-T-B-NEREIS-022218	MCN1-COMP-T-C-NEREIS-022218	MCN1-COMP-T-D-NEREIS-022218	MCN1-COMP-T-E-NEREIS-022218	MCN2-COMP-T-A-NEREIS-022218	MCN2-COMP-T-B-NEREIS-022218	MCN2-COMP-T-C-NEREIS-022218
	Sample Date	1/24/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018
	Matrix	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Chemical	FDA Action Level																			
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	MCN5	MCN5	MCN5	MCN5	MCN5	BIN	BIN
	Sample ID	MCN2-COMP-T-D-NEREIS-022218	MCN2-COMP-T-E-NEREIS-022218	MCN3-COMP-A-NEREIS-022218	MCN3-COMP-B-NEREIS-022218	MCN3-COMP-C-NEREIS-022218	MCN3-COMP-D-NEREIS-022218	MCN3-COMP-E-NEREIS-022218	MCN4-COMP-A-NEREIS-022218	MCN4-COMP-B-NEREIS-022218	MCN4-COMP-C-NEREIS-022218	MCN4-COMP-D-NEREIS-022218	MCN4-COMP-E-NEREIS-022218	MCN5-COMP-A-NEREIS-022218	MCN5-COMP-B-NEREIS-022218	MCN5-COMP-C-NEREIS-022218	MCN5-COMP-D-NEREIS-022218	MCN5-COMP-E-NEREIS-022218	BIN-COMP-T-A-NEREIS-022218	BIN-COMP-T-B-NEREIS-022218
	Sample Date	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018
	Matrix	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
	FDA Action Level																			
Conventional Parameters (%)																				
Lipids	--	**0.85**	**0.76**	**1.2**	**0.58**	**0.95**	**0.72**	**0.62**	**0.68**	**0.68**	**0.5**	**0.86**	**0.55**	**1.2**	**0.76**	**1**	**0.56**	**1**	**1**	**0.65**
Metals (mg/kg)																				
Mercury	1[1]	**0.0201**	**0.0148**	**0.016**	**0.0134**	**0.0231**	**0.0191 J**	**0.0148 J**	0.00339 UJ	**0.00459 J**	**0.00726 J**	**0.0182 J**	0.00356 UJ	**0.0109 J**	**0.00754 J**	**0.00381 J**	**0.0182 J**	**0.00358 J**	**0.0219 J**	**0.0123 J**
Organometallic Compounds (µg/kg)																				
Dibutyltin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pesticides (µg/kg)																				
2,4'-DDD (o,p'-DDD)	--	0.29 U	0.28 U	0.28 U	0.28 U	0.29 U	0.29 U	0.29 U	0.28 U	0.28 U	0.29 U	0.29 U	0.28 U	0.29 U	0.29 U	0.29 U	0.28 U	0.29 U	0.29 U	0.29 U
2,4'-DDE (o,p'-DDE)	5,000[2]	**1.7 J**	**4.5**	**1.8 J**	**1.3 J**	**1.5 J**	**2.1**	**1.3 J**	**1.6 J**	**1.2 J**	**1 J**	**1.3 J**	**1.9 J**	0.99 U	**1.3 J**	1 U	**1 J**	**1.5 J**	**1.6 J**	**1.3 J**
2,4'-DDT (o,p'-DDT)	5,000[2]	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.32 U	0.32 U	0.32 U
4,4'-DDD (p,p'-DDD)	--	**23**	**22**	**24**	**19**	**17**	**26**	**15**	**22**	**15**	**16**	**15**	**21**	**9.5 J**	**11**	**7.1**	**7.1**	**8.3 J**	**14**	**12**
4,4'-DDE (p,p'-DDE)	5,000[2]	**7.6**	**8.8**	**7**	**8.3**	**5.6**	**10**	**6**	**8.8**	**7.9**	**11**	**9.1**	**7.3 J**	**8.6 J**	**7.9 J**	**7.5**	**5.1**	**8.3 J**	**7.9 J**	**8**
4,4'-DDT (p,p'-DDT)	5,000[2]	0.44 U	0.43 U	0.43 U	0.43 U	0.44 U	0.44 U	0.45 U	0.43 U	0.43 U	0.44 U	0.45 U	0.43 U	0.44 U	0.45 U	0.44 U	0.43 U	0.45 U	0.45 U	0.44 U
Total DDx (U = 0)	5,000[2]	**32.3 J**	**35.3**	**32.8 J**	**28.6 J**	**24.1 J**	**38.1**	**22.3 J**	**32.4 J**	**24.1 J**	**28 J**	**25.4 J**	**30.2 J**	**18.1 J**	**20.2 J**	**14.6**	**13.2 J**	**18.1 J**	**23.5 J**	**21.3 J**
PCB Congeners (µg/kg)																				
PCB-018	--	0.071 U	**0.31**	**0.31**	**0.25**	0.071 U	**0.27**	0.073 U	0.07 U	0.07 U	0.072 U	**0.22**	0.07 U	0.071 U	0.073 U	0.072 U	0.07 U	0.073 U	0.073 U	0.072 U
PCB-028	--	0.034 U	0.033 U	0.033 U	0.033 U	0.034 U	0.034 U	0.034 U	0.033 U	0.033 U	0.034 U	0.034 U	0.033 U	0.034 U	0.034 U	0.034 U	0.033 U	0.034 U	0.034 U	0.034 U
PCB-037	--	0.06 U	0.06 U	0.059 U	0.06 U	0.06 U	0.061 U	0.062 U	0.059 U	0.06 U	0.061 U	0.062 U	0.059 U	0.06 U	0.062 U	0.061 U	0.059 U	0.062 U	0.062 U	0.061 U
PCB-044	--	0.087 U	0.086 U	**0.39**	0.086 U	0.087 U	0.088 U	0.089 U	0.085 U	0.086 U	0.088 U	0.089 U	**0.25**	0.087 U	0.089 U	0.088 U	0.085 U	0.089 U	0.089 U	0.088 U
PCB-049	--	0.11 U	**0.31**	**0.26**	**0.22**	0.11 U	0.11 U	**0.21**	**0.25**	**0.28**	0.11 U	0.11 U	**0.26**	**0.25**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
PCB-052	--	**0.82**	**0.9**	**0.89**	**0.55**	**0.64**	**1**	**0.46**	**0.32**	**0.56**	**0.52**	**0.66**	**0.43**	**0.53**	**0.65**	**0.39**	0.061 U	**0.44**	**0.55**	**0.41**
PCB-066	--	**0.43**	**0.6**	**0.6**	**0.39**	**0.28**	**0.49**	**0.42**	**0.27**	**0.56**	**0.35**	**0.21**	**0.5**	**0.27**	**0.22**	**0.28**	0.1 U	0.1 U	**0.36**	0.1 U
PCB-070	--	0.06 U	0.059 U	0.058 U	0.059 U	0.06 U	0.06 U	0.061 U	0.058 U	0.059 U	0.06 U	0.061 U	0.058 U	0.06 U	0.061 U	0.06 U	0.058 U	0.061 U	0.061 U	0.06 U
PCB-074	--	0.087 U	**0.26**	0.085 U	0.086 U	0.087 U	0.088 U	0.089 U	0.085 U	0.086 U	0.088 U	0.089 U	0.085 U	0.087 U	0.089 U	0.088 U	0.085 U	0.089 U	0.089 U	0.088 U
PCB-077	--	0.078 U	0.077 U	0.076 U	0.077 U	0.078 U	0.078 U	0.079 U	0.076 U	0.077 U	0.078 U	0.079 U	0.076 U	0.078 U	0.079 U	0.078 U	0.076 U	0.079 U	0.079 U	0.078 U
PCB-081	--	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
PCB-087	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
PCB-099	--	**0.45**	**0.59**	**0.63**	**0.46**	**0.38**	**0.52**	**0.4**	**0.26**	**0.44**	**0.33**	**0.23**	**0.3**	**0.27**	**0.33**	**0.2**	**0.25**	**0.35**	**0.33**	**0.23**
PCB-101	--	**0.98**	**1**	**0.97**	**0.71**	**0.69**	**1**	**0.62**	**0.51**	**0.61**	**0.61**	**0.6**	**0.44**	**0.63**	**0.65**	**0.48**	**0.44**	**0.51**	**0.68**	**0.52**
PCB-105	--	**0.49**	**0.46**	**0.33**	0.054 U	0.055 U	**0.41**	0.056 U	0.054 U	0.054 U	0.055 U	0.056 U	0.054 U	0.055 U	0.056 U	0.055 U	0.054 U	0.056 U	0.056 U	0.055 U
PCB-110	--	**0.53**	**0.71**	**0.66**	**0.51**	**0.47**	**0.64**	**0.36**	**0.33**	**0.4**	**0.33**	**0.42**	**0.42**	**0.42**	**0.49**	**0.36**	**0.3**	**0.44**	**0.56**	**0.42**
PCB-114	--	0.082 U	0.081 U	0.08 U	0.081 U	0.082 U	0.083 U	0.084 U	0.08 U	0.081 U	0.083 U	0.084 U	0.08 U	0.082 U	0.084 U	0.083 U	0.08 U	0.084 U	0.084 U	0.083 U
PCB-118	--	**0.37**	**0.5**	**0.69**	**0.51**	**0.4**	**0.52**	**0.29**	**0.31**	**0.3**	**0.31**	**0.33**	**0.35**	**0.32**	0.086 U	**0.27**	**0.27**	0.086 U	**0.32**	**0.25**
PCB-119	--	0.094 U	0.094 U	0.093 U	0.094 U	0.094 U	0.095 U	0.096 U	0.093 U	0.094 U	0.095 U	0.096 U	0.093 U	0.094 U	0.096 U	0.095 U	0.093 U	0.096 U	0.096 U	0.095 U
PCB-123	--	0.1 U	0.1 U	**0.34**	0.1 U	0.1 U	0.11 U	0.11 U	0.1 U	0.1 U	0.11 U	0.11 U	0.1 U	0.1 U	0.11 U	0.11 U	0.1 U	0.11 U	0.11 U	0.11 U
PCB-126	--	0.08 U	0.079 U	0.078 U	0.079 U	0.08 U	0.081 U	0.082 U	0.078 U	0.079 U	0.081 U	0.082 U	0.078 U	0.08 U	0.082 U	0.081 U	0.078 U	0.082 U	0.082 U	0.081 U
PCB-128	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
PCB-132/153	--	**1.7**	**1.9**	**2.2**	**1.5**	**1.5**	**2**	**1.5**	**1.5**	**1.7**	**1.6**	**1.2**	**1.4**	**1.5**	**1.5**	**1.3**	**1.1**	**1.4**	**1.4**	**1.3**
PCB-138/158	--	**1.2**	**1.5**	**1.9**	**1.3**	**1**	**1.7**	**1.1**	**1**	**1.2**	**0.95**	**0.94**	**0.92**	**1.3**	**1.1**	**0.87**	**0.75**	**1**	**1**	**1.1**
PCB-149	--	**0.89**	**1.1**	**1.2**	**0.82**	**0.91**	**1.1**	**0.75**	**0.87**	**0.9**	**0.7**	**0.7**	**0.82**	**0.76**	**0.77**	**0.64**	**0.59**	**0.71**	**0.85**	**0.78**
PCB-151	--	**0.3**	**0.33**	**0.35**	**0.25**	**0.21**	**0.36**	0.069 U	0.066 U	0.067 U	0.068 U	0.069 U	0.066 U	0.067 U	0.069 U	0.068 U	0.066 U	0.069 U	0.069 U	0.068 U
PCB-156	--	0.058 U	0.057 U	0.056 U	0.057 U	0.058 U	0.058 U	0.059 U	0.056 U	0.057 U	0.058 U	0.059 U	0.056 U	0.058 U	0.059 U	0.058 U	0.056 U	0.059 U	0.059 U	0.058 U
PCB-157	--	0.052 U	0.052 U	0.051 U	0.052 U	0.052 U	0.053 U	0.053 U	0.051 U	0.052 U	0.053 U	0.053 U	0.051 U	0.052 U	0.053 U	0.053 U	0.051 U	0.053 U	0.053 U	0.053 U
PCB-167	--	0.062 U	0.061 U	0.06 U	0.061 U	0.062 U	0.062 U	0.063 U	0.06 U	0.061 U	0.062 U	0.063 U	0.06 U	0.062 U	0.063 U	0.062 U	0.06 U	0.063 U	0.063 U	0.062 U
PCB-168	--	0.049 U	0.048 U	0.048 U	0.048 U	0.049 U	0.049 U	0.05 U	0.048 U	0.048 U	0.049 U	0.05 U	0.048 U	0.049 U	0.05 U	0.049 U	0.048 U	0.05 U	0.05 U	0.049 U
PCB-169	--	0.061 U	0.06 U	0.06 U	0.06 U	0.061 U	0.062 U	0.062 U	0.06 U	0.06 U	0.062 U	0.062 U	0.06 U	0.061 U	0.062 U	0.062 U	0.06 U	0.062 U	0.062 U	0.062 U
PCB-170	--	0.063 U	**0.42**	**0.56**	**0.27**	0.063 U	**0.48**	**0.31**	0.062 U	**0.34**	0.064 U	0.065 U	0.062 U	**0.44**	**0.37**	**0.29**	**0.27**	0.065 U	**0.37**	**0.27**
PCB-177	--	0.087 U	0.086 U	0.085 U	0.086 U	0.087 U	0.088 U	0.089 U	0.085 U	0.086 U	0.088 U	0.089 U	0.085 U	0.087 U	0.089 U	0.088 U	0.085 U	0.089 U	0.089 U	0.088 U
PCB-180	--	0.042 U	**0.83**	**1**	0.042 U	0.042 U	**0.73**	0.043 U	0.041 U	0.042 U	**0.71**	0.043 U	0.041 U	**0.67**	**0.6**	**0.49**	**0.39**	**0.65**	0.043 U	0.042 U
PCB-183	--	**0.27**	**0.26**	**0.4**	**0.23**	**0.26**	**0.35**	**0.27**	**0.39**	**0.31**	**0.29**	**0.26**	**0.31**	**0.25**	**0.22**	**0.2**	0.11 U	**0.22**	**0.26**	0.11 U
PCB-187	--	**0.63**	**0.7**	**0.84**	**0.62**	**0.64**	**0.86**	**0.54**	**0.55**	**0.73**	**0.57**	**0.61**	**0.54**	**0.69**	**0.69**	**0.56**	**0.43**	**0.61**	**0.65**	**0.38**
PCB-189	--	0.061 U	0.06 U	0.06 U	0.06 U	0.061 U	0.062 U	0.062 U	0.06 U	0.06 U	0.062 U	0.062 U	0.06 U	0.061 U	0.062 U	0.062 U	0.06 U	0.062 U	0.062 U	0.062 U
PCB-194	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
PCB-201	--	0.097 U	0.096 U	0.095 U	0.096 U	0.097 U	0.098 U	0.099 U	0.095 U	0.096 U	0.098 U	0.099 U	0.095 U	0.097 U	0.099 U	0.098 U	0.095 U	0.099 U	0.099 U	0.098 U
PCB-206	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	**0.42**	0.19 U	0.19 U	0.2 U	0.2 U	0.19 U

Table 24

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

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

	Location ID	BIN	BIN	BIN	BIME	BIME	BIME	BIME	BIME	BIMW	BIMW	BIMW	BIMW	BIMW	BIS	BIS	BIS	BIS	BIS
	Sample ID	BIN-COMP-T-C-NEREIS-022218	BIN-COMP-T-D-NEREIS-022218	BIN-COMP-T-E-NEREIS-022218	BIME-COMP-T-M-A-NEREIS-022218	BIME-COMP-T-M-B-NEREIS-022218	BIME-COMP-T-M-C-NEREIS-022218	BIME-COMP-T-M-D-NEREIS-022218	BIME-COMP-T-M-E-NEREIS-022218	BIMW-COMP-T-M-A-NEREIS-022218	BIMW-COMP-T-M-B-NEREIS-022218	BIMW-COMP-T-M-C-NEREIS-022218	BIMW-COMP-T-M-D-NEREIS-022218	BIMW-COMP-T-M-E-NEREIS-022218	BIS-COMP-A-NEREIS-022218	BIS-COMP-B-NEREIS-022218	BIS-COMP-C-NEREIS-022218	BIS-COMP-D-NEREIS-022218	BIS-COMP-E-NEREIS-022218
	Sample Date	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018
	Matrix	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Chemical	**FDA Action Level**																		
Total PCB Congener (U = 0)	2,000[3]	**9.72 J**	**10.24**	**7.03**	**11.58**	**11.47**	**9.64**	**10.26**	**9.53**	**7.43**	**7.57**	**9.22**	**7.21**	**9.72**	--	--	--	--	--

Notes:

All non-detect results are reported at the method detection limit.

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

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

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

USEPA Stage 2A data validation was completed by Anchor QEA.

Bold: detected result

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

J: estimated value

N: normal environmental sample

U: compound analyzed but not detected above detection limit

1. Action level for methyl mercury.
2. Action level for DDT and DDE (individually or in combination).
3. Tolerance level for PCBs. No action level.

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

	Location ID	Time Zero	LA3-REF	LA3-REF	LA3-REF	LA3-REF	LA3-REF	NC2	NC2	NC2	NC2	NC2	NC3	NC3	NC3	NC3	NC3
	Sample ID	T0-A-MACOMA-022619	LA3-REF-A-MACOMA-032719	LA3-REF-B-MACOMA-032719	LA3-REF-C-MACOMA-032719	LA3-REF-D-MACOMA-032719	LA3-REF-E-MACOMA-032719	NC2-COMP-A-MACOMA-032719	NC2-COMP-B-MACOMA-032719	NC2-COMP-C-MACOMA-032719	NC2-COMP-D-MACOMA-032719	NC2-COMP-E-MACOMA-032719	NC3-COMP-A-MACOMA-032719	NC3-COMP-B-MACOMA-032719	NC3-COMP-C-MACOMA-032719	NC3-COMP-D-MACOMA-032719	NC3-COMP-E-MACOMA-032719
	Sample Date	2/26/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019
	Matrix	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Chemicals	**FDA Action Level**																
Conventional Parameters (%)																	
Lipids	--	**0.72**	**0.63**	**0.32**	**0.39**	**0.53**	**0.38**	**0.34**	**0.32**	**0.38**	**0.34**	**0.49**	**0.25**	**0.54**	**0.38**	**0.44**	**0.48**
Metals (mg/kg)																	
Mercury	1[1]	**0.00535 J**	**0.00721 J**	**0.00707 J**	**0.0175 J**	**0.00919 J**	**0.0143 J**	**0.0197 J**	**0.0155 J**	**0.0224 J**	**0.0137 J**	**0.0228 J**	**0.0122 J**	**0.0127 J**	**0.015 J**	**0.0124 J**	**0.0144 J**

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

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

	Location ID	Time Zero	LA3-REF	LA3-REF	LA3-REF	LA3-REF	LA3-REF	NC2	NC2	NC2	NC2	NC2	NC3	NC3	NC3	NC3	NC3
	Sample ID	T0-A-NEREIS-022619	LA3-REF-A-NEREIS-032719	LA3-REF-B-NEREIS-032719	LA3-REF-C-NEREIS-032719	LA3-REF-D-NEREIS-032719	LA3-REF-E-NEREIS-032719	NC2-COMP-A-NEREIS-032719	NC2-COMP-B-NEREIS-032719	NC2-COMP-C-NEREIS-032719	NC2-COMP-D-NEREIS-032719	NC2-COMP-E-NEREIS-032719	NC3-COMP-A-NEREIS-032719	NC3-COMP-B-NEREIS-032719	NC3-COMP-C-NEREIS-032719	NC3-COMP-D-NEREIS-032719	NC3-COMP-E-NEREIS-032719
	Sample Date	2/26/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019
	Matrix	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Chemicals	**FDA Action Level**																
Conventional Parameters (%)																	
Lipids	--	**0.96**	**0.82**	**0.9**	**0.86**	**0.77**	**0.52**	**0.71**	**0.54**	**0.5**	**0.68**	**0.54**	**1.1**	**0.41**	**0.42**	**0.96**	**0.52**
Metals (mg/kg)																	
Mercury	1[1]	**0.0302 J**	**0.00628 J**	**0.0218 J**	**0.00519 J**	**0.023 J**	**0.0254 J**	**0.0239 J**	**0.0213 J**	**0.00924 J**	**0.0235 J**	**0.011 J**	**0.0197 J**	**0.0229 J**	**0.0253 J**	**0.00842 J**	**0.0259 J**

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

3.4.1 Comparison of Tissue Burdens to U.S. Food and Drug Administration Action Levels

A comparison of FDA action levels for poisonous or deleterious substances in fish and shellfish for human food is presented in Tables 23 through 26. The FDA action level for mercury is 1 mg/kg of methyl mercury. Methyl mercury is only a fraction of the total mercury concentration. All concentrations of mercury in tissues exposed to LNB federal channels sediments were less than this action level. The FDA action level for DDT and DDE (individually or in combination) is 5,000 µg/kg. All concentrations of DDTs in tissues exposed to LNB sediments were less than this action level. The FDA does not have action levels for PCBs or dibutyltin. Total PCB concentrations were compared to the FDA tolerance level of 2,000 µg/kg. All PCB concentrations in tissues exposed to federal channels sediments were less than this tolerance level. FDA actions levels were not exceeded or absent; therefore, results were also compared to tissue concentrations of organisms exposed to reference sediment.

3.4.2 Comparison of Tissue Burdens to Reference Sediment Tissue Burdens

Bioaccumulation data were analyzed by statistically comparing chemical concentrations in tissues of organisms exposed to project material to tissues of organisms exposed to reference sediment (Appendix F). Results of statistical analysis are presented in Tables 27 and 28.

3.4.2.1 Macoma nasuta

Mercury, four DDT derivatives (2,4′-DDD, 2,4′-DDE, 4,4′-DDD, and 4,4′-DDE), total DDTs, dibutyltin, several PCB congeners, and total PCBs were statistically elevated in *M. nasuta* tissue samples exposed to federal channels sediments. Mercury was statistically elevated in tissues from four DUs (Turning Basin and Main Channels 1, 2, and 3). The magnitudes of exceedances were low, with mean mercury concentrations ranging from 2.2 to 9.1 times greater than the reference. DDTs were statistically elevated in tissues from all DUs tested. Mean DDT derivative concentrations ranged from 1.8 to 80.3 times greater than the reference, while mean total DDT concentrations ranged from 7.8 to 17.3 times greater than the reference. Dibutyltin was statistically elevated in tissues from the Turning Basin. The mean dibutyltin concentration was 9.3 times greater than the reference. PCBs were statistically elevated in tissues from all DUs tested, except Bay Island South. Mean PCB congener concentrations ranged from 2.4 to 106 times greater than the reference, while mean total PCB concentrations ranged from 12.8 to 65.2 times greater than the reference.

3.4.2.2 Nereis virens

Three DDT derivatives (2,4′-DDE, 4,4′-DDD and 4,4′-DDE), total DDTs, several PCB congeners, and total PCBs were statistically elevated in *N. virens* tissue samples exposed to federal channels sediments. DDTs were statistically elevated in tissues from eight DUs (Main Channel North 2, 3, 4, and 5; and Bay Island North, Middle East and West, and South). Mean DDT derivative concentrations ranged from 2.9 to 55.4 times greater than the reference, while mean total DDT concentrations ranged from 9.2 to 18.2 times greater than the reference. PCBs were statistically elevated in tissues from all DUs tested, except Bay Island South. Mean PCB congener concentrations ranged from 1.5 to 70.9 times greater than the reference, while mean total PCB concentrations ranged from 2.9 to 9.6 times greater than the reference.

3.4.3 Comparison of Tissue Burdens to Environmental Residue Effects Database

The comparison of day zero corrected project tissue concentrations to selected ERED TRVs is presented in Tables 27 and 28. All concentrations were less than selected ERED TRVs. A summary of the rationale for selection of each TRV is presented in Table 29.

Table 27
Summary of Statistically Elevated *Macoma nasuta* Tissue Residues

Dredge Unit	Analyte	Units	MDL[1]	Day 0 Tissue Concentration	Reference Mean Tissue Concentration	Project Area Mean Tissue Concentration	P Value	Project Area Mean: Reference Mean Ratio	Day 0 Corrected Project Area Mean Tissue Concentration	ERED[2]	TRV	Conclusion: Project Tissue > TRV?
Turning Basin	4,4'-DDE	µg/kg	2.2	0.22 U	4.3	7.58	0.0216	1.76	7.58	No relevant effects in ERED.	--	--
	Dibutyltin	µg/kg	0.75	0.36 U	0.367 U	3.42	0.0283	9.31	3.42	NOED: 48 µg/kg for reproduction in Atlantic dogwinkle *Nucella lapillus* (controlled laboratory study; single chemical exposure).	48	No
	Mercury	mg/kg	0.00371	0.00698	0.0046	0.0414	<.0001	9.10	0.0344	LOED: 8.0 mg/kg for development of the common slipper shell *Crepidula fornicata*.	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 *Asterias rubens*.	162[4]	No
Main Channel North 1	4,4'-DDD	µg/kg	2.5	0.25 U	0.309	7.78	0.0074	25.2	7.78	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	2.3	0.22 U	4.3	15.2	0.0122	3.53	15.2	No relevant effects in ERED.	--	--
	Mercury	mg/kg	0.00356	0.0070	0.0046	0.0174	<.0001	3.82	0.0104	LOED: 8.0 mg/kg for development of the common slipper shell *C. fornicata*.	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 *A. rubens.*	162[4]	No
Main Channel North 2	2,4'-DDD	µg/kg	0.29	0.145 U	0.143 U	0.908	0.0122	6.35	0.91	No relevant effects in ERED.	--	--
	2,4'-DDE	µg/kg	1	0.495 U	0.677	1.8	0.0367	2.66	1.8	No relevant effects in ERED.	--	--
	4,4'-DDD	µg/kg	5	0.25 U	0.309	17.5	<.0001	56.6	17.5	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.4	0.22 U	4.3	32.2	0.0122	7.49	32.2	No relevant effects in ERED.	--	--
	Mercury	mg/kg	0.00371	0.0070	0.0046	0.0166	<.0001	3.65	0.0096	LOED: 8.0 mg/kg for development of the common slipper shell *C. fornicata.*	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 *Leptocheirus plumulosus.*	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.087	0.095 U	0.474	14.0	0.0122	29.6	14.0	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
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 *C. fornicata.*	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 *L. plumulosus.*	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.088	0.095 U	0.474	9.82	0.0122	20.7	9.82	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
Main Channel North 4	2,4'-DDD	µg/kg	0.29	0.145 U	0.143 U	1.10	0.0122	7.72	1.10	No relevant effects in ERED.	--	--
	4,4'-DDD	µg/kg	5	0.25 U	0.309	12.6	<.0001	40.8	12.6	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.4	0.22 U	4.3	35.6	0.0122	8.28	35.6	No relevant effects in ERED.	--	--
	PCB049	µg/kg	0.11	0.055 U	0.055 U	0.252	0.0119	4.58	0.252	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.458	0.0122	14.6	0.458	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.418	0.0122	8.36	0.418	No relevant effects in ERED.	--	--
	PCB070	µg/kg	0.061	0.03 U	0.0298 U	0.338	0.0122	11.3	0.338	No relevant effects in ERED.	--	--
	PCB074	µg/kg	0.088	0.0435 U	0.0434 U	0.203	0.0367	4.67	0.203	No relevant effects in ERED.	--	--
	PCB087	µg/kg	0.11	0.055 U	0.055 U	0.488	0.0119	8.87	0.488	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.318	0.0122	4.36	0.318	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.062	0.0305 U	0.0303 U	0.338	0.0122	11.2	0.338	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.099	0.049 U	0.0489 U	0.594	0.0122	12.1	0.594	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0229 U	0.566	0.0122	24.7	0.566	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.085	0.042 U	0.105	0.460	0.0122	4.37	0.460	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	0.085 U	0.302	0.786	0.0122	2.60	0.786	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.096	0.047 U	0.120	0.682	0.0122	5.67	0.682	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.099	0.049 U	0.0489 U	0.592	<.0001	12.1	0.592	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.086	0.042 U	0.042 U	0.203	0.0367	4.82	0.203	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	0.495 U	4.69	50.7	<.0001	10.8	50.7	LD50: 2,690 µg/kg for mortality of the amphipod *L. plumulosus.*	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.088	0.095 U	0.474	6.82	0.0122	14.4	6.82	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
Main Channel North 5	2,4'-DDD	µg/kg	0.29	0.145 U	0.143 U	0.587	0.0216	4.10	0.587	No relevant effects in ERED.	--	--
	4,4'-DDD	µg/kg	2.5	0.25 U	0.309	6.8	0.0073	22.0	6.8	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	2.3	0.22 U	4.3	28	0.0122	6.51	28	No relevant effects in ERED.	--	--
	PCB049	µg/kg	0.11	0.055 U	0.055 U	0.156	0.0367	2.84	0.156	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.290	0.0122	9.27	0.290	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.396	0.0122	7.92	0.396	No relevant effects in ERED.	--	--
	PCB070	µg/kg	0.061	0.03 U	0.0298 U	0.268	0.0122	8.99	0.268	No relevant effects in ERED.	--	--
	PCB087	µg/kg	0.11	0.055 U	0.055 U	0.440	0.0122	8.00	0.440	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.298	0.0122	4.08	0.298	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.062	0.0305 U	0.0303 U	0.342	0.0122	11.3	0.342	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.099	0.049 U	0.0489 U	0.524	0.0122	10.7	0.524	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0229 U	0.498	0.0122	21.7	0.498	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.085	0.042 U	0.105	0.410	0.0122	3.89	0.410	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	0.085 U	0.302	0.730	0.0122	2.42	0.730	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.096	0.047 U	0.120	0.634	0.0122	5.27	0.634	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.099	0.049 U	0.0489 U	0.546	<.0001	11.2	0.546	No relevant effects in ERED.	--	--

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 *L. plumulosus.*	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.088	0.095 U	0.474	6.08	0.0122	12.8	6.08	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
Bay Island North	2,4'-DDD	µg/kg	0.29	0.145 U	0.143 U	0.671	0.0216	4.69	0.671	No relevant effects in ERED.	--	--
	4,4'-DDD	µg/kg	5.1	0.25 U	0.309	11	<.0001	35.6	11	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.5	0.22 U	4.3	37	0.0122	8.60	37	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.360	0.0216	11.5	0.360	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.468	0.0122	9.36	0.468	No relevant effects in ERED.	--	--
	PCB070	µg/kg	0.061	0.03 U	0.0298 U	0.286	0.0216	9.60	0.286	No relevant effects in ERED.	--	--
	PCB087	µg/kg	0.11	0.055 U	0.055 U	0.442	0.0122	8.04	0.442	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.366	0.0119	5.01	0.366	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.062	0.0305 U	0.0303 U	0.426	0.0122	14.1	0.426	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.099	0.049 U	0.0489 U	0.600	0.0122	12.3	0.600	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0229 U	0.570	0.0122	24.9	0.570	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.085	0.042 U	0.105	0.450	0.0122	4.27	0.450	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	0.085 U	0.302	0.788	0.0122	2.61	0.788	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.096	0.047 U	0.120	0.678	0.0122	5.64	0.678	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.099	0.049 U	0.0489 U	0.596	<.0001	12.2	0.596	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	0.495 U	4.69	50.4	<.0001	10.8	50.4	LD50: 2,690 µg/kg for mortality of the amphipod *L. plumulosus .*	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.088	0.095 U	0.474	6.57	0.0122	13.9	6.57	1,620 µg/kg: significant difference in embryo development of *A. rubens*	162[4]	No
Bay Island Middle East	2,4'-DDD	µg/kg	0.29	0.145 U	0.143 U	2.17	0.0122	15.2	2.17	No relevant effects in ERED.	--	--
	2,4'-DDE	µg/kg	1	0.495 U	0.677	2.52	0.0122	3.72	2.52	No relevant effects in ERED.	--	--
	4,4'-DDD	µg/kg	5.1	0.25 U	0.309	24.8	<.0001	80.3	24.8	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.5	0.22 U	4.3	51.6	0.0122	12.0	51.6	No relevant effects in ERED.	--	--
	PCB049	µg/kg	0.11	0.055 U	0.055 U	0.322	0.0122	5.85	0.322	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.504	0.0122	16.1	0.504	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.644	0.0122	12.9	0.644	No relevant effects in ERED.	--	--
	PCB070	µg/kg	0.061	0.03 U	0.0298 U	0.454	0.0122	15.2	0.454	No relevant effects in ERED.	--	--
	PCB074	µg/kg	0.088	0.0435 U	0.0434 U	0.294	0.0122	6.77	0.294	No relevant effects in ERED.	--	--
	PCB087	µg/kg	0.11	0.055 U	0.055 U	0.674	0.0122	12.3	0.674	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.458	0.0122	6.27	0.458	No relevant effects in ERED.	--	--
	PCB097	µg/kg	0.14	0.07 U	0.069 U	0.308	0.0007	4.46	0.308	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.062	0.0305 U	0.0303 U	0.454	0.0122	15.0	0.454	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.099	0.049 U	0.0489 U	0.788	0.0122	16.1	0.788	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0229 U	0.764	0.0122	33.4	0.764	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.085	0.042 U	0.105	0.608	0.0122	5.77	0.608	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	0.085 U	0.302	1.04	0.0122	3.44	1.04	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.096	0.047 U	0.120	0.824	0.0122	6.85	0.824	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.099	0.049 U	0.0489 U	0.768	<.0001	15.7	0.768	No relevant effects in ERED.	--	--
	PCB151	µg/kg	0.068	0.0335 U	0.0336 U	0.225	0.0367	6.69	0.225	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.086	0.042 U	0.042 U	0.260	0.0122	6.19	0.260	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	0.495 U	4.69	81.1	<.0001	17.3	81.1	LD50: 2,690 µg/kg for mortality of the amphipod *L. plumulosus.*	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.088	0.095 U	0.474	9.62	0.0122	20.3	9.62	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
Bay Island Middle West	2,4'-DDD	µg/kg	0.29	0.145 U	0.143 U	1.34	0.0122	9.40	1.34	No relevant effects in ERED.	--	--
	2,4'-DDE	µg/kg	1	0.495 U	0.677	2.68	0.0122	3.96	2.68	No relevant effects in ERED.	--	--

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.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	0.495 U	4.69	74.6	<.0001	15.9	74.6	LD50: 2,690 µg/kg for mortality of the amphipod *L. plumulosus.*	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.087	0.095 U	0.474	7.80	0.0122	16.5	7.80	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
Bay Island South	4,4'-DDD	µg/kg	5	0.25 U	0.309	10.5	<.0001	34.0	10.5	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.5	0.22 U	4.3	31.4	0.0122	7.30	31.4	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	0.495 U	4.69	43.2	<.0001	9.21	43.2	LD50: 2,690 µg/kg for mortality of the amphipod L. plumulosus.	134[3]	No

Notes:
Organics were normalized to percent lipids prior to statistical analysis.
U: non-detect; half the detection limit shown
1. If MDL differed between samples, maximum MDL is presented.
2. Tissue effects data from the ERED (USACE 2018)
3. An uncertainty factor of 20 was applied to ED50 and/or LD50 values to estimate LOED (USACHPPM 2000).
4. Full dose/response curve not measured; therefore, an uncertainty factor of 10 was applied to estimate LOED (Lin and Davis 2018; USACHPPM 2000).

Table 28
Summary of Statistically Elevated *Nereis virens* Tissue Residues

Dredge Unit	Analyte	Units	MDL[1]	Day 0 Tissue Concentration	Reference Mean Tissue Concentration	Project Area Mean Tissue Concentration	P Value	Project Area Mean: Reference Mean Ratio	Day 0 Corrected Project Area Mean Tissue Concentration	ERED[2]	TRV	Conclusion: Project Tissue > TRV?
Turning Basin	PCB018	µg/kg	0.084	0.036 U	0.0356 U	0.716	0.0122	20.1	0.716	No relevant effects in ERED.	--	--
	PCB028	µg/kg	0.039	0.017 U	0.0168 U	0.896	0.0122	53.3	0.896	No relevant effects in ERED.	--	--
	PCB044	µg/kg	0.1	0.044 U	0.0436 U	0.746	0.0122	17.1	0.746	No relevant effects in ERED.	--	--
	PCB049	µg/kg	0.13	0.055 U	0.055 U	0.748	0.0122	13.6	0.748	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.074	0.0315 U	0.0313 U	2.22	0.0122	70.9	2.22	No relevant effects in ERED.	--	--
	PCB056	µg/kg	0.15	0.065 U	0.063 U	0.49	0.0122	7.78	0.49	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.12	0.05 U	0.05 U	1.42	0.0122	28.4	1.42	No relevant effects in ERED.	--	--
	PCB070	µg/kg	0.07	0.03 U	0.0298 U	0.43	0.0122	14.4	0.43	No relevant effects in ERED.	--	--
	PCB074	µg/kg	0.1	0.044 U	0.0436 U	0.46	0.0122	10.6	0.46	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.17	0.075 U	0.073 U	1.6	0.0122	21.9	1.6	No relevant effects in ERED.	--	--
	PCB097	µg/kg	0.16	0.07 U	0.068 U	0.612	0.0119	9.00	0.612	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.071	0.24	0.0303 U	1.01	0.0122	33.3	0.77	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.12	0.31	0.145	1.94	0.0122	13.4	1.63	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.054	0.023 U	0.0228 U	1.46	0.0122	64.0	1.46	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.099	0.26	0.082	1.08	0.0122	13.2	0.816	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.2	1.1	0.866	2.32	<.0001	2.68	1.22	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.11	0.84	0.574	1.72	<.0001	3.00	0.88	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.11	0.38	0.280	1.32	<.0001	4.72	0.94	No relevant effects in ERED.	--	--
	PCB151	µg/kg	0.079	0.034 U	0.0338 U	0.343	0.0122	10.1	0.343	No relevant effects in ERED.	--	--
	PCB170	µg/kg	0.075	0.29	0.069	0.338	0.0216	4.87	0.048	No relevant effects in ERED.	--	--
	PCB183	µg/kg	0.13	0.26	0.123	0.33	<.0001	2.68	0.07	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.099	0.57	0.402	0.83	<.0001	2.06	0.26	No relevant effects in ERED.	--	--
	PCB206	µg/kg	0.23	0.095 U	0.095 U	0.212	0.0216	2.23	0.212	No relevant effects in ERED.	--	--
	Total PCB Congeners (ND = 0)	µg/kg	0.1	4.85	2.45	23.7	0.0122	9.64	18.8	1,620 µg/kg: significant difference in embryo development of *Asterias rubens* .	162[4]	No
Main Channel North 1	PCB049	µg/kg	0.11	0.055 U	0.055 U	0.344	0.0122	6.25	0.344	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.828	0.0122	26.5	0.828	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.658	0.0122	13.2	0.658	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.872	0.0122	11.9	0.872	No relevant effects in ERED.	--	--
	PCB097	µg/kg	0.14	0.07 U	0.068 U	0.304	0.0122	4.47	0.304	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.062	0.24	0.0303 U	0.628	0.0122	20.7	0.388	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.1	0.31	0.145	1.07	0.0122	7.34	0.756	No relevant effects in ERED.	--	--
	PCB105	µg/kg	0.056	0.0275 U	0.0273 U	0.338	0.0216	12.4	0.338	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0228 U	0.71	0.0122	31.1	0.71	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.086	0.26	0.082	0.576	0.0122	7.06	0.316	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	1.1	0.866	1.92	<.0001	2.22	0.82	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.096	0.84	0.574	1.42	<.0001	2.47	0.58	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.1	0.38	0.280	1.08	<.0001	3.87	0.704	No relevant effects in ERED.	--	--
	PCB151	µg/kg	0.069	0.034 U	0.0338 U	0.267	0.0216	7.90	0.267	No relevant effects in ERED.	--	--
	PCB170	µg/kg	0.065	0.29	0.069	0.292	0.0216	4.21	0.002	No relevant effects in ERED.	--	--

Table 28
Summary of Statistically Elevated *Nereis virens* Tissue Residues

Dredge Unit	Analyte	Units	MDL[1]	Day 0 Tissue Concentration	Reference Mean Tissue Concentration	Project Area Mean Tissue Concentration	P Value	Project Area Mean: Reference Mean Ratio	Day 0 Corrected Project Area Mean Tissue Concentration	ERED[2]	TRV	Conclusion: Project Tissue > TRV?
Main Channel North 1	PCB183	µg/kg	0.11	0.26	0.123	0.308	0.0004	2.50	0.048	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.086	0.57	0.402	0.716	<.0001	1.78	0.146	No relevant effects in ERED.	--	--
	Total PCB Congeners (ND = 0)	µg/kg	0.088	4.85	2.45	13.3	0.0122	5.42	8.46	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
Main Channel North 2	2,4'-DDE	µg/kg	0.99	2	0.918	2.64	0.0122	2.88	0.64	No relevant effects in ERED.	--	--
	4,4'-DDD	µg/kg	2.5	0.255 U	0.542	20.6	<.0001	38.0	20.6	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	2.2	1.8	1.52	8.3	0.001	5.47	6.5	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.063	0.0315 U	0.0313 U	0.864	0.0122	27.6	0.864	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.568	0.0122	11.4	0.568	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.83	0.0122	11.4	0.83	No relevant effects in ERED.	--	--
	PCB097	µg/kg	0.14	0.07 U	0.068 U	0.31	0.0122	4.56	0.31	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.061	0.24	0.0303 U	0.52	0.0122	17.2	0.28	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.098	0.31	0.145	0.96	0.0122	6.61	0.65	No relevant effects in ERED.	--	--
	PCB105	µg/kg	0.055	0.0275 U	0.0273 U	0.388	0.0122	14.21	0.388	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.046	0.023 U	0.0228 U	0.632	0.0122	27.7	0.632	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.084	0.26	0.082	0.478	0.0122	5.86	0.218	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.17	1.1	0.866	1.76	<.0001	2.03	0.66	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.094	0.84	0.574	1.28	<.0001	2.23	0.44	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.098	0.38	0.280	1	<.0001	3.57	0.62	No relevant effects in ERED.	--	--
	PCB151	µg/kg	0.067	0.034 U	0.0338 U	0.304	0.0122	8.99	0.304	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.084	0.57	0.402	0.68	0.0001	1.69	0.11	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	3.8	2.63	31.5	<.0001	12.0	27.7	LD50: 2,690 µg/kg for mortality of the amphipod *Leptocheirus plumulosus .*	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.086	4.85	2.45	12.2	0.0122	4.98	7.38	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
Main Channel North 3	4,4'-DDD	µg/kg	2.6	0.255 U	0.542	20.2	<.0001	37.3	20.2	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	2.2	1.8	1.52	7.38	0.0017	4.87	5.58	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.708	0.0122	22.6	0.708	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.436	0.0122	8.72	0.436	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.664	0.0122	9.10	0.664	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.062	0.24	0.0303 U	0.478	0.0122	15.8	0.238	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.1	0.31	0.1453	0.798	0.0122	5.49	0.488	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0228 U	0.528	0.0122	23.2	0.528	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.086	0.26	0.082	0.482	0.0122	5.91	0.222	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	1.1	0.866	1.74	<.0001	2.01	0.64	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.096	0.84	0.574	1.4	<.0001	2.44	0.56	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.1	0.38	0.280	0.956	<.0001	3.42	0.576	No relevant effects in ERED.	--	--
	PCB151	µg/kg	0.069	0.034 U	0.0338 U	0.241	0.0122	7.13	0.241	No relevant effects in ERED.	--	--
	PCB183	µg/kg	0.11	0.26	0.123	0.302	0.0014	2.46	0.042	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.086	0.57	0.402	0.7	<.0001	1.74	0.13	No relevant effects in ERED.	--	--

Table 28
Summary of Statistically Elevated *Nereis virens* Tissue Residues

Dredge Unit	Analyte	Units	MDL[1]	Day 0 Tissue Concentration	Reference Mean Tissue Concentration	Project Area Mean Tissue Concentration	P Value	Project Area Mean: Reference Mean Ratio	Day 0 Corrected Project Area Mean Tissue Concentration	ERED[2]	TRV	Conclusion: Project Tissue > TRV?
Main Channel North 3	Total DDTs (ND = 0)	µg/kg	0.29	3.8	2.63	29.2	<.0001	11.1	25.4	LD50: 2,690 µg/kg for mortality of the amphipod *L. plumulosus.*	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.088	4.85	2.45	10.9	0.0122	4.42	6.00	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
Main Channel 4	4,4'-DDD	µg/kg	5.1	0.255 U	0.542	17.8	<.0001	32.8	17.8	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.5	1.8	1.52	8.82	<.0001	5.82	7.02	No relevant effects in ERED.	--	--
	PCB018	µg/kg	0.073	0.036 U	0.0356 U	0.072	0.0361	2.03	0.072	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.498	0.0122	15.9	0.498	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.378	0.0122	7.56	0.378	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.46	0.0119	6.30	0.46	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.062	0.24	0.0303 U	0.312	0.0122	10.3	0.072	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.1	0.31	0.1453	0.554	0.0122	3.81	0.244	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0228 U	0.38	0.0122	16.7	0.38	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.086	0.26	0.082	0.32	0.0122	3.92	0.06	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	1.1	0.866	1.48	<.0001	1.71	0.38	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.096	0.84	0.574	1.00	<.0001	1.75	0.162	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.1	0.38	0.280	0.798	<.0001	2.85	0.418	No relevant effects in ERED.	--	--
	PCB183	µg/kg	0.11	0.26	0.123	0.312	<.0001	2.54	0.052	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.086	0.57	0.402	0.6	<.0001	1.49	0.03	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	3.8	2.63	28.0	<.0001	10.6	24.2	LD50: 2,690 µg/kg for mortality of the amphipod *L. plumulosus.*	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.088	4.85	2.45	7.60	0.0122	3.10	2.748	1,620 µg/kg: significant difference in embryo development of *A. rubens* .	162[4]	No
Main Channel North 5	4,4'-DDE	µg/kg	4.5	1.8	1.52	7.48	0.0133	4.93	5.68	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.408	0.0122	13.0	0.408	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.408	0.0122	5.59	0.408	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.062	0.24	0.0303 U	0.28	0.0122	9.24	0.04	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.1	0.31	0.145	0.542	0.0122	3.73	0.232	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0228 U	0.402	0.0122	17.6	0.402	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	1.1	0.866	1.36	0.0047	1.57	0.26	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.096	0.84	0.574	1.00	0.0007	1.75	0.164	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.1	0.38	0.280	0.694	0.0188	2.48	0.314	No relevant effects in ERED.	--	--
	PCB180	µg/kg	0.043	0.021 U	0.021 U	0.56	0.0122	26.7	0.56	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.086	0.57	0.402	0.596	0.0129	1.48	0.026	No relevant effects in ERED.	--	--
	Total PCB Congeners (ND = 0)	µg/kg	0.088	4.85	2.45	7.16	0.0122	2.92	2.31	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
Bay Island North	4,4'-DDD	µg/kg	5.1	0.255 U	0.542	13.6	0.0067	25.1	13.6	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.5	1.8	1.52	8.72	0.0035	5.75	6.92	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.522	0.0122	16.7	0.522	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.29	0.0216	5.80	0.29	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.546	0.0122	7.48	0.546	No relevant effects in ERED.	--	--
	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 L. plumulosus.	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.088	4.85	2.45	8.58	0.0122	3.50	3.73	1,620 µg/kg: significant difference in embryo development of *A. rubens* .	162[4]	No
Bay Island Middle East	2,4'-DDE	µg/kg	1	2	0.918	2.8	0.0122	3.05	0.8	No relevant effects in ERED.	--	--
	4,4'-DDD	µg/kg	5.1	0.255 U	0.542	30	<.0001	55.4	30	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.5	1.8	1.52	15	<.0001	9.89	13.2	No relevant effects in ERED.	--	--
	PCB049	µg/kg	0.12	0.055 U	0.055 U	0.286	0.0122	5.20	0.286	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.065	0.0315 U	0.0313 U	0.642	0.0122	20.5	0.642	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.11	0.05 U	0.05 U	0.426	0.0122	8.52	0.426	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.704	0.0122	9.64	0.704	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.063	0.24	0.0303 U	0.426	0.0122	14.1	0.186	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.1	0.31	0.1453	0.858	0.0122	5.91	0.548	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0228 U	0.481	0.0122	21.1	0.481	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	1.1	0.866	1.74	<.0001	2.01	0.64	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.097	0.84	0.574	1.34	<.0001	2.33	0.5	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.1	0.38	0.280	1.03	<.0001	3.68	0.65	No relevant effects in ERED.	--	--
	PCB170	µg/kg	0.065	0.29	0.069	0.382	0.0216	5.50	0.092	No relevant effects in ERED.	--	--
	PCB180	µg/kg	0.043	0.021 U	0.021 U	0.758	0.0122	36.1	0.758	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.087	0.57	0.402	0.668	0.0006	1.66	0.098	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	3.8	2.63	47.8	<.0001	18.2	44	LD50: 2,690 µg/kg for mortality of the amphipod *L. plumulosus.*	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.089	4.85	2.45	11.4	0.0122	4.65	6.55	1,620 µg/kg: significant difference in embryo development of *A. rubens* .	162[4]	No
Bay Island Middle West	2,4'-DDE	µg/kg	1	2	0.918	3.2	0.0216	3.49	1.2	No relevant effects in ERED.	--	--
	4,4'-DDD	µg/kg	5.1	0.255 U	0.542	21	<.0001	38.7	21	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.5	1.8	1.52	10.3	0.0001	6.82	8.54	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.606	0.0122	19.4	0.606	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.6	0.0122	8.22	0.6	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.062	0.24	0.0303 U	0.334	0.0122	11.0	0.094	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.1	0.31	0.1453	0.69	0.0122	4.75	0.38	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0228 U	0.516	0.0122	22.6	0.516	No relevant effects in ERED.	--	--
	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 *L. plumulosus*.	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.088	4.85	2.45	8.93	0.0122	3.64	4.08	1,620 µg/kg: significant difference in embryo development of *A. rubens*.	162[4]	No
Bay Island South	4,4'-DDD	µg/kg	5.1	0.255 U	0.542	13.9	0.0017	25.6	13.9	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.5	1.8	1.52	10.4	<.0001	6.85	8.58	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	3.8	2.63	26.1	0.0003	9.92	22.3	LD50: 2,690 µg/kg for mortality of the amphipod *L.* plumulosus.	134[3]	No

Notes:

Organics were normalized to percent lipids prior to statistical analysis.

U: non-detect; half the detection limit shown

1. If MDL differed between samples, maximum MDL is presented.

2. Tissue effects data from the ERED (USACE 2018)

3. An uncertainty factor of 20 was applied to ED50 and/or LD50 values to estimate LOED (USACHPPM 2000).

4. Full dose/response curve not measured; therefore, an uncertainty factor of 10 was applied to estimate LOED (Lin and Davis 2018; USACHPPM 2000).

Table 29
Summary of Rationale for Selection of Toxicity Reference Values

Analyte	ERED[1]	TRV	Rationale
2,4'-DDD	No relevant effects in ERED	--	No marine invertebrate species in ERED
2,4'-DDE	No relevant effects in ERED	--	No marine invertebrate species in ERED
4,4'-DDD	No relevant effects in ERED	--	No marine invertebrate species in ERED
4,4'-DDE	No relevant effects in ERED	--	No marine invertebrate species in ERED
Total DDTs	LD50: 2,690 µg/kg for mortality of the amphipod *Leptocheirus plumulosus*	134 µg/kg[2]	TRV selected by Lin and Davis (2018) for San Francisco Bay
Dibutyltin	LOED: 18 µg/kg for imposex in gastropod *Hexaplex trunculus* (field study; exposure to mixture of organotins in sediment)	--	TRV selected by USEPA in 2017 (Anchor QEA 2017b). Following review of Pellizzato et al. (2004), it was determined that this was a field study in which gastropods were exposed to a mixture of organotins in situ; therefore, it was not clear whether some or all of the organotins or other confounding factors were the cause of the observed imposex (Anchor QEA 2017b). The updated ERED (2018) correlates observed effects in this study to tributyltin; therefore, this TRV has been removed.
	NOED: 48 µg/kg for reproduction in Atlantic dogwinkle *Nucella lapillus* (controlled laboratory study; single chemical exposure)	48 µg/kg	Although the endpoint documented is the NOED, which is not the preferred endpoint, the study involved controlled, single chemical exposures in the laboratory with a sensitive gastropod; results showed no effects associated with a water exposure (NOED = 48 µg/kg) or following injection with dibutyltin (NOED = 226 µg/kg).
Mercury	LOED: 8.0 mg/kg for development of the common slipper shell *Crepidula fornicata.*	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., *Asteria rubens*)
PCB128	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED.
PCB132/153	No relevant effects in ERED	--	PCB153: Only biochemical effects measured in marine invertebrate species (i.e., *A. rubens*)
PCB138/158	No relevant effects in ERED	--	PCB138: Only marine invertebrate species in ERED was mussel (*Mytilus galloprovincialis*); effects were observed only for non-ecologically relevant (i.e., digestion) endpoints at 1,580 µg/kg.
PCB149	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB151	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB170	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB180	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB183	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB187	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB206	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
Total PCB Congeners	1,620 µg/kg: significant difference in embryo development of *A. rubens*	162 µg/kg[3]	TRV selected by Lin and Davis (2018). Total PCBs based on Clophen A50. Clophen A50 is similar to Aroclor 1254, which is representative of PCB congener profile in San Francisco Bay (Lin and Davis 2018).

Notes:

1. Tissue effects data from the ERED (USACE 2018)
2. An uncertainty factor of 20 was applied to ED50 and/or LD50 values to estimate LOED (USACHPPM 2000).
3. Full dose/response curve not measured; therefore, an uncertainty factor of 10 was applied to estimate LOED (Lin and Davis 2018; USACHPPM 2000).

4 Quality Assurance/Quality Control

A review of analytical results was conducted to evaluate the laboratories' performance in meeting quality assurance/quality control (QA/QC) guidelines outlined in the SAP (Anchor QEA 2017a).

4.1 Physical and Chemical Analyses of Sediment

The data validation reports prepared by Anchor QEA for physical and chemical analyses of sediment are presented in Appendix G. Samples were analyzed within the appropriate holding times, with only minor exceptions. Mercury analysis on individual core samples from the January 2018 sampling event was performed past the 28-day hold time for USEPA method 7471A; however, samples were stored frozen from the time of sample receipt at the laboratory until extraction. Based on the State Water Resources Control Board (SWRCB) Surface Water Ambient Monitoring Program (SWAMP) Quality Assurance Program Plan's Measurement Quality Objectives (SWRCB 2017), a 1-year hold time is allowed for mercury, if samples are stored frozen and analyzed within 14 days of thawing; therefore, this deviation is not expected to affect the overall results.

Generally, QA/QC sample results were within the project-specified control limits, with the following exceptions:

- Reference and composite sediment from January 2018 sampling event:
  - Selenium was detected in the method blank associated with sample LA3-REF, and chromium was detected in the method blank associated with sample BIN-COMP. Associated sample results were significantly greater than (five times) the concentrations in the method blanks, so no data were qualified.
  - The pyrethroid surrogate dibutyl chlorendate percent recovery value was below the control limit for sample BIN-COMP. Associated results were qualified to indicate a potentially low bias.
  - The matrix spike (MS) percent recovery value for TOC exceeded the control limit for sample BIN-COMP. Associated results were qualified to indicate a potentially high bias.
  - The matrix spike duplicate (MSD) percent recovery values for 4,4'-DDT and methoxychlor were below the control limit for sample LA3-REF, and the MS/MSD relative percent difference (RPD) values exceeded the control limit. The MS/MSD RPD value for 4,4'-DDD also exceeded the control limit for LA3-REF. Parent sample results were qualified to indicate a potentially low bias.
  - 4,4'-DDE did not recover in the MS and MSD for sample BIS-COMP. The sample concentration was greater than four times the spike concentration, so no data were qualified. Endrin aldehyde also did not recover in the MS and MSD for sample BIS-COMP. This compound was not detected in the parent sample, so the result was rejected.

- The MS and MSD percent recovery values for 4,4′-DDD, 4,4′-DDE, and heptachlor epoxide exceeded the control limit for sample BIN-COMP. The parent sample result for 4,4′-DDD was qualified to indicate a potentially high bias. The sample concentration for 4,4′-DDE was greater than four times the spike concentration and heptachlor epoxide was not detected; therefore, no data were qualified.
- The MS and MSD percent recovery values for tributyltin were below the control limit for sample BIMW-COMP. The parent sample result was qualified to indicate a potentially low bias.
- The MS and/or MSD percent recovery values for several pyrethroids exceeded the control limit on sample BIS-COMP. Cyfluthrin was detected in the parent sample and was qualified to indicate a potentially high bias.
- The MS/MSD RPD values for allethrin and resmethrin/bioresmethrin exceeded the control limit for sample EC-COMP. These compounds were not detected in the parent sample, so no data were qualified. The MSD percent recovery value for fluvinate was below the control limit for sample EC-COMP. The parent sample result was qualified to indicate a potentially low bias.

- Individual core samples from the January 2018 sampling event:
  - The pesticide surrogate decachlorobiphenyl percent recovery value exceeded the control limit for sample BIN-06. No data were qualified because the sample was analyzed at a high dilution.
  - The MSD percent recovery value for 4,4′-DDT was below the control limit for sample MCN1-03, and the MS/MSD RPD value exceeded the control limit. The MS and MSD percent recovery values for 4,4′-DDT were below 20% for sample BIS-03. Parent sample results were qualified to indicate a potentially low bias.
- Reference, composite and Individual core samples from the January 2019 sampling event:
  - The laboratory control sample (LCS) and laboratory control sample duplicate percent recovery values for tributyltin were below the control limit. Associated results were qualified to indicate a potentially low bias.
  - The LCS percent recovery values for benzo(k)fluoranthene, 1-methylnaphthalene, and pyrene were below the control limit. Associated results were qualified to indicate a potentially low bias.
  - The MS percent recovery value for naphthalene was below the control limit for sample NC2-04. The parent sample result was qualified to indicate a potentially low bias.
  - The MS and/or MSD percent recovery values for several pyrethroids and pesticides were above the control limit for sample LA3-REF. The parent sample results for 4,4′-DDD and 4,4′-DDE were qualified to indicate a potentially high bias. Other analytes were not detected in the parent sample, so no data were qualified.

- The MS and/or MSD percent recovery values for chromium, zinc, and lead were above the control limit for sample LA3-REF. Associated results were qualified to indicate a potentially high bias.
- The MS and/or MSD percent recovery values for several pyrethroids were above the control limit for samples NC3-04 and/or NC2-COMP. Parent sample results were not detected, so no data were qualified.
- The MS and MSD percent recovery values for zinc were above the control limit for sample LA3-REF. Associated results were qualified to indicate a potentially high bias.
- The MS and/or MSD percent recovery values for aldrin and 4,4′-DDE were below the control limit for sample NC3-04. Parent sample results were qualified to indicate a potentially low bias.
- The MS and/or MSD percent recovery values for methoxychlor and 4,4′-DDE were outside the control limit for sample NC2-COMP. Parent sample results were qualified to indicate they are estimated.
- The MS and/or MSD percent recovery values for several PAHs were below the control limit for samples NC3-04 and/or NC2-COMP. Parent sample results were qualified to indicate a potentially low bias.

Results of this assessment concluded that most data were acceptable as reported; all other data were acceptable as qualified, except for one endrin aldehyde result. Endrin aldehyde did not recover in the MS, MSD, or sample BIS-COMP, so this result was rejected. The sediment data reviewed from LNB federal channels met the data quality objective of 95% completeness.

4.2 Biological Testing

Biological testing of LNB federal channels sediments incorporated standard QA/QC procedures, consistent with OTM (USEPA/USACE 1991) and ITM (USEPA/USACE 1998) guidelines.

Sediments were stored at 4°C plus or minus 2°C and used within the 8-week holding period. All test organism responses within the negative (laboratory) controls met acceptability criteria, except one SPP testing using *M. beryllina* (initiated on February 27, 2019). Survival in the laboratory control (88%) was slightly less than control acceptability criterion of 90%; therefore, results were conservatively compared to the site water control (94%). All water quality conditions were within the appropriate limits. Raw water quality data are provided in Appendix D.

All SP reference toxicant tests LC_{50} values were within two standard deviations of the laboratory mean, indicating that sensitivity of test organisms was normal. However, amphipod control survival was less than 90% for each reference toxicant test associated with the January 2018 sampling event. Although control survival was reduced, the response to both toxicants (cadmium chloride and ammonium chloride) was normal based on historical tests, and mean survival in the laboratory controls associated with project sediments met acceptability criterion. All SPP reference toxicant tests LC_{50} and/or EC_{50} values were within two standard deviations of the laboratory mean, with two exceptions. The LC_{50} value of one *A. bahia* reference toxicant test (initiated on February 21, 2018; 160.2 micrograms per liter [µg/L]) was below the control limit (175.9 µg/L), indicating organisms were slightly more sensitive when compared to historical tests. Therefore, if test performance was affected, these organisms would have shown a greater level of toxicity than other batches. The LC_{50} value of one *M. beryllina* reference toxicant test (initiated on February 22, 2018; 266.7 µg/L) was slightly above the control limit (266 µg/L), indicating organisms may have been slightly less sensitive when compared to historical tests. These minor deviations are not expected to affect the overall results.

As discussed in Section 2.3, interstitial ammonia concentrations were measured on project sediments prior to testing. Ammonia concentrations in composite samples from Bay Island North (21.7 mg/L), Bay Island Middle East (26.1 mg/L), Bay Island Middle West (27.8 mg/L), and Bay Island South (26.1 mg/L) were at levels of potential concern for the amphipod SP test (greater than 15 mg/L; USACE et al. 2001). Test sediments were purged to reduce ammonia concentrations prior to testing. In addition, a water-only ammonia reference toxicant test was conducted with the amphipod test to evaluate the contribution of elevated ammonia concentrations on test organism survival. An ammonia reference toxicant test was also run with the bivalve larval development bioassay due to the sensitivity of *M. galloprovincialis* to elevated ammonia concentrations. As described in Section 3.2.2, ammonia concentrations in the 100% elutriate treatments from Bay Island Middle East and West, Bay Island South, and Main Channel North 3 and 4 (3.8 to 10.5 mg/L) exceeded the NOEC in the associated ammonia reference toxicant tests (3.5 and 4.0 mg/L), indicating that ammonia likely contributed to the abnormal development of *M. galloprovincialis* in these samples.

In BP tests, mean survival of *N. virens* was slightly reduced in composite samples from Newport Channel 2 and 3 (66% and 76%, respectively). Upon arrival, test organisms appeared stressed; however, organisms were deemed acceptable for use based on low mortality, activity level, and overall size. Because reference toxicant tests are not performed with BP tests, the sensitivity of test organisms could not be evaluated. Although survival was somewhat reduced, sufficient tissue mass was available for the required chemical analysis; therefore, test acceptability criteria were met.

4.3 Chemical Analysis of Tissue Residues

The data validation reports prepared by Anchor QEA for chemical analysis of tissue residues are presented in Appendix G. Samples were analyzed within the appropriate holding times, with only minor exceptions. Mercury analysis for samples from the January 2018 sampling event was performed past the 28-day hold time for USEPA method 7471A; however, samples were stored frozen from the time of sample receipt at the laboratory until extraction. Based on the SWRCB SWAMP Quality Assurance Program Plan's Measurement Quality Objectives (SWRCB 2017), a 1-year hold time is allowed for mercury, if samples are stored frozen and analyzed within 14 days of thawing; therefore, this deviation is not expected to affect the overall results.

Generally, QA/QC sample results were within the project-specified control limits, with the following exceptions:

- The MS and/or MSD percent recovery values for mercury were below the control limit for samples MCN3-COMP-D-NEREIS, BIMW-COMP-T-M-D-NEREIS, T0-A-NEREIS-022619, and NC3-COMP-D-NEREIS. Associated results were qualified to indicate a potentially low bias.
- 4,4′-DDD did not recover in the MS and MSD for sample MCN4-COMP-B-MACOMA. The parent sample result was qualified to indicate a potentially low bias.
- 4,4′-DDD exceeded the control limit and did not recover in the MSD for sample MCN4-COMP-E-MACOMA. The associated result was qualified to indicate an estimated concentration. The MS percent recovery value for 4,4′-DDT also exceeded the control limit for sample MCN4-COMP-E-MACOMA. This compound was not detected in the parent sample, so no data were qualified.
- The MS and MSD percent recovery values for 4,4′-DDD, 4,4′-DDE, and 4,4′-DDT exceeded the control limit for sample BIS-COMP-D-MACOMA. Parent sample results for 4,4′-DDD and 4,4′-DDE were qualified to indicate a potentially high bias. 4,4′-DDT was not detected in the parent sample, so no data were qualified.
- The MS percent recovery value for 4,4′-DDT exceeded the control limit for sample BIS-COMP-E-MACOMA. This compound was not detected in the parent sample, so no data were qualified.

Results of this assessment concluded that most data were acceptable as reported; all other data were acceptable as qualified. The tissue data reviewed from LNB federal channels met the data quality objective of 95% completeness.

5 Discussion

LNB federal channels sediments were tested to determine suitability for ocean disposal at LA-3 ODMDS. In addition, sediment from the Entrance Channel was evaluated to determine compatibility for nearshore placement along beaches north of the harbor entrance and up to the Santa Ana River. Testing for ocean disposal included physical and chemical analyses and biological testing in accordance with guidelines specified in the OTM (USEPA/USACE 1991). To support the evaluation for nearshore placement, grain size data were collected from Newport Pier to the Newport Bay entrance channel to establish a grain size envelope for the nearshore receiver site.

5.1 Evaluation for Nearshore Placement

Sediments from the Entrance Channel and nearshore receiver site were analyzed for grain size to determine compatibility for nearshore placement. A grain size envelope was developed using the coarsest and finest gradation curves from the receiver site. Source material samples were plotted against the grain size envelope to determine compatibility. The grain size distributions for the Entrance Channel fit within the grain size envelope, and percent fines of all stations were within 10% of the finest receiver site sample. These results indicate the sediment from the Entrance Channel is compatible with the nearshore receiver site.

Composite sediment chemistry results indicated that sediment from the Entrance Channel is clean, with all concentrations less than the ERL. SP and SPP testing indicated that sediment from the Entrance Channel is not acutely toxic to marine organisms. Due to the high percentage of sand (98.12%) and low concentrations of contaminants, tissue analysis was not required. Based on the results of testing, sediment from the Entrance Channel should be considered suitable for nearshore placement.

5.2 Evaluation for Ocean Disposal

5.2.1 Turning Basin, Main Channel North, Bay Island, and the Entrance Channel

Sediment core sampling was conducted within the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel in January 2018. Sediment from all DUs were evaluated for ocean disposal. Sediment cores were collected at 48 stations, and 11 composite samples were created for physical and chemical analyses and biological testing. Based on composite sediment chemistry results, potential contaminants of concern included mercury, DDTs, dibutyltin, and PCBs. Mercury exceeded the ERM value in sediment from the Turning Basin and Main Channel North 1, 2, and 3. Total DDTs exceeded the ERM value in all DUs, except the Entrance Channel. Total PCBs exceeded the ERM in the Turning Basin. Dibutyltin ranged from non-detect to 40 µg/kg, with the highest concentration measured in the Turning Basin.

Based on composite sediment chemistry results, individual core samples were analyzed for mercury, DDTs, and PCBs, as requested by USEPA (Table 6). Mercury exceeded the USEPA-recommended threshold of 1 mg/kg at several stations within the Turning Basin and Main Channel North 1, 2, and 3 (Figure 18). Total DDTs exceeded the ERM value at all stations, except MCN3-04 and BIN-03 (Figure 19). Total PCBs exceeded the ERM value at three stations within the Turning Basin (Figure 20).

No toxicity was observed during SP testing with amphipods or polychaetes. Survival was greater than 90% in all test treatments. During SPP testing, sediment from Bay Island Middle East, Bay Island Middle West, Bay Island South, and Main Channel North 3 and 4 resulted in an effect on the development of *M. galloprovincialis*. Although ammonia likely contributed to the observed toxicity in these samples and is not a contaminant of concern, STFATE modeling was performed to demonstrate LPC compliance. Based on STFATE modeling, LNB federal channel sediments do not pose a toxicity risk to water column organisms after discharge. BP testing and tissue chemistry indicated significant bioaccumulation of mercury, dibutyltin, DDTs, and PCBs when compared to reference sediment; however, all concentrations were less than FDA action levels and selected TRVs that have been shown to cause toxicity to marine invertebrates. These results indicate that it is unlikely that exposure to LNB federal channel sediments would cause impairment to marine organisms.

The SAPR for Turning Basin, Main Channel North, Bay Island, and the Entrance Channel was initially presented to the SC-DMMT in July 2018. At this meeting, USEPA expressed concerns regarding mercury and PCB concentrations but indicated no material would be excluded from ocean disposal due to DDT concentrations. USEPA requested supplemental information to support a suitability determination, including mass loading calculations and a compilation of historical data from Newport Bay. Mass loading calculations and a compilation of historical data were provided to USEPA in April 2019.

The data compilation consists of a comprehensive summary of past data from Newport Bay, including historical sediment mercury, DDT, and PCB data; bioassay testing data; and bioaccumulation tissue data. The data compilation was developed using historical data from 2003 to 2019, including dredge material evaluations, post-dredge sediment sampling investigations, and a feasibility study (i.e., Rhine Channel). The data compilation is presented in Appendix H.

Mass loadings of mercury and PCBs were calculated for each DU. Mass loading calculations are presented in Appendix I. The calculations show that approximately 50% of the mercury loadings and nearly 40% of the total PCB loadings are attributed to Turning Basin and Newport Channel 1 DUs. As previously discussed, Newport Channel 1 (Stations NC1-01 and NC1-02) was eliminated from the evaluation for ocean disposal based on elevated mercury concentrations in individual cores.

5.2.2 Newport Channel

Newport Channel was not initially included in this sediment characterization program or the previous federal channels investigation in 2009 (Newfields 2009) due to historical contamination and amphipod toxicity in 2003 and 2006 (Weston 2007). During the federal channels sampling in January 2018, exploratory sampling was conducted within Newport Channel and results were cleaner than expected. Based on these results, the City expanded the federal channels characterization to include Newport Channel.

Sediment core sampling was conducted within Newport Channel in January 2019. Sediment cores were collected at 12 stations within three DUs. Sediment from each core was submitted for physical and chemical analyses. Based on individual core sediment chemistry results, two composite samples (NC2-COMP and NC3-COMP) were created in coordination with USEPA for physical and chemical analyses and biological testing. Stations NC1-01 and NC1-02 were eliminated from the sediment characterization for ocean disposal due to elevated mercury.

Based on composite sediment chemistry results, potential contaminants of concern included mercury. No toxicity was observed during SP testing with amphipods or polychaetes. Survival was greater than 90% in all test treatments. During SPP testing, no toxicity was observed with LC_{50} and/or EC_{50} values greater than 100% for all tests. For BP testing and tissue chemistry, all mercury concentrations were less than the FDA action level. All *N. virens* tissue concentrations were less than the time zero sample. *N. virens* and *M. nasuta* tissue concentrations were not statistically elevated when compared to the reference; therefore, no further evaluation of tissue samples was not performed. These results indicate that it is unlikely that exposure to Newport Channel 2 and 3 sediments would cause impairment to marine organisms.

6 Conclusions

Physical, chemical, and biological analyses were conducted to evaluate the suitability of LNB federal channels sediments for ocean disposal. In addition, sediment from the Entrance Channel was evaluated to determine compatibility for nearshore placement. Based on the results of analyses, the following conclusions may be drawn:

- Composite sediment chemistry and further chemical characterization of individual cores showed some areas with elevated mercury above the USEPA-recommended threshold of 1 mg/kg and PCBs above 100 µg/kg. These include Newport Channel 1 and areas within the Turning Basin and the Main Channel North.
- Results of SP testing indicate that no sediments were acutely toxic to benthic organisms and meet LPC requirements for ocean disposal.
- Results of SPP testing and STFATE modeling also suggest that sediments do not pose a toxicity risk to existing water column organisms after discharge and meet LPC requirements for ocean disposal.
- Tissue concentrations from the bioaccumulation tests showed levels less than established FDA action thresholds and concentrations that have been shown to cause toxicity to marine invertebrates.
- Grain size of composite sediments consisted primarily of fines (silt and clay), except for the Entrance Channel. Grain size of the Entrance Channel consisted primarily of sand, which was compatible with the nearshore receiver site.

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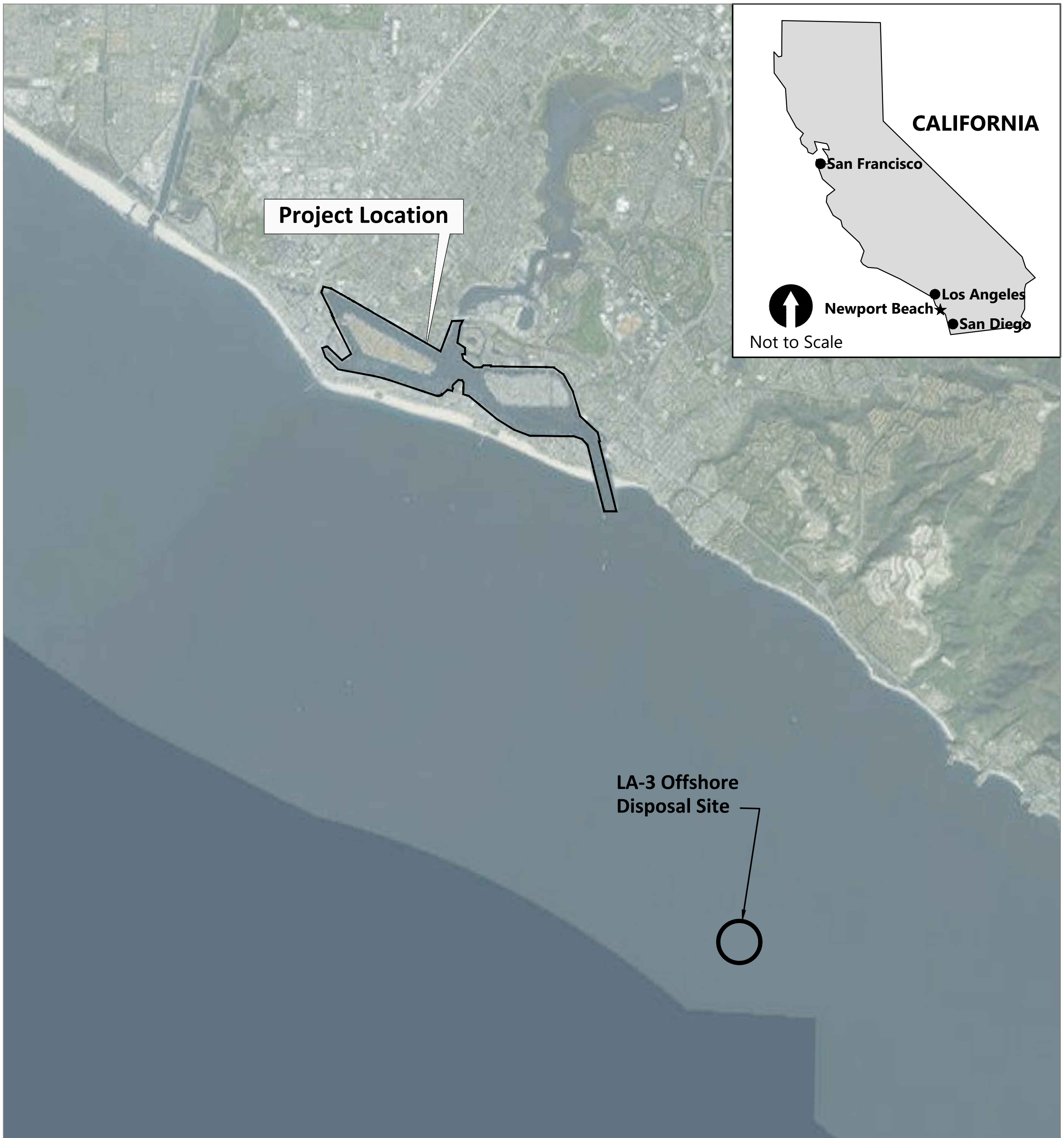
Figures



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

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

Publish Date: 2017/11/20 1:26 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-001 VIC_recover.dwg AQ-A-VMAP

ANCHOR QEA

Figure 1
Vicinity Map
Lower Newport Bay Federal Channels Dredging

AERIAL SOURCE: Bing Maps 2016. Dredge depths and boundaries from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83, U.S. Feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

Publish Date: 2017/12/18 3:47 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-012 FEDERAL CHANNELS.dwg FIG 2

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

Difference between Existing Bathymetry (Base) and Authorized Depth (Comparison)	
Design Elevation Below Bathy (ft)	Color
At or Above Existing Bathy	
0.0 to - 1.0	
- 1.0 to - 2.0	
- 2.0 to - 3.0	
- 3.0 to - 4.0	
- 4.0 to - 5.0	
- 5.0 <	

AERIAL SOURCE: Bing Maps 2016
SURVEY SOURCE: U.S. Army Corps of Engineers survey dated June 2017. Dredge depths and boundaries from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83, U.S. Feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

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

ANCHOR QEA

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

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

ANCHOR QEA

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

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

LEGEND:

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

0 300
Feet

Publish Date: 2019/05/02 3:39 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015A ACTUAL SAMPLING.dwg FIG 5

ANCHOR QEA

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

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

LEGEND:

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

0 300
Feet

Publish Date: 2018/02/09 9:06 AM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015B ACTUAL SAMPLING.dwg FIG 7

ANCHOR QEA

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

Lower Newport Bay Federal Channels Dredging

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

LEGEND:

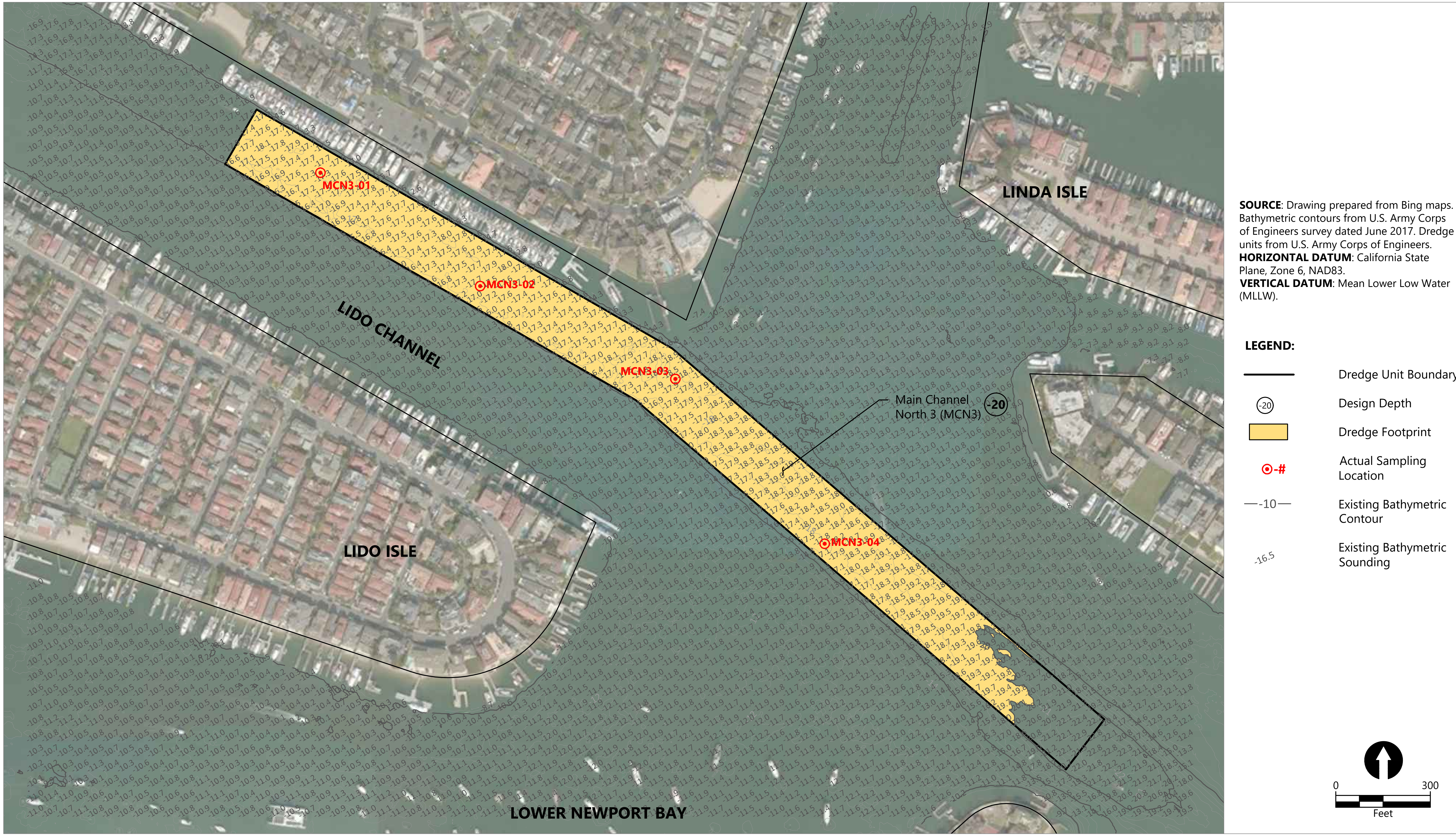
	Dredge Unit Boundary
-20	Design Depth
	Dredge Footprint
-#	Actual Sampling Location
-10	Existing Bathymetric Contour
-16.5	Existing Bathymetric Sounding

0 300
Feet

Publish Date: 2018/02/09 9:11 AM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015C ACTUAL SAMPLING.dwg FIG 8

ANCHOR QEA

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

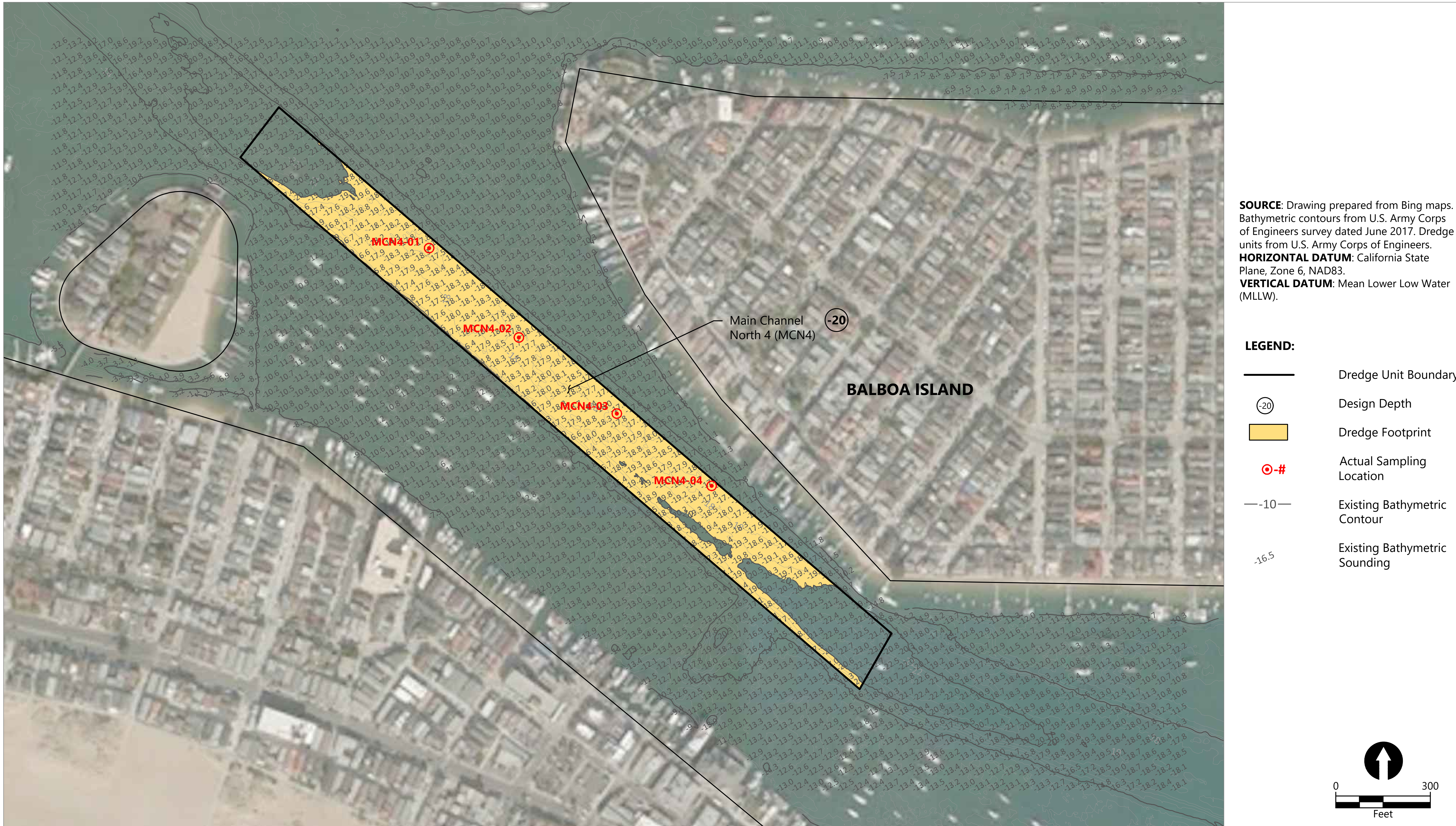


Publish Date: 2018/02/09 10:36 AM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015D ACTUAL SAMPLING.dwg FIG 9

ANCHOR QEA

Figure 8
Dredge Unit, Bathymetry, and Actual Sampling Locations - Main Channel North 3

Lower Newport Bay Federal Channels Dredging

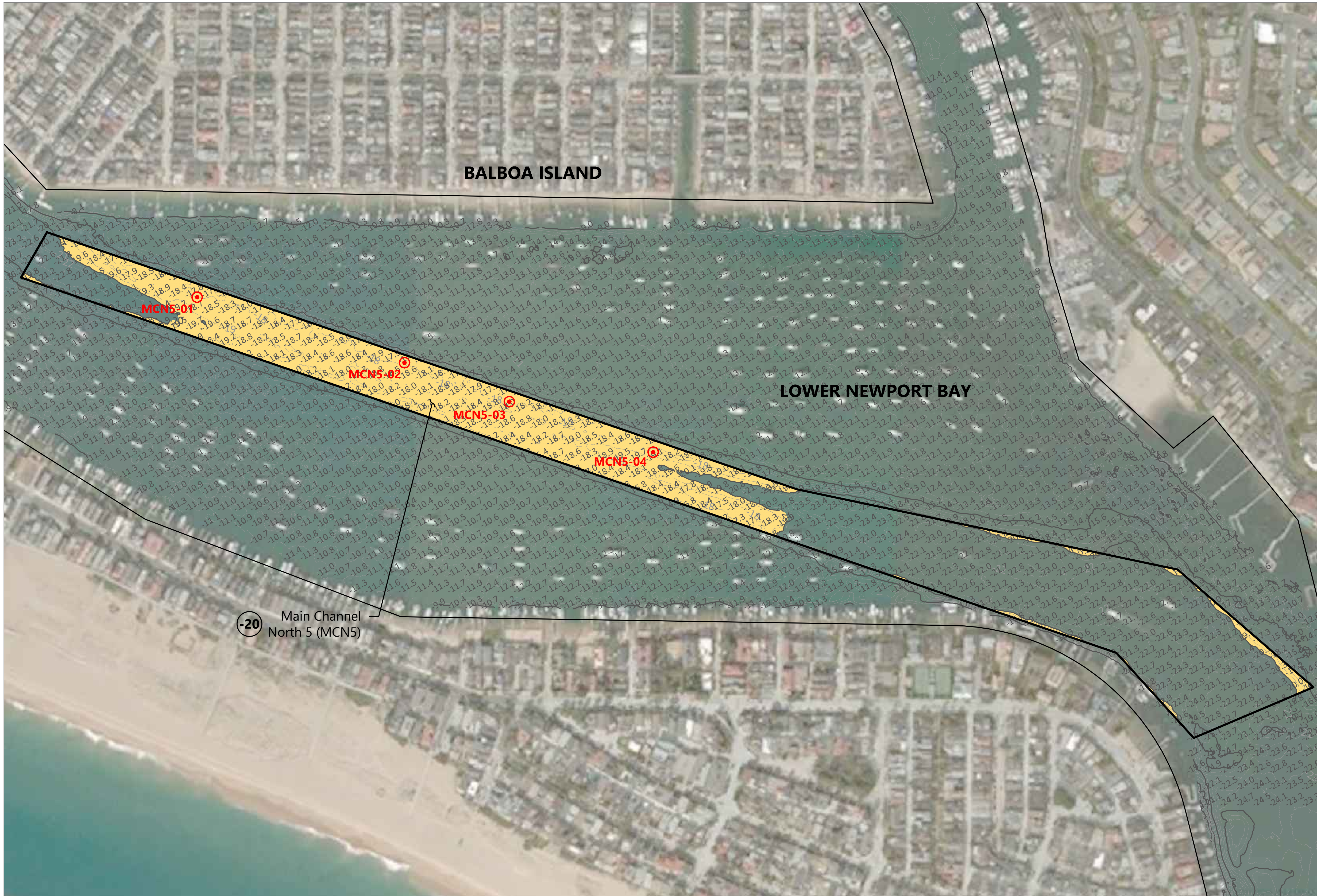


Publish Date: 2018/02/09 12:43 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015I ACTUAL SAMPLING.dwg FIG 14

ANCHOR QEA

Figure 9
Dredge Unit, Bathymetry, and Actual Sampling Locations - Main Channel North 4

Lower Newport Bay Federal Channels Dredging



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

LEGEND:

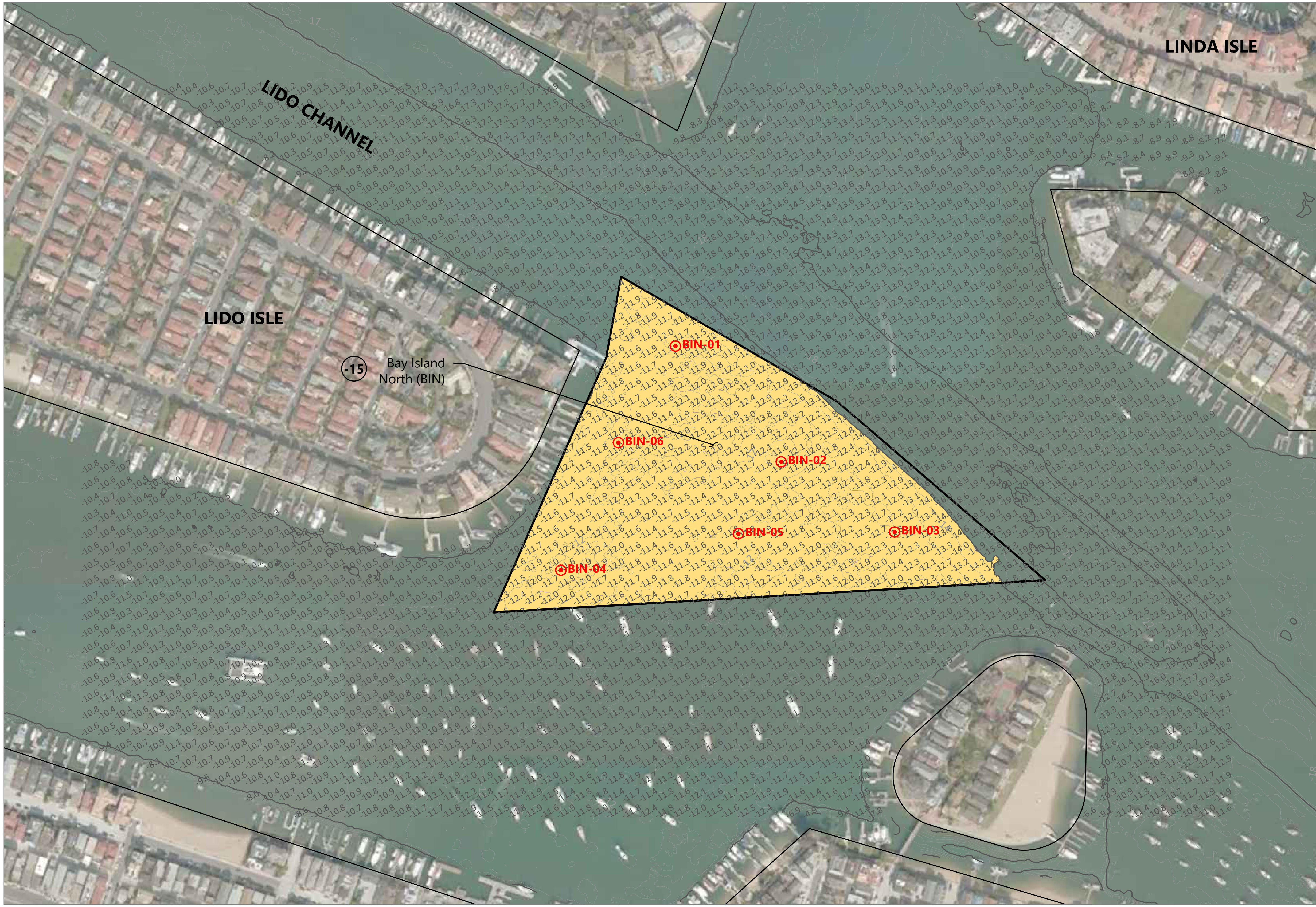
- Dredge Unit Boundary
- -20 Design Depth
- Dredge Footprint
- -# Actual Sampling Location
- -10 Existing Bathymetric Contour
- -16.5 Existing Bathymetric Sounding

0 400
Feet

Publish Date: 2018/02/09 12:53 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015J ACTUAL SAMPLING.dwg FIG 15

ANCHOR QEA

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



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

LEGEND:

- Dredge Unit Boundary
- (-15) Design Depth
- Dredge Footprint
- -# Actual Sampling Location
- —-10— Existing Bathymetric Contour
- -16.5 Existing Bathymetric Sounding

0 300
Feet

Publish Date: 2018/02/09 11:09 AM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015E ACTUAL SAMPLING.dwg FIG 10

ANCHOR QEA

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

Publish Date: 2018/02/09 3:35 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015G ACTUAL SAMPLING.dwg FIG 12

ANCHOR QEA

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

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

LEGEND:

- Dredge Unit Boundary
- -15 Design Depth
- Dredge Footprint
- -# Actual Sampling Location
- -10 Existing Bathymetric Contour
- -16.5 Existing Bathymetric Sounding

0 300
Feet

Publish Date: 2018/02/09 3:57 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015F ACTUAL SAMPLING.dwg FIG 11

ANCHOR QEA

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

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

LEGEND:

- Dredge Unit Boundary
- (-15) Design Depth
- Dredge Footprint
- -# Actual Sampling Location
- -10 Existing Bathymetric Contour
- -16.5 Existing Bathymetric Sounding

0 300
Feet

Publish Date: 2019/05/10 3:52 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015H ACTUAL SAMPLING.dwg Figure 14

ANCHOR QEA

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

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

LEGEND:

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

0 500
Feet

Publish Date: 2018/02/09 1:09 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015K ACTUAL SAMPLING.dwg FIG 16

ANCHOR QEA

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

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

LEGEND:

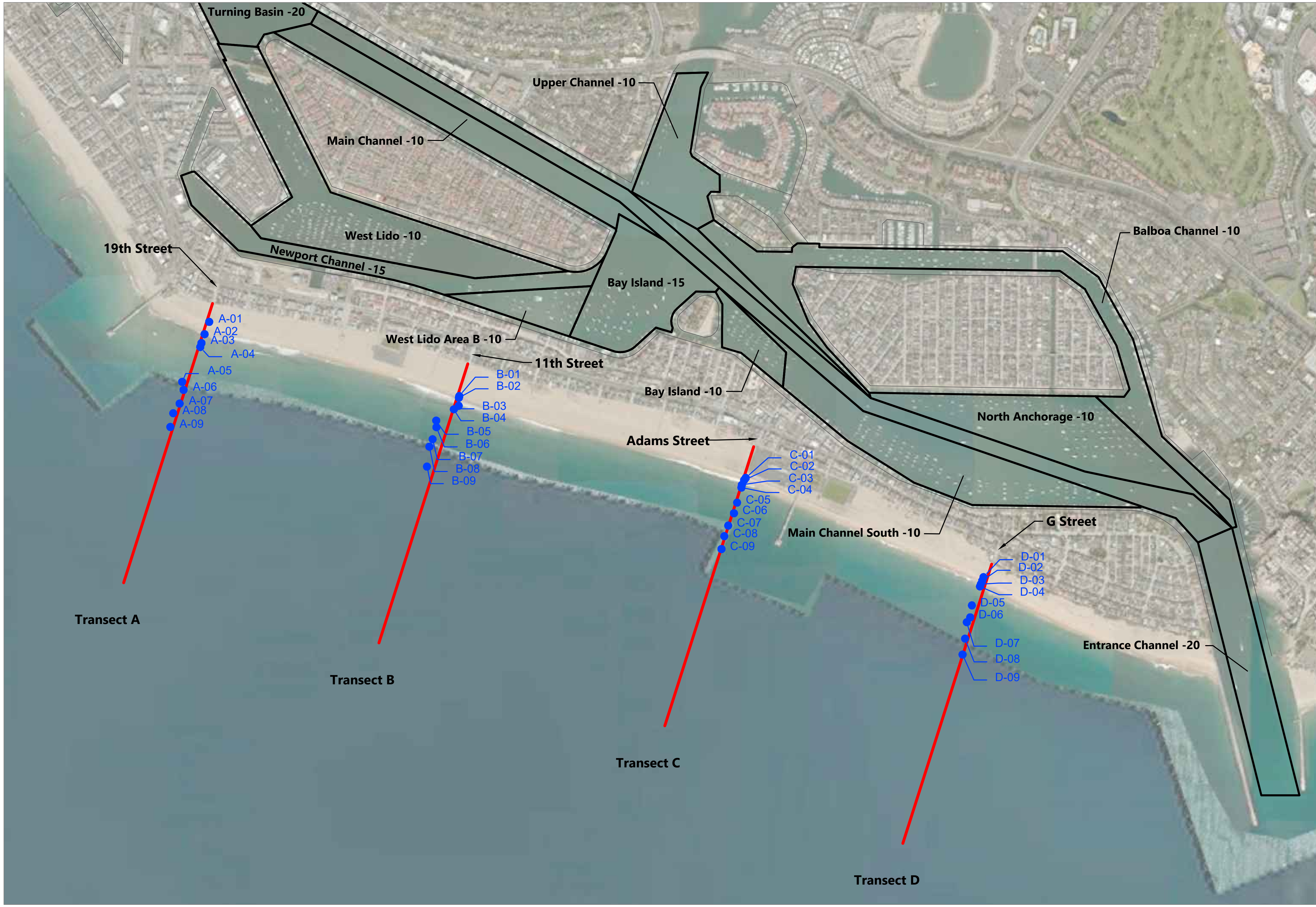
- Dredge Unit Boundary
- (-15) Design Depth
- Dredge Footprint
- -12.8 Existing Bathymetry
- NC-# Actual Sampling Location

0 400 Feet

Publish Date: 2019/05/02 4:05 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-018 NEWPORT CHANNEL.dwg FIG 16

ANCHOR QEA

Figure 16
Dredge Units, Bathymetry, and Actual Sampling Locations - Newport Channel
Lower Newport Bay Federal Channels Dredging



AERIAL SOURCE: Bing Maps 2016. Dredge depths and boundaries from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83, U.S. Feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

Publish Date: 2018/03/20 3:40 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-016 ACTUAL TRANSECTS.dwg FIG 1

ANCHOR QEA

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

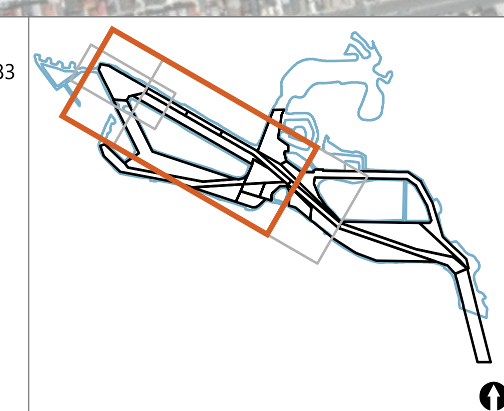
LEGEND:

Mercury (mg/kg)

- 0.088 - 0.15 (< ERL)
- 0.151 - 0.71 (< ERM)
- 0.711 - 1 (< USEPA Recommended Threshold)
- 1.01 - 5 (> USEPA Recommended Threshold)

Dredge Units

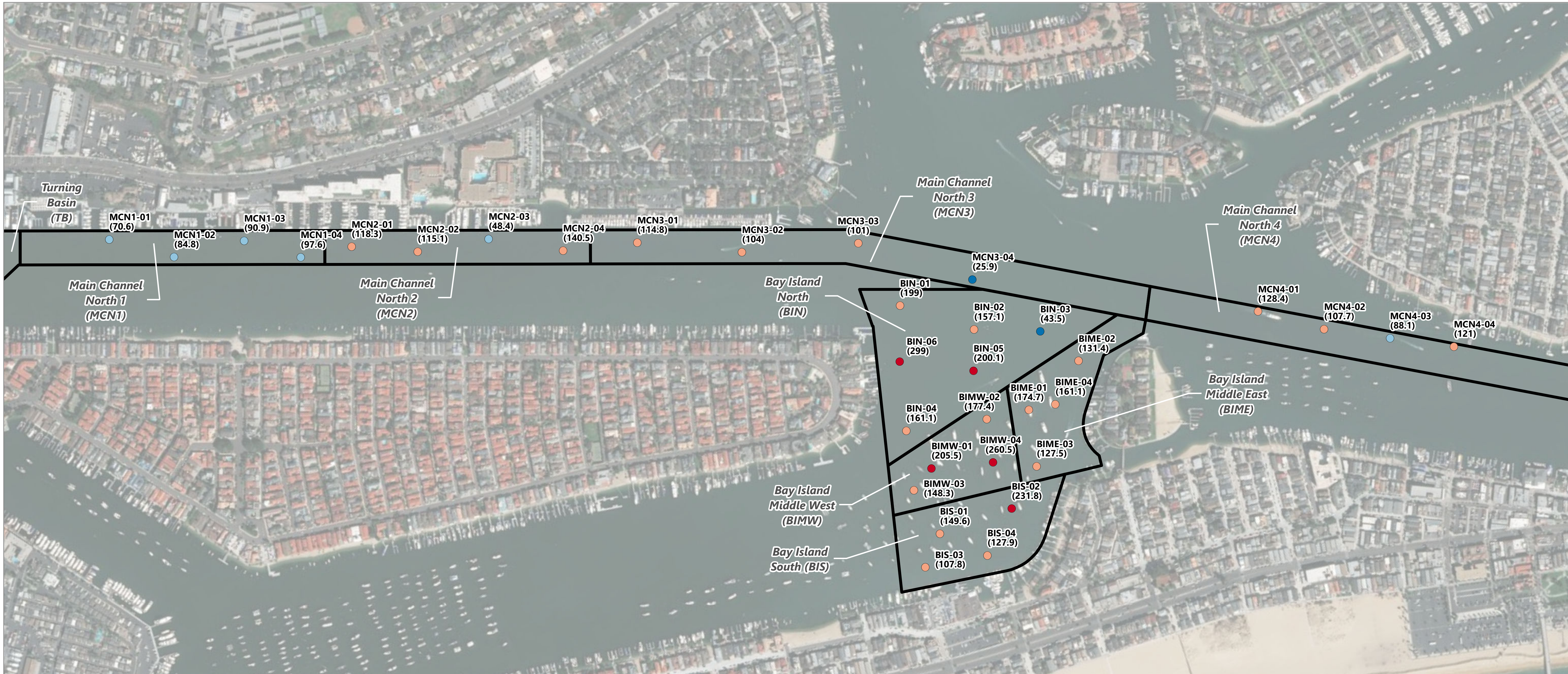
NOTES:
Horizontal datum: California State Plane Zone 6, NAD83
Aerial photo: ESRI



Publish Date: 2019/05/15, 12:41 PM | User: ckiblinger
Filepath: \\orcas\GIS\Jobs\City_of_Newport_Beach_0243\RGP_54_SedimentSampling\Maps\Core_Sediment\Core_Sed_Hg_PCB_DDT_Lower_Newport.mxd

ANCHOR QEA

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



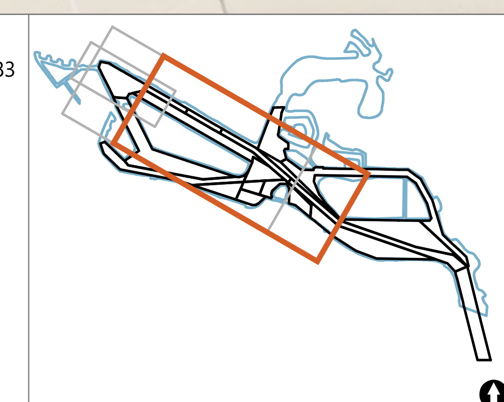
LEGEND:

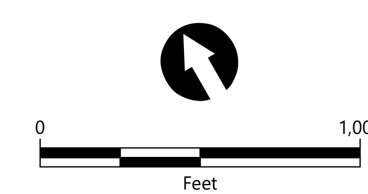
Total DDTs (µg/kg)

- 25.9 - 46.1 (< ERM)
- 46.2 - 100 (> ERM)
- 101 - 200
- 201 - 299

Dredge Units

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

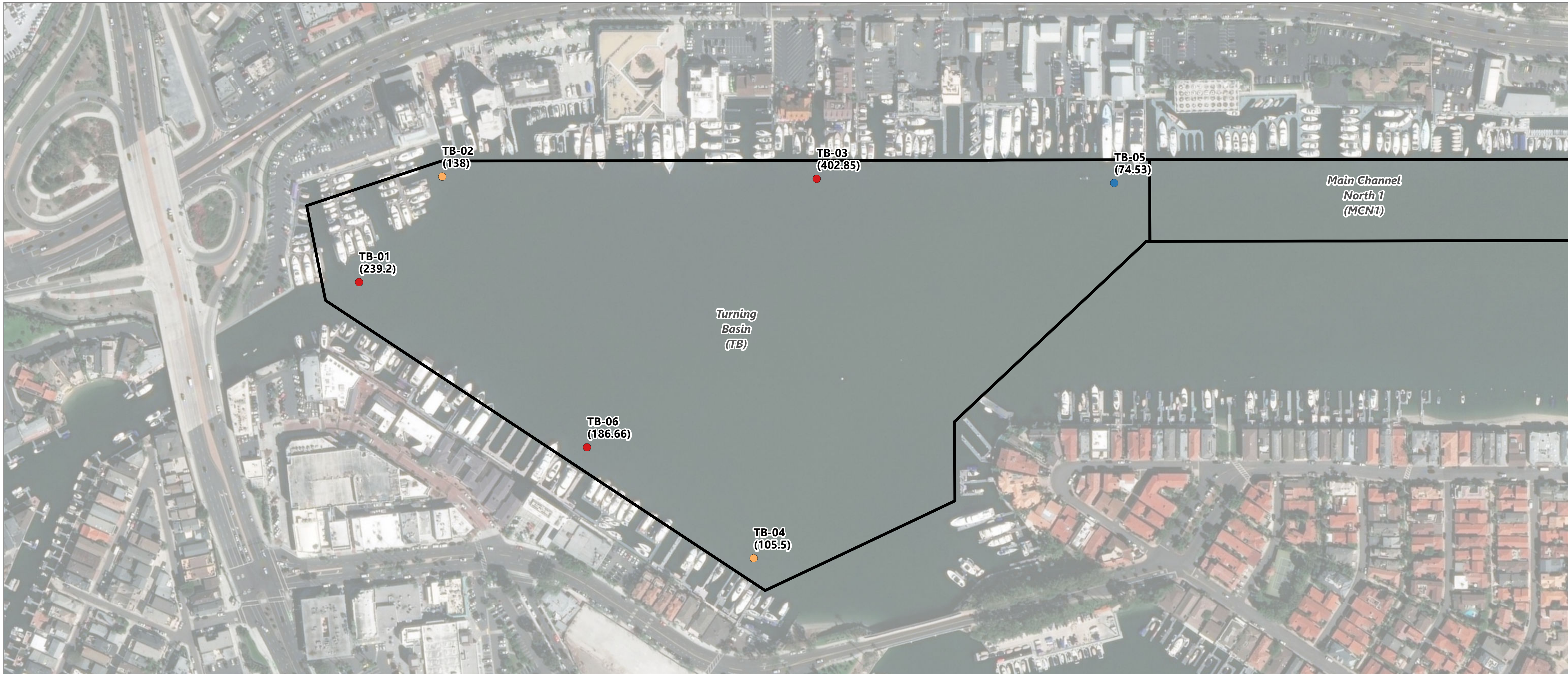




Publish Date: 2019/05/15, 12:41 PM | User: ckiblinger
Filepath: \\orcas\GIS\Jobs\City_of_Newport_Beach_0243\RGP_54_SedimentSampling\Maps\Core_Sediment\Core_Sed_Hg_PCB_DDT_Lower_Newport.mxd

ANCHOR QEA

Figure 19
Total DDT Concentrations for Individual Stations within Main Channel North 1, 2, 3, and 4, and Bay Island
Lower Newport Bay Federal Channels Dredging



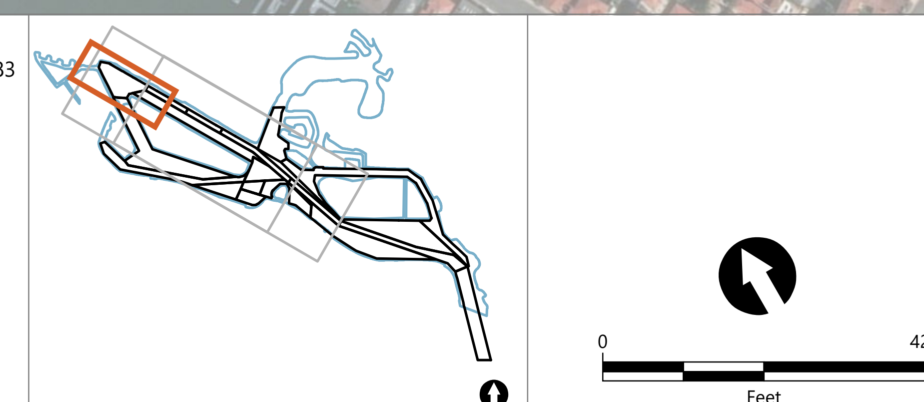
LEGEND:

Total PCBs (µg/kg)

- 74.5 - 100
- 101 - 180 (< ERM)
- 181 - 403 (> ERM)

Dredge Units

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



Publish Date: 2019/05/15, 12:42 PM | User: ckiblinger
Filepath: \\orcas\GIS\Jobs\City_of_Newport_Beach_0243\RGP_54_SedimentSampling\Maps\Core_Sediment\Core_Sed_Hg_PCB_DDT_Lower_Newport.mxd

ANCHOR QEA

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

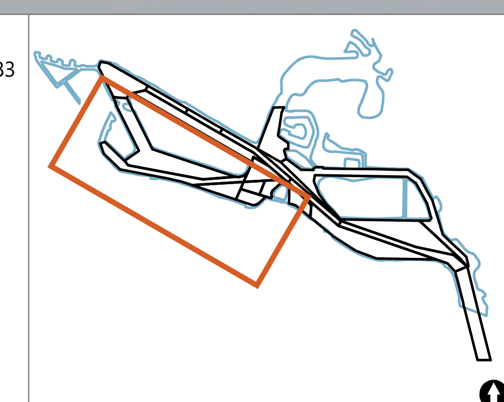
LEGEND:

Mercury (mg/kg)

- 0.088 - 0.15 (< ERL)
- 0.151 - 0.71 (ERL - ERM)
- 0.711 - 1
- 1.01 - 5
- 2019 Stations
- 2018 Exploratory Stations

Dredge Units

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

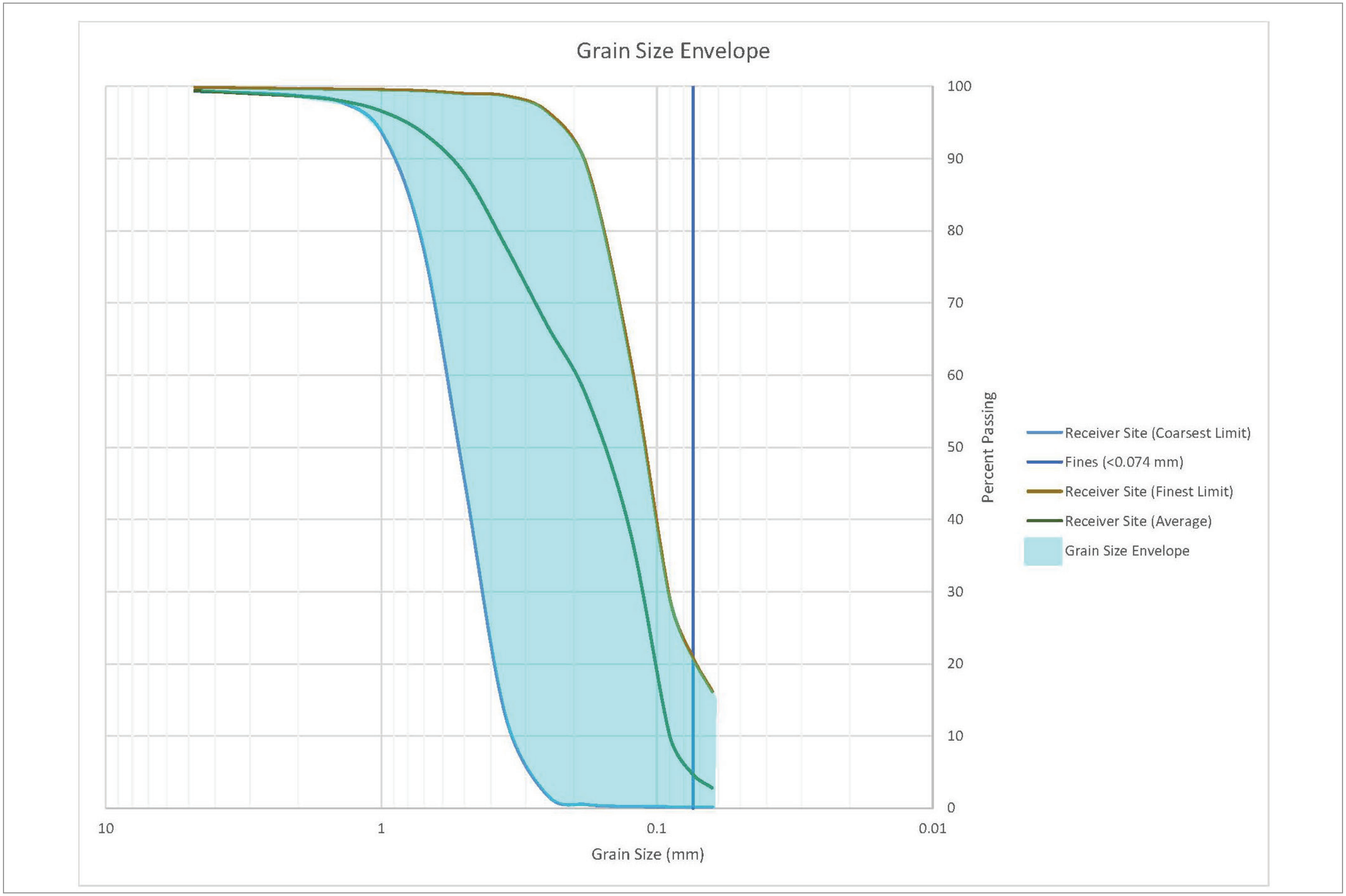


0 1,000
Feet

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

ANCHOR QEA

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



ANCHOR QEA

Figure 22
Grain Size Envelope for Newport Beach
Lower Newport Bay Federal Channels Dredging

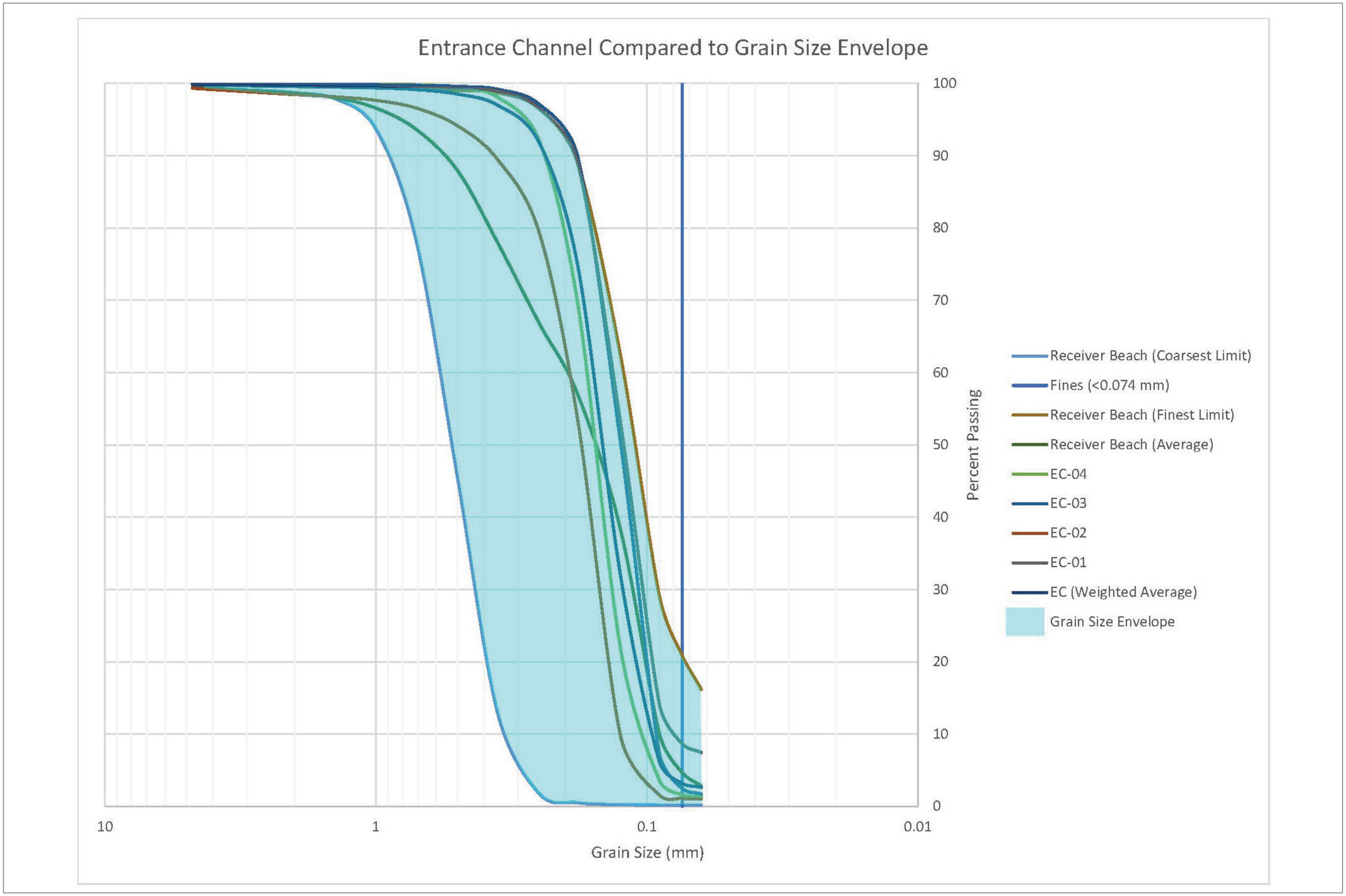


Figure 23
Comparison of Grain Size from the Entrance Channel to Grain Size Envelope
Lower Newport Bay Federal Channels Dredging

Appendices available upon request.

APPENDIX C

CULTURAL RESOURCES

CESPL-PD-RN 11 September 2020

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 Entrance Channel and the Main Channel Balboa Reach to authorized depths. Specifically, the Corps proposes to remove approximately 68,000 cubic yards of sediment in the Entrance Channel between stations 4+00 and 30+00 and approximately 77,000 cubic yards from the Main Channel Balboa Reach between stations 61+00 and 91+50. The dredging would return the channel to its authorized and previously dredged depth. The undertaking is being proposed 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. Cumulatively, the Main Channel Balboa Reach was dredged between stations 62+00 and 90+00 during the 2012 and 2003 dredge cycles. The current proposal would include an additional 100 to 150 feet on either side of this dredge footprint. Pre-dredge surveys reveal that in 2011 the channel was still at its authorized depth in these area so any sediment in these areas is less than 10 years old. The Entrance Channel was dredged between stations 5+00 to 28+00 in 1980 and between stations 4+00 to 14+00 in 2003. The proposed dredging mostly falls within this previously dredged footprint. As with the Main Channel Balboa Reach, pre-dredge surveys reveal that in 2003 the Entrance Channel was still at its authorized depth between stations 28+00 and 30+00; consequently, any sediment in these areas is less than twenty 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 between stations 4+00 and 30+00 and 61+00 and 91+50 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 sediment deposited in the last ten to twenty 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

	Pounds per day					
Construction Activity/Equipment Type	**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

	Pounds per day					
Construction Activity/Equipment Type	**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/ROG[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[5]				
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 x (X/Y) x Z; Where V=VMT, W=Distance, X=number of vehicles, Y=1 hour, Z= estimated travel time

VMT= 12.5 miles/day x (18 vehicles/hr) x 0.5 hr = 112.5 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 x 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 miles/day x 0.00065 lbs/mile = 0.08 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"

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

<u>Travel emission formula</u>= [(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 Final Environmental Assessment (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 and Main Channel Balboa Reach portions of the federal navigation channels in Lower Newport Bay.

b. General Description: [1.1.2] The proposed project is maintenance dredging to maintain authorized channel depths in the Entrance Channel and Main Channel Balboa Reach to allow for continued, safe navigation for recreational and commercial boats in Lower Newport Bay. Pursuant to Corps regulations at 33 CFR 323.2(d)(3), the dredging activities associated with this project are excluded from coverage under CWA and are not included in this evaluation. Dredged sediments from the Entrance Channel 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 68,000 cubic yards (cy) of Entrance Channel sediment 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 77,000 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 basic project purpose is navigation. The overall project purpose 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 68,000 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: [1.1.6] 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) and230.25)

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 SubpartH)

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 within the Newport Beach Nearshore Placement Site. Eelgrass beds located in the Entrance Channel are considered to be special aquatic sites. Although Entrance Channel dredging activities are not subject this 404(b)(1) Analysis, as discussed above, impacts to eelgrass beds associated with Entrance Channel dredging are discussed herein for informational purposes only.

Dredging in the Entrance Channel is expected to remove approximately 1.5 acres of eelgrass beds. These losses are expected to self-mitigate over time by regrowth in the impacted areas. Dredging in the Entrance Channel is not expected to happen for another 15-20 years (prior dredging in this area was in 2003). However, to reduce the temporal loss of this habitat, the Corps will be planting eelgrass into impacted areas as a mitigation measure. Transplants will take place in the growth season in April 2021. A detailed mitigation plan will be prepared after the exact area of impact is determined using a pre- and post-construction eelgrass survey in the Entrance Channel. The detailed mitigation plan will be provided to NMFS, CDFW, Santa Ana RWQCB, and the Coastal Commission for review and comment prior to implementation. Successful mitigation will result in no net loss of eelgrass habitat in the Entrance Channel.

(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)(l) 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 placement were evaluated. Alternative placement sites were not considered
practicable due to their unavailability at this time. Alternative site placement sites would have similar impacts to the Aquatic Ecosystem and would not provide the same beneficial effects as those to be realized by placement within the Newport Beach Nearshore Placement site. Use of this placement area will nourish the beach and protect it from erosion. It will protect recreational uses of the beach as well as wildlife use by foraging shorebirds, spawning California grunion, and invertebrates commonly found only on sandy beaches. 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 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 Newport Beach Nearshore Placement Site.

(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 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,

X_ (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: September 14, 2020

APPENDIX F

ENVIRONMENTAL JUSTICE SCREEN RESULTS

EJSCREEN Report (Version 2019)

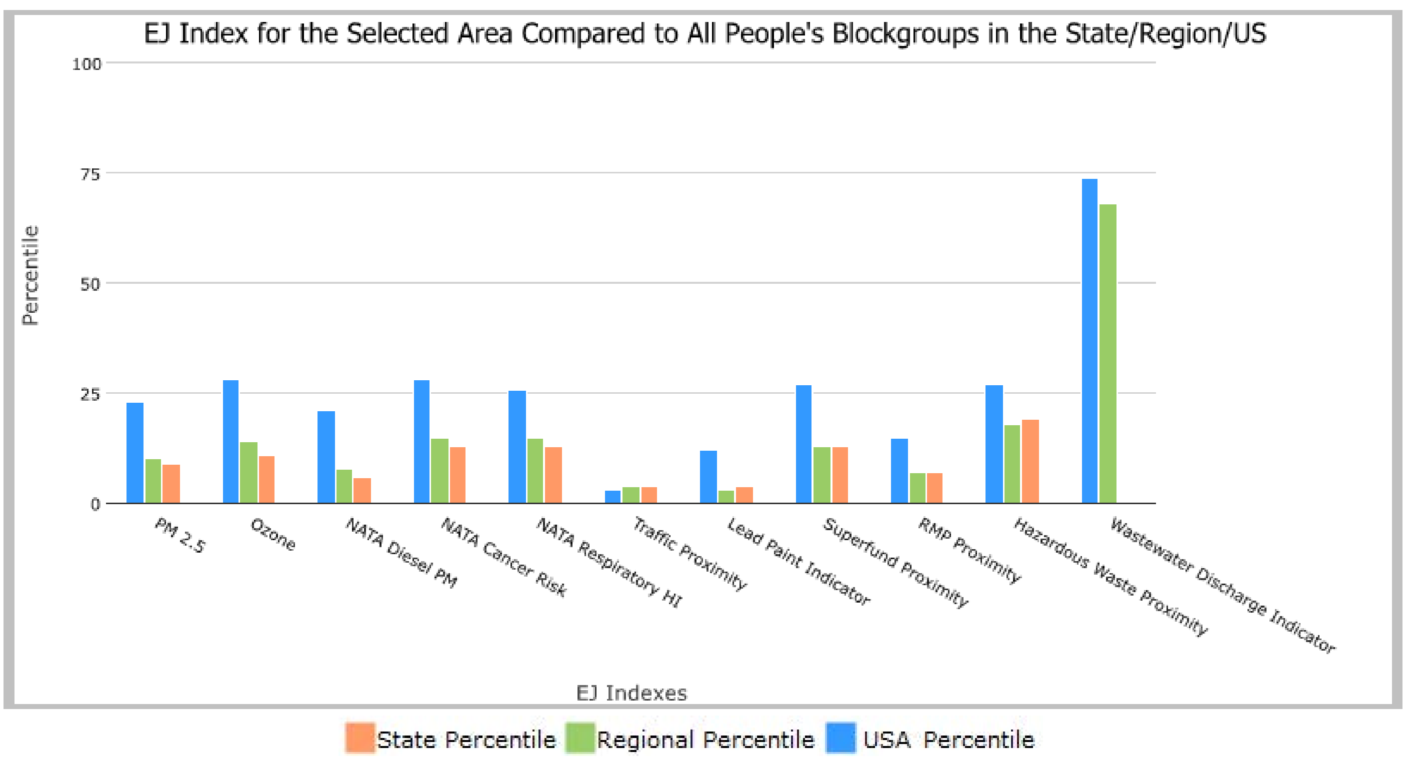
1 miles Ring around the Area, CALIFORNIA, EPA Region 9

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.

EJSCREEN Report (Version 2019)

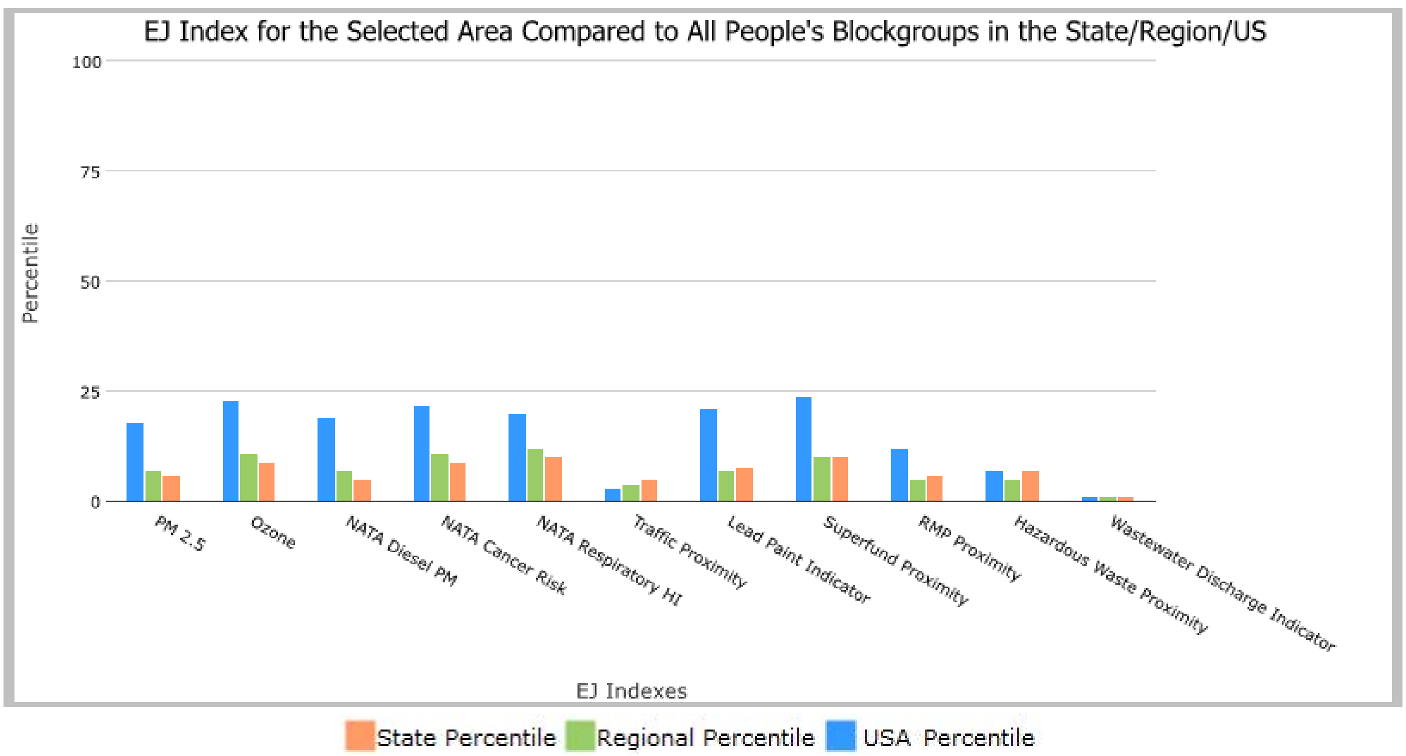
City: Newport Beach, CALIFORNIA, EPA Region 9

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.

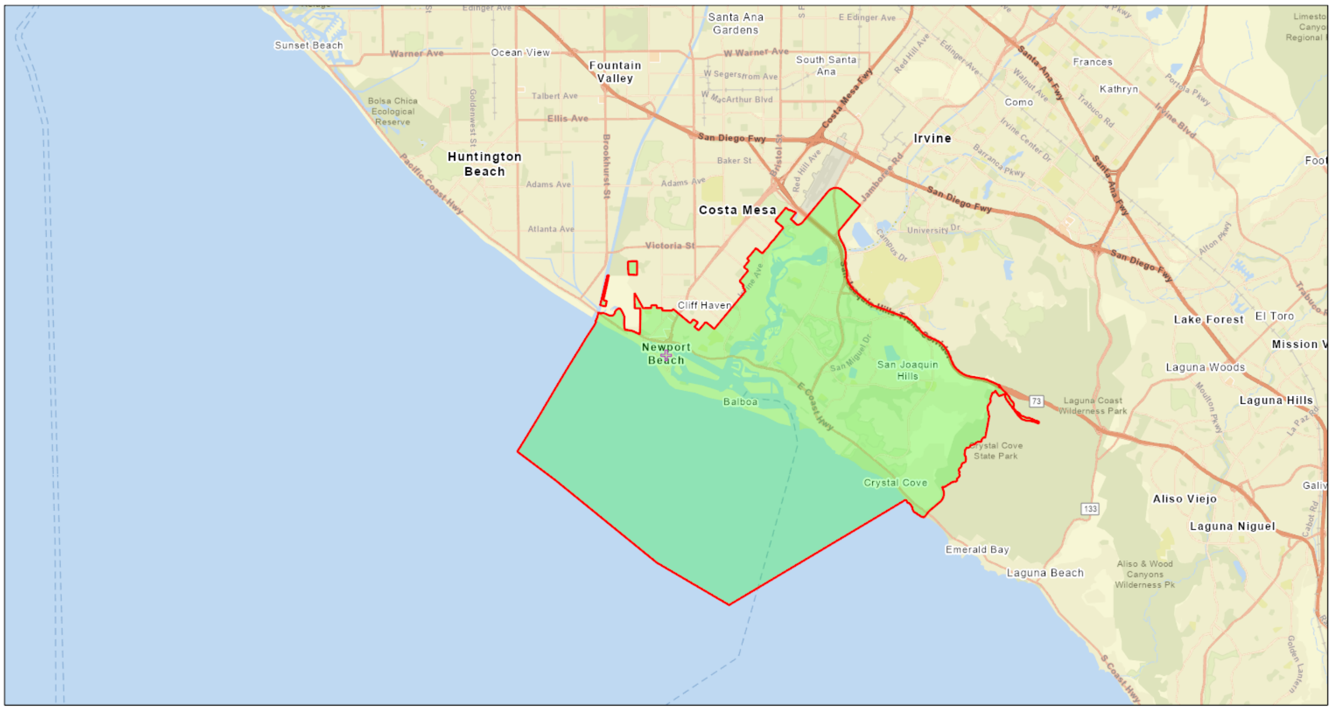
EJSCREEN Report (Version 2019)

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.)



May 11, 2020

City of Newport Beach

Project 1

1:144,448

0 1.5 3 6 mi

0 2.25 4.5 9 km

Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

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 µg/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 (µg/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

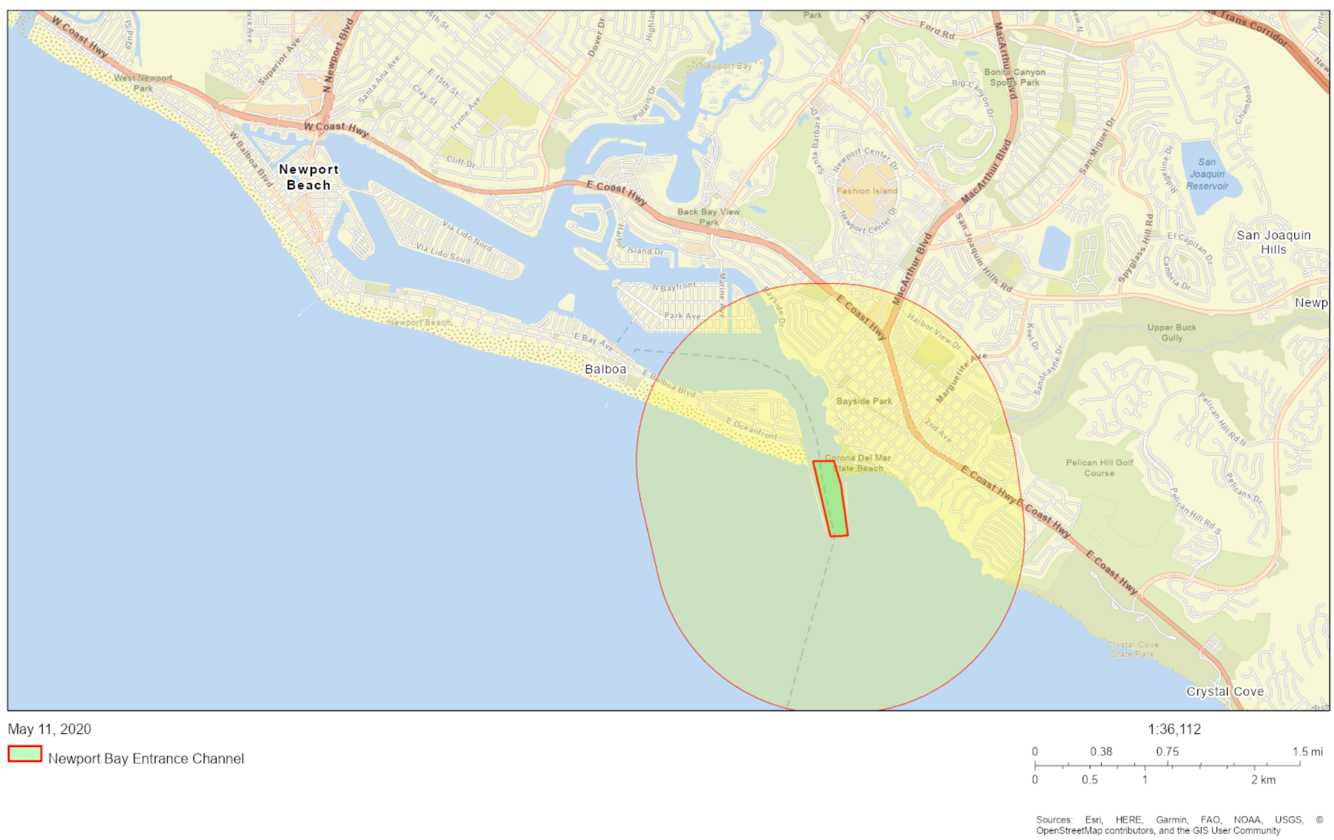
EJSCREEN Report (Version 2019)

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.)



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

United States Environmental Protection Agency

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 µg/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 (µg/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

APPENDIX G

DRAFT EA COMMENTS AND RESPONSES, STATE AND FEDERAL CONSULTATION CORRESPONDENCE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

July 21, 2020

Eduardo T. De Mesa
Chief, Planning Division
U.S. Army Corps of Engineers, Los Angeles District
915 Wilshire Boulevard, Suite 930
Attn: Mr. Larry Smith, CESPL-PDR-Q
Los Angeles, California 90017-3489

Subject: Draft Environmental Assessment for the Lower Newport Bay Maintenance Dredging Project, Orange County, California

Dear Chief De Mesa:

The U.S. Environmental Protection Agency has reviewed the above-referenced document. Our review is pursuant to the National Environmental Policy Act, Council on Environmental Quality regulations (40 CFR Parts 1500-1508), and our NEPA review authority under Section 309 of the Clean Air Act.

The proposed project would dredge 70,000 cubic yards of sediments from the Lower Newport Bay Entrance Channel and 90,000 cy from the Main Channel Balboa Reach in order to remove shoals and improve safe navigation in the project area. Alternative 1, which is identified as the recommended plan, would place sediments from the Entrance Channel at the Newport Beach Nearshore Placement Site and dispose of sediments from the Main Channel at the LA-3 ocean disposal site. Alternative 2 proposes to dispose of all dredged material at LA-3. The EPA provides the following recommendations to assist the U.S. Army Corps of Engineers in determining whether a Finding of No Significant Impact can be concluded following the completion of the environmental assessment process.

Dredged Material Management

Several sections of the Draft EA, including Table 1 (p. 3) and Section 6.4 (p. 34), state that the EPA provided "initial concurrence" on ocean disposal for the project in June 2019. The EPA provided our assessment of sediment suitability per the Ocean Testing Manual in June 2019; we did not, however, evaluate the project against all required criteria at 40 CFR 227.

Additionally, Section 6.1.3 states, "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" (p. 30). Please note that this statement is inaccurate. As noted in our comment above, the EPA did not evaluate the proposed project against all of the ocean dumping criteria in June 2019; we only evaluated the sediment test results against the criteria at 40 CFR 227 Subpart B. In addition, 40 CFR 225.2 (b-e) does not provide the criteria against which ocean dumping of dredged material is evaluated. Rather, these sections provide the process by which the EPA will concur on USACE dredging projects. 40 CFR 225.2(a) states that the EPA will use the criteria at 40 CFR 227 to evaluate proposed ocean disposal of dredged material from USACE projects.

Recommendations for the Final EA:

1-1
- In the Final EA, please remove characterizations of EPA suitability determinations as "initial concurrence." Our suitability determinations assessed compliance 40 CFR 227 Subpart B only. Please revise all such statements in the Final EA to state that, in June 2019, the EPA provided a suitability determination indicating that the Entrance Channel and Main Channel Balboa Reach areas complied with 40 CFR 227 Subpart B.

1-2
- Please revise the text in Section 6.1.4 to reference 40 CFR 227 for the ocean dumping criteria. Summarize EPA's final ocean dumping concurrence. Please note that this comment letter does not constitute our final concurrence. Our final concurrence will be issued in a separate correspondence.

The project proposes to dispose of dredged sediments at the LA-3 disposal site; however, several sections of the Draft EA incorrectly reference the LA-2 disposal site. For example, page 6 describes transportation to the LA-2 site and page 9 references disposal at, and authorization of, the LA-2 site. The Draft EA also references the Los Angeles River Estuary project dredge site. Page 13 states that preconstruction surveys will be performed at the LARE dredge site.

Recommendation for the Final EA:

1-3
- Ensure that all sections of the Final EA reference disposal at the LA-3 ocean disposal site. For example, please correct the text on pages 6 and 9 noted above.

1-4
- Ensure that all sections of the Final EA reference the Lower Newport Bay dredge site. For example, please correct the reference to LARE on page 13.

Impacts to Aquatic Life

The Draft EA appears to lack a clear and consistent characterization of the project's impacts on eelgrass. Section 4.2.1 confirms that eelgrass is located in the Entrance Channel; however, Section 4.2.3 does not disclose how many acres of eelgrass would be impacted by the dredging, only stating that eelgrass impacts will be avoided to maximum extent practicable and that unavoidable impacts will be mitigated in consultation with the National Marine Fisheries Service under the California Eelgrass Mitigation Policy. In addition, Section 6.2 states, "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." Based on the Draft EA, it is unclear whether the USACE intends to dredge areas with eelgrass, and, if so, how many acres of eelgrass habitat would be impacted.

1-5 ***Recommendation for the Final EA:*** Clarify how many acres of eelgrass within the Entrance Channel would be removed due to dredging activities associated with the project. If eelgrass would be removed, update Section 4.2.3 to account for such impacts and revise the commitment in Section 6.2 to state that impacts to eelgrass will be mitigated in consultation with NMFS under the CEMP. Identify, at minimum, a conceptual mitigation approach for eelgrass impacts.

Water Quality

Section 4.1.1 identifies the total maximum daily loads that have been implemented by the Santa Ana Regional Water Quality Control Board for Lower Newport Bay (p. 7). It also states that the EPA has issued a "technical" TMDL for copper. In addition to copper, the EPA has issued technical TMDLs for lead and zinc.

1-6 ***Recommendation for the Final EA:*** Add lead and zinc to the list of technical TMDLs that have been issued by the EPA. We also recommend stating that the Santa Ana Regional Water Quality Control Board is currently evaluating whether Lower Newport Bay is meeting water quality standards for copper, lead, and zinc.

Cumulative Impacts

The cumulative impact analysis in Section 5 briefly notes that "the Corps anticipates future funding to complete maintenance dredging at Lower Newport Bay" and that the EA will be amended after funding has been secured, if necessary, to account for disposal (p. 28).

1-7 ***Recommendations for the Final EA:***

- Provide additional information about other reasonably foreseeable planned maintenance dredging projects in Lower Newport Bay, including the anticipated scope of work, implementation timeframe, and relevant cumulative environmental effects. Include a more detailed analysis of cumulative effects from other planned dredging projects in the Final EA for this project.
- 1-8 Confirm that additional environmental review would be performed for future dredging activities that exceeds the scope of the proposed project's footprint. Clarify that any additional environmental analysis would not only account for impacts from dredged material disposal, but all other relevant impacts, including impacts from dredging activities.
- 1-9 State that the USACE will need to separately request and obtain concurrence from the EPA for ocean disposal of any dredged material not included in this Draft EA.

Air Quality

The project area is located within a federal nonattainment area for ozone (extreme) and particulate matter 2.5 (serious) and is also a maintenance area for PM10 and carbon monoxide. Given the air quality challenges in the project area, and the presence of residences adjacent to the project's dredging footprint, we encourage the USACE to consider additional measures to further reduce the project's air quality impacts.

Recommendation for the Final EA:

- 1-10 Identify any nearby sensitive receptors (e.g., schools, daycares, hospitals, senior centers, etc.). Discuss mitigation measures to reduce any impacts to sensitive receptors that would be adversely affected by project-related emissions.
- 1-11 Require tugboats to meet or exceed Tier 3 standards.
- 1-12 Describe how the project would be consistent with California's Commercial Harbor Craft Regulations.[1]
- 1-13 Revise the General Conformity *de minimis* threshold for NOx in Table 5 (p. 17). The correct threshold for extreme ozone nonattainment areas is 10 tons per year.

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[1] Available at: https://ww2.arb.ca.gov/sites/default/files/2019-03/complianceguidelines021017.pdf

We appreciate the opportunity to provide feedback on the Draft EA. Please send an electronic copy of the Final EA when it becomes available to capilla.morgan@epa.gov. If you have any questions, please contact me at 415-947-4167, or Morgan Capilla, the lead reviewer for this project, at 415-972-3504 or capilla.morgan@epa.gov.

Sincerely,

Jean Prijatel
Manager, Environmental Review Branch

cc via email
Bryant Chesney, National Marine Fisheries Service
Jason Freshwater, Santa Ana Regional Water Quality Control Board
Larry Simon, California Coastal Commission

Responses to Comments

USEPA Letter dated July 21, 2020

1-1: Language in the Final EA has been changed to reflect the final conditional concurrence received from USEPA via email on July 24, 2020. All references to "initial concurrence" have been removed.

1-2: Text in Section 6.4.1 has been revised to reflect the final conditional concurrence received from USEPA via email on July 24, 2020 in the Final EA.

1-3: References to LA-2 were typographical errors. All references to LA-2 have been changed to LA-3 in the Final EA.

1-4: References in the text to "LARE" were in error. All references to "LARE" have been removed from the Final EA.

1-5: Section 4.2.3 has been revised to address an estimated 1.5 acres of potential eelgrass loss in the Entrance Channel. A conceptual mitigation approach of performing transplants into all impacted areas has been added to this section. The applicable Environmental Commitment has been updated to reflect the Corps' commitment to develop a complete mitigation plan in consultation with the National Marine Fisheries Service and other resource agencies that ensures no net loss to eelgrass habitat.

1-6: Both lead and zinc have been added to the list of technical TMDLs. The suggested text regarding the current evaluation for copper, lead, and zinc has been added to the Final EA.

1-7: Additional information on possible maintenance dredging in other parts of the bay have been added to the cumulative impacts discussion. Requested information on scope of work and timeframe are not available and will be dependent on the level of funding received from Congress during the next FY, which is impossible to predict. The cumulative impact analysis reflected in the Final EA has been updated with additional information.

1-8: Text has been revised to reflect the Corps' need to prepare a new NEPA document for future dredging projects in Lower Newport Bay. That document would address dredging and placement/disposal impacts. The concept of preparing a Supplemental EA has been deleted.

1-9: The requested statement that an additional request for concurrence from USEPA for ocean disposal of dredged material has been added to the Final EA. The Corps recognizes its responsibilities in this regard and will comply.

1-10: There are no nearby sensitive receptors in the project area. The closest is the Oasis Senior Citizen Center approximately ¾ mile from the Entrance Channel.

1-11: Emissions from maintenance dredging are exempt from General Conformity rules. In addition, air quality impacts are less than significant and do not require the implementation of mitigation measures, such as tugboats meeting or exceeding Tier III standards to reduce emissions to below significance. USACE disagrees with this recommendation.

1-12: The contractor would be required to comply with all applicable environmental regulations, including the California Commercial Harbor Craft Regulations per construction specifications. USACE is not subject to this regulation and cannot dictate how the contractors comply with the California Commercial Harbor Craft Regulation.

1-13: The suggested revision has been made to the Final EA.

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Marine Region
1933 Cliff Drive, Suite 9
Santa Barbara, CA 93109
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

July 23, 2020

Eduardo T. De Mesa
Chief, Planning Division
U.S. Army Corps of Engineers, Los Angeles District
915 Wilshire Boulevard, Suite 930
ATTN: Mr. Larry Smith (CESPL-PDR-Q)
Los Angeles, California 90017-3489
Lawrence.J.Smith@usace.army.mil

SUBJECT: LOWER NEWPORT BAY MAINTENANCE DREDGING PROJECT (PROJECT) DRAFT ENVIRONMENTAL ASSESSMENT

Dear Mr. Smith:

The California Department of Fish and Wildlife (Department) received a Draft Environmental Assessment (DEA) from the U.S. Army Corps of Engineers for the Lower Newport Bay Maintenance Dredging Project (Project).

Thank you for the opportunity to provide comments and recommendations regarding those activities involved in the Project that may affect California fish and wildlife resources.

DEPARTMENT ROLE

The Department is California's Trustee Agency for fish and wildlife resources and holds those resources in trust by statute for all the people of the state [Fish & G. Code, Section 711.7, subd. (a) & 1802; Pub. Resources Code, Section 21070; CEQA Guidelines Section 15386, subd. (a).]. The Department, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species (*Id.*, Section 1802.). The Department is also responsible for marine biodiversity protection under the Marine Life Protection Act in coastal marine waters of California and ensuring fisheries are sustainably managed under the Marine Life Management Act. Pursuant to our jurisdiction, the Department has the following comments and recommendations regarding the Project.

PROJECT DESCRIPTION SUMMARY

Proponent: U.S. Army Corps of Engineers (USACE)
Objective: The objective of the Project is to maintain authorized channel depths (–20 feet Mean Lower Low Water) in the Entrance Channel and Main Channel Balboa Reach to allow for continued, safe navigation for recreational and commercial boats in Lower Newport Bay. Project activities include mechanical removal of approximately 70,000 cubic yards (cy) of sediment from the Entrance Channel and 90,000 cy from the Main Channel

Balboa Reach using either a clamshell or barge-mounted excavator discharging into scows for transport to the disposal sites. Dredged material from the Entrance Channel will be disposed of at the Newport Beach Nearshore Placement Site and material from the Main Channel Balboa Reach will be disposed of at the LA-3 Ocean Dredged Material Disposal Site (ODMDS).

Location: Lower Newport Bay, Orange County, CA.

Timeframe: Project construction is proposed to begin October 2020 and will take three to four months to complete.

MARINE BIOLOGICAL SIGNIFICANCE

The diverse shallow habitats and ecosystems within the intertidal and subtidal areas of Newport Bay provide habitat and forage areas for a variety of marine species, some of which are unique to southern California. The marine habitats of Newport Bay are important Essential Fish Habitat and nursery grounds for state and federally managed fish species. Habitats include eelgrass beds, sandy intertidal, and shallow soft bottom areas. The diverse habitats within Newport Bay support both commercial and recreational fisheries that are important to California's coastal economy.

COMMENTS AND RECOMMENDATIONS

The Department offers the comments and recommendations below to assist the USACE in adequately identifying and/or mitigating the Project's significant, or potentially significant, direct and indirect impacts on fish and wildlife resources.

I. Project Level Impacts

Native Eelgrass

Native eelgrass beds of *Zostera marina* and *Zostera pacifica* (*Z. marina and Z pacifica*) are an important part of the Newport Bay ecosystem and are recognized by state and federal statutes as both highly valuable and sensitive habitats. Eelgrass provides primary production and nutrients to the ecosystem along with spawning, foraging, and nursery habitat for fish and other species. Pursuant to the federal Magnuson-Stevens Fishery Conservation and Management Act (MSA), eelgrass is designated as Essential Fish Habitat (EFH) for various federally managed fish species within the Pacific Coast Groundfish and Pacific Coast Salmon Fisheries Management Plans (FMP). Eelgrass is also considered a habitat area of particular concern (HAPC) for various species within the Pacific Coast Groundfish FMP. Eelgrass habitats are further protected under state and federal "no-net-loss" policies for wetland habitats. Additionally, the importance of eelgrass protection and restoration, as well as the ecological benefits of eelgrass is identified in the California Public Resources Code (PRC Section 35630).

Comments:

2-1 The Department is concerned that the DEA does not adequately address potential Project impacts to eelgrass habitat. The DEA states that: 1) the Project would not result in any significant, adverse impacts to the existing environment; 2) fish and wildlife habitat will be unaffected by Project activities; and 3) no compensatory mitigation is required. In addition, the Draft Finding of No Significant Impact (FONSI) from the DEA states that habitat impacts would be considered insignificant. The DEA, however, does not provide information to support any of the above conclusions.

2-2 The DEA also states that "dredging shall not occur closer than 50 feet to any existing eelgrass beds"; however, the 2016 map of eelgrass habitat (DEA - Figure 5) when compared with the dredging footprint (DEA – Figure 2) clearly shows the dredge footprint overlapping existing eelgrass habitat. Even if dredging occurs 50 feet away from eelgrass habitat, impacts to eelgrass could still occur from changes in water quality, such as elevated turbidity. Furthermore, the information presented in the DEA appears to contradict the Department's recent discussions with the National Marine Fisheries Service (NMFS) [1] which point to the USACE identifying the potential of 4 acres of eelgrass being impacted by the Project. The conclusion that the Project will have a less than significant impact is not supported without a current, detailed eelgrass impact estimate and a fully developed eelgrass mitigation plan.

2-3 The DEA includes a citation for a general commitment to the California Eelgrass Mitigation Policy (CEMP). However, the DEA provides no further information regarding eelgrass monitoring and mitigation that would be a part of the CEMP. Information regarding *Z. pacifica* mitigation is lacking and there is high uncertainty regarding restoration success of this species. The assumptions in the CEMP regarding eelgrass mitigation ratios are based on mitigation of *Z. marina* and cannot be assumed to fully apply to *Z. pacifica*. In addition, the DEA does not address the loss in temporal function of eelgrass habitat and how that temporal loss will be compensated for.

2-4 **Recommendations:** The Department recommends the proposed Project avoid and minimize impacts to eelgrass and fully mitigate for any remaining unavoidable impacts. To reduce the impact to eelgrass to a level of less than significant, the Department recommends the Final Environmental Assessment (FEA) include the following:

- <u>A comprehensive analysis of impacts to eelgrass habitat.</u> This analysis should disclose the specific location(s) and amount of eelgrass habitat that may be impacted by both direct and indirect dredging activities for each species (*Z. pacifica* and *Z. marina*). The analysis should also include a more recent eelgrass survey.
- <u>A comprehensive eelgrass mitigation and monitoring plan.</u> This plan should include descriptions of the proposed mitigation action(s) and monitoring schedule as well as other details outlined in the CEMP (NMFS, 2014). Ratios for eelgrass mitigation must be high enough to ensure "no net loss" of habitat. The

[1] B. Chesney, personal communication, 7/15/2020

high level of uncertainty associated with restoration success of *Z. pacifica* should be addressed in the FEA and incorporated into the eelgrass mitigation plan. The mitigation ratios within the CEMP may not be high enough to ensure no net loss of this species. Potential donor beds for *Z. pacifica* should be identified and surveyed in advance. The USACE should coordinate with the Department and other natural resource agencies, such as NMFS, to determine the appropriate mitigation ratio for the Project. The mitigation and monitoring plan should also incorporate the loss of temporal function into the eelgrass monitoring and mitigation plan.

2-5 If transplanting of eelgrass is required for mitigation, a Scientific Collecting Permit (SCP) from the Department will be required prior to harvest and transplanting activities. The SCP may include conditions such as donor bed surveys, limits on number and density of turions collected, methods for collection and transplanting, notification of activities, and reporting requirements. Please visit the Department's SCP webpage for more information: https://wildlife.ca.gov/Licensing/Scientific-Collecting.

2-6 Finally, the Department recommends that, prior to commencement of any Project activities, the USACE involves the Department and other state and federal resource agencies in a review of all eelgrass habitat surveys, impact analyses, appropriate monitoring, and any mitigation for impacts to eelgrass habitat. Prior to commencement of Project activities, the USACE should provide to all applicable agencies, including the Department, any survey results, impact analyses, and monitoring and mitigation protocols determined through the multiagency process and required by permitting agencies.

CONCLUSION

The Department appreciates the opportunity to comment on the Lower Newport Bay Maintenance Dredging Project DEA to assist the U.S. Army Corps of Engineers in identifying and mitigating Project impacts on biological resources.

Questions regarding this letter or further coordination should be directed to Loni Adams, Environmental Scientist at 858-627-3985 or Loni.Adams@wildlife.ca.gov.

Sincerely,

Craig Shuman, D. Env.
Marine Regional Manager

cc: Office of Planning and Research, State Clearinghouse
1400 10th St. #12, Sacramento, CA 95814

ec: Becky Ota, Environmental Program Manager
California Department of Fish and Wildlife
Becky.Ota@wildlife.ca.gov

Eric Wilkins, Senior Environmental Scientist Supervisor
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Amanda Canepa, Environmental Scientist
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Loni Adams, Environmental Scientist
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Marc Brown, Environmental Scientist
Santa Ana Regional Water Quality Control Board
Marc.Brown@waterboards.ca.gov

Larry Simon, Federal Consistency Unit Manager
California Coastal Commission
Larry.Simon@coastal.ca.gov

REFERENCES

NMFS, 2014. California Eelgrass Mitigation Policy, National Marine Fisheries Service, https://archive.fisheries.noaa.gov/wcr/publications/habitat/california_eelgrass_mitigation/Final%20CEMP%20October%202014/cemp_oct_2014_final.pdf.

Responses to Comments

California Department of Fish and Wildlife email dated July 23, 2020

2-1: The Draft Environmental Assessment (EA) provided an overview of potential eelgrass impacts. The U.S. Army Corps of Engineers, Los Angeles District (Corps) continued to work with the National Marine Fisheries Service (NMFS) during the public notice period to refine the estimated impact to eelgrass while identifying possible minimization measures and potential mitigation strategies. The Final EA provides the Corps' current estimate of 1.5 acres of eelgrass impacts and identifies the mitigation strategy as a transplant in to all impacted areas to reduce the temporal loss of eelgrass values. This area is not expected to be dredged again for 15-20 years allowing eelgrass to reestablish. The dredged areas will be within the depth limitations for this species of eelgrass in the Entrance Chanel. The Final EA adequately addresses potential impacts to eelgrass habitat and supports its conclusion that the project, with inclusion of its commitment to mitigate for eelgrass impacts, will not result in substantial impacts to eelgrass habitat.

2-2: This comment refers to one of the environmental commitments included in section 6.2 of the Draft EA. This was inadvertently left in place from an earlier version of the document and should have been deleted. As the comment correctly points out, there are expected impacts to eelgrass from the current project. The current impact estimate is base on an older eelgrass survey, which is too old to be useful for detailed mitigation planning. It was used instead to estimate potential impacts and to establish the goal of no net loss of eelgrass. The Corps' commitment to develop and implement an eelgrass mitigation plan that ensures no net loss of eelgrass, which is supported by a detailed conceptual eelgrass mitigation plan (see Appendix H), and will be informed by pre- and post-project eelgrass surveys, is sufficient to support the Corps' finding of less than significant impacts.

2-3: The concerns reflected in this comment have been addressed through updates to the EA. The Final EA includes significantly more information about the Corps' plan for eelgrass monitoring and mitigation (see section 4.2) and includes a conceptual eelgrass mitigation plan (Appendix H).

2-4: The Final EA addresses minimization and avoidance measures for eelgrass. As described above, a detailed post-construction survey will be prepared that will include a comprehensive analysis of impacts to eelgrass habitat. A detailed mitigation and monitoring plan will be drawn up that will include a comprehensive plan for conducting eelgrass mitigation to ensure no net loss of eelgrass and will be specific for *Zostera pacifica*. The "high level on uncertainty associated with the restoration of *Z. pacifica*" is an inaccurate description. Successful mitigation of *Zostera pacifica* has occurred in southern California, so that there exists a reasonable level of certainty of success. Restoration of the original impact area means that the only loss would be a temporal loss, which is what the mitigation is designed to minimize and offset. This will be clearly spelled out in the final, detailed mitigation plan, which will be developed in consultation with NMFS, CDFW, and other resource agencies.

2-5: The Corps will contract eelgrass mitigation to a qualified firm that will obtain all necessary permits, including the Scientific Collecting Permit.

2-6: The Corps agrees to coordinate with federal and state resource agencies prior to commencement of mitigation activities. As described in the Final EA and conceptual eelgrass mitigation plan, the Corps has agreed to share survey result and coordinate the development of the mitigation plan with the NMFS, CDFW, Santa Ana Regional Water Quality Control Board, and the California Coastal Commission. See those document for more details about the Corps commitment to further coordination with resource agencies..

From:	Scianni, Melissa
To:	Smith, Lawrence J Jr CIV USARMY CESPL (USA)
Cc:	Hayward, Christopher A CIV USARMY CESPL (USA); Solek, Christopher W CIV USARMY CESPL (USA); Demesa, Eduardo T CIV USARMY CESPL (USA); Ota, Allan; Ross, Brian; Ziegler, Sam; Blake, Ellen
Subject:	[Non-DoD Source] EPA Ocean Disposal Conditional Concurrence Newport Main Channel Balboa Reach
Date:	Friday, July 24, 2020 3:14:14 PM
Attachments:	EPA_SoCal ODMDS site use conditions_Nov-2017.pdf 2020-07-21_EPA comments DEA_Lower Newport Bay Maintenance Dredging Project_signed.pdf EPA Ocean Disposal Concurrence Newport Main Channel Balboa Reach.pdf

Larry,

This message transmits EPA's conditional concurrence for ocean disposal at LA-3 of material to be dredged from the Lower Newport Bay Maintenance Dredging Project. This concurrence is provided pursuant to our authorities and responsibilities under the Marine Protection, Research, and Sanctuaries Act (MPRSA), and to the related Ocean Dumping regulations published at 40 CFR 220-227.

EPA determined that for this routine maintenance dredging project, the June 2020 Draft Environmental Assessment (DEA) and June 2019 "Lower Newport Bay Federal Channels Dredging Sampling and Analysis Program Report" (SAPR) prepared by Anchor QEA, LLC. contained sufficient information to demonstrate compliance with the requirements in Section 103 of the MPRSA and the associated regulations at 40 CFR 227. We note that this may not be the case for other more complex projects; those with questions about practicable alternatives; or ones without a previous Dredged Material Management Team (DMMT) suitability determination.

As part of the subject project, the USACE proposes to discharge approximately 77,000 cy of clean fine grained material from the Main Channel Balboa Reach at LA-3. This area was identified as composite "MCN5" in the SAPR and was tested to -22 ft Mean Lower Low Water (MLLW). EPA has determined the proposed disposal complies with the requirements in Section 103 of the MPRSA and the associated regulations at 40 CFR 227, including the need for ocean disposal, suitability of the material, and environmental impacts from the disposal. Our determination is based on the DEA and the results of physical, chemical, and biological testing conducted in accordance with the Ocean Testing Manual as presented in the SAPR.

3-1 The SAPR for Lower Newport Bay includes other areas that were tested for ocean disposal. EPA is only concurring on disposal of the Main Channel Balboa Reach (MCN5 area) at this time. The USACE will need to request and obtain concurrence from EPA for ocean disposal of any other material.

3-2 EPA hereby concurs in ocean disposal at LA-3 of 77,000 cy of material from the dredging of the Main Channel Balboa Reach. Our concurrence is conditional on compliance with all the attached Standard Conditions for use of LA-3, as well as those Standard Conditions being included in the contract solicitation and final contracts/authorizations. We also request the USACE provide EPA a copy of the final Construction Plan prior to disposal of any material at LA-3.

Feel free to contact me or Allan Ota if there are any questions about this concurrence, or the mandatory ocean disposal conditions. For your reference, I have also attached our NEPA comments on the Draft EA.

Regards,

Melissa

Melissa Scianni

Wetlands Office

US EPA, Region IX, Southern CA Field Office

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scianni.melissa@epa.gov

Responses to Comments

U.S. Environmental Protection Agency email dated July 24, 2020

3-1: Final concurrence noted. The limitation to the Main Chanel Balboa Reach is noted. Dredging in any other area for purposes of ocean disposal will include a request for concurrence from USEPA on suitability.

3-2: The Corps has included the Standard Conditions for use of LA-3 in it contract specifications and will monitor compliance. A copy of the final Construction Plan requested by USEPA) will be provided prior to the start of dredging operations.

From: Vissman, Sandy
To: Smith, Lawrence J Jr CIV USARMY CESPL (USA)
Cc: Snyder, Jonathan
Subject: [Non-DoD Source] Lower Newport Bay Maintenance Dredging Project
Date: Monday, July 27, 2020 5:42:02 PM

Hi Larry,

We reviewed the DRAFT ENVIRONMENTAL ASSESSMENT FOR LOWER NEWPORT BAY MAINTENANCE DREDGING PROJECT Orange County, California (EA), and had some comments and suggestions as you work to finalize the EA.

4-1 1) We recommend that the Corps include a minimization measure that assures that dredging (scheduled for October) will be conducted outside the California least tern nesting season should the project schedule change.

4-2 2) The document should include a map that shows the least tern nesting sites in Newport Bay in relationship to the project and information about least tern nesting in Newport Bay. (for example, based on State reporting, Newport nest sites supported 20 nests in 2016).

4-3 3) In general, we recommend informal consultation (e.g. request for concurrence that the project is not likely to adversely affect the species) for projects conducted in listed species habitat. This project is in California least tern foraging habitat.

4-4 4) The document should include eelgrass maps that depict the location of eelgrass within the project footprint (from 2016 and 2018 surveys). Based on the bathymetry depicted in the document, some of the areas are very shallow and likely support eelgrass.

4-5 3) We noticed that there is a concurrent jetty repair project proposed (mentioned in the EA on page , and would like additional information regarding the jetty repair project. The southern part of the Balboa Peninsula is a significant wintering area for western snowy plovers. If the jetty repair project includes land-side work, minimization measures for western snowy plover should be incorporated into the project.

Thanks Larry, I will give you a call to discuss this week.

Sandy

Responses to Comments

U.S. Fish and Wildlife Service email dated July 27, 2020

4-1: Dredging will take place as soon as possible after contract award, which is currently scheduled for September 2020. Dredging is expected to commence in October and the Corps will take all measures it can to ensure that it meets this schedule. It is unlikely that dredging would be delayed so long that we dredge during nesting season. In the unlikely event that dredging slips into the nesting season, the Corps has determined that the project, even if it occurred during the California least tern nesting season, would have no effect on the species.
4-2: The Corps will revise Figure 1 to point out the location of the California least tern nest sites located in the upper bay. Information on nesting mentioned in the letter will also be added to the Final EA.

4-3: The Corps has determined that the project, even if it occurred during the California least tern nesting season, would have no effect on the species. Given that the project is very unlikely to extend into the nesting season and that the species is completely absent outside the nesting season, there is no reason to consult with USFWS on this species.

4-4: A map of known eelgrass was included in the Draft EA. That map has been overlain with the dredge prism in Figure 4 of the Final EA.

4-5: This comment is not applicable to the Draft EA. The Corps is discussing this issue with the USFWS for the East Jetty Repair Project.

Santa Ana Regional Water Quality Control Board

July 27, 2020

Eduardo T. DeMesa
Chief, Planning Division
U.S. Army Corps of Engineers, Los Angeles District
915 Wilshire Boulevard, Suite 930
ATTN: Mr. Larry Smith (CESPL-PDR-Q)
Los Angeles, California 90017-3489

eduardo.t.demesa@usace.army.mil

RE: COMMENTS ON THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE LOWER NEWPORT BAY MAINTENANCE DREDGING PROJECT

Dear Mr. DeMesa

On June 27, 2020, Santa Ana Regional Water Quality Control Board (Santa Ana Water Board) staff received the U.S. Army Corps of Engineers, Los Angeles District (USACE) draft Environmental Assessment (EA) for the Lower Newport Bay Maintenance Dredging Project (Project). The USACE has also applied for a Clean Water Act Section 401 Water Quality Certification for the Project.

The purpose of the Project is to remove accumulated sediment from two channels in Lower Newport Bay (the Entrance Channel and Main Channel Balboa Reach) to their authorized depths of 20 feet below mean sea level. Approximately 70,000 cubic yards of sediment would be dredged from the Entrance Channel and disposed at the Newport Beach Nearshore Placement Site. Approximately 90,000 cubic yards would be dredged from the Main Channel Balboa Reach and disposed at the LA-3 Ocean Dredged Material Disposal Site (ODMDS), which is administered by the U.S. Environmental Protection Agency (USEPA). Both channels would be mechanically dredged using a clamshell and scow or a barge-mounted excavator and scow. The Project would take three to four months to complete.

The Project's draft EA states that the Project would have insignificant impacts on fish and wildlife habitat and on water quality, while aquatic resources/wetlands would not be affected. The draft EA includes the USACE's finding that the Project would have no effect on federally listed species or their designated critical habitat. No compensatory mitigation is proposed.

Since receiving the draft EA, we received additional information on the Project from USACE staff Larry Smith. On July 15, 2020 we received an email from Mr. Smith and that email stated the Project would impact about four acres of eelgrass. This estimate was based on an eelgrass survey conducted by the City of Newport Beach in 2015. The email also described various eelgrass mitigation options that the USACE considered. Of those options, the USACE identified a mitigation approach that they decided to pursue. Since that time, Mr. Smith stated to Santa Ana Water Board staff that, as a result of reassessing the impacts of the Project, the USACE determined that about 1.5 acres of eelgrass would be impacted by the Project, instead of four acres.

Mr. Smith also emailed Santa Ana Water Board staff on July 24, 2020 that the contractor would be able to dredge down to 22 feet below MLLW, even though the authorized dredging depth was 20 feet below MLLW. This information was not in the draft EA.

Santa Ana Water Board staff has the following comments on the draft EA and the subsequent information from Mr. Smith:

1. Water Quality Monitoring: Section 4.12 (Environmental Consequences) and Section 6.2 (Commitments) state: "*weekly monitoring for salinity, pH, temperature, dissolved oxygen, turbidity and light transmissivity, and monthly sampling for total dissolved solids and TRPH. 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.*"

5-1 a. The applicable water quality objective for turbidity in Lower Newport Bay is specified in the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan). The Basin Plan states that increases in turbidity resulting from controllable water quality factors shall be limited to a maximum increase of 20 percent for inland bays and estuaries that have a natural turbidity of less than 20 NTU, which is the case for Lower Newport Bay. *The USACE must limit any increases in turbidity that result from the Project to a maximum increase of 20 percent; therefore, the EA must be corrected to reflect the appropriate water quality objective.*

5-2 b. Weekly sampling is insufficient to provide information to the dredge contractor regarding the turbidity plume around the dredge operation. Monitoring data must be provided daily at the beginning of the Project. The monitoring interval may be increased based on compliance with the monitoring standard of a maximum increase in turbidity of 20 percent (as discussed in 1.a., above).

5-3 c. The draft EA does not explain how the proposed standard of 40 percent in light transmittance would be protective of sensitive beneficial uses, which are considered a subset of California's water quality standards. The monitoring standard for the Project must be based on the water quality monitoring plan developed for the previous (2012) USACE dredging project in Lower Newport Bay. The monitoring standards were determined on the basis of a special study (see enclosure) conducted within Lower Newport Bay and are listed in Table 1 below.

Table 1: Turbidity Related Standards Developed for the USACE's 2012 Dredging Project in Lower Newport Bay

Parameter	Units	Applicable in Vicinity of Eelgrass Beds (within 500 feet)	Applicable When not in Vicinity of Eelgrass Beds (>500 feet)
TSS	mg/L	15	50
Transmittance (mid-depth)	%	38.4	47.6
Turbidity	NTU	15.9	15.2

5-4 d. All turbidity and transmittance monitoring must be performed while the dredge is operating. The "downstream" sample must be collected downcurrent of the dredge with respect to the tidal current and must be timed to coincide with active incoming or outgoing tidal stages.

5-5 e. The draft EA refers to the use of controls, such as *"modifying the dredging operation and the use of silt curtains (if warranted)"* to ensure protection of water quality standards. The EA must include a discussion of the feasibility and effectiveness of using silt curtains in the areas to be dredged and should specifically describe the modifications to the dredging operation that will be implemented.

5-6 f. The monitoring program at the nearshore placement site must include collection of samples for *Enterococci*. Sample locations for *Enterococci* must include at least one location downcoast, one location upcoast, and one location landward of the placement site. The applicable water quality objective is 110 colony forming units (cfu)/100 ml.

5-7 2. Eelgrass Avoidance: Section 4.2.3 (Environmental Consequences) of the draft EA states "*Impacts to eelgrass beds (considered to be an ASBS) would be avoided to the maximum extent practicable commensurate with the maintenance of safe navigation*." But Section 6.2 (Commitments) states: "*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.*"

5-8 a. Section 6.2 describes avoidance only for eelgrass in the Entrance Channel but the Main Channel Balboa Reach is also part of the Project. The EA must clarify whether eelgrass areas in the Main Channel Balboa Reach would also be avoided in the manner described for the Entrance Channel.

5-9 b. The avoidance described in Section 4.2.3 is only "to the maximum extent practicable," which is undefined. The avoidance described in Section 6.2 is clearly defined as it relates to the Entrance Channel. The EA must present a consistent description of where and how eelgrass impacts would be avoided.

5-10 3. Eelgrass Mitigation: (Email of Larry Smith, dated July 15, 2020).
   a. Our procedures require that mitigation plans be submitted prior to issuance of the Certification to adequately assess proposed compensation for impacts to sensitive areas.
   b. Mitigation Plans must be submitted for approval by the Santa Ana Water Board's Executive Officer.
   c. All elements of the mitigation plan must be consistent with the *California Eelgrass Mitigation Policy and Implementation Guidelines*.

5-11 4. Cumulative Impact Analysis: The Sampling and Analysis Plan Report (SAPR, APPENDIX B) includes characterization data for all units that are proposed for the overall Lower Newport Bay maintenance dredge project. As this application includes only two of the multiple dredge units evaluated in the SAPR, Santa Ana Water Board staff finds it necessary to clarify that the comments provided to this EA apply only to those units included in the application: Lower Newport Bay Maintenance Dredging Project (LNB Maintenance Dredging) and the Lower Newport Bay East Jetty Repair Project (Jetty Repair).

There is a statement at the end of Section 5 indicating that "*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.*" Santa Ana Water Board staff does not support this conclusion. The locations that are part of the overall maintenance project plan, not included in this application, have not been evaluated with respect to environmental impact. Santa Ana Water Board staff will require further information prior to approval of any other dredge units (other than the Jetty Repair and LNB Maintenance Dredging Projects) from the overall Lower Newport Bay maintenance dredge plan to determine whether additional monitoring would be required for those projects, if and when they occur.

5-12 5. Regarding the information that Mr. Smith relayed to Santa Ana Water Board staff that the contractor would be able to dredge down to 22 feet below MLLW, even though the authorized dredging depth was 20 feet below MLLW, we have the following comment.

> Santa Ana Water Board staff understands that dredging to 22 feet below MLLW may further damage eelgrass by hindering its ability to grow back. We understand that in bays and harbors, it is possible to limit the over depth dredging to one foot. Please consider requiring less over depth dredging; otherwise, additional mitigation could be required for further damage to eelgrass habitat.

If you have any questions, please contact Marc Brown at (951) 321-4584 or Marc.Brown@waterboards.ca.gov or me at (951) 782-7960 or David.Woelfel@waterboards.ca.gov.

Sincerely,

Marc K. Brown

for:
David Woelfel
Senior Environmental Scientist
Regional Planning Programs Section

Enclosure: Anchor QEA memorandum dated May 2012: Lower Newport Bay Water Quality Monitoring Suspended Sediment Special Study

cc:
Kenneth Wong, USACE – Kenneth.Wong@usace.army.mil
Larry Smith, USACE – Larry.Smith@usace.army.mil
Bryant Chesney, NOAA-NMFS – bryant.chesney@noaa.gov
Robert Stein, City of Newport Beach – rstein@newportbeachca.gov
Chris Miller, City of Newport Beach – cmiller@newportbeachca.gov

Responses to Comments

Santa Ana Regional Water Quality Control Board letter dated July 27, 2020

5-1: The Corps provided the Water Board staff the report used to establish water quality thresholds and water quality monitoring methodology for the Corps. The Water Board also provided the Corps with a similar document. Both documents found that light transmissivity is the better method for monitoring turbidity than is NTU. The Corps recommends that the Water Board shift their turbidity monitoring methodology and threshold to light transmittance in accordance with both documents. If the Water Board chooses to retain the thresholds described, the Corps will incorporate both into the Water Quality Monitoring Plan.

5-2: The Corps monitors dredging and beach nourishment activities on a weekly basis. This has been adequate in the past for maintenance dredging activities in channels with clean sediments. Most projects, including those in Newport Bay rarely, if ever, exceed water quality thresholds. Monitoring on a more frequent basis results in added costs and data without providing any additional protection to water quality. The only exceedances seen in Newport Bay during Corps maintenance dredging were to the Water Board's thresholds and is the result of using the less accurate and less reliable NTU method to monitor turbidity. The documents discussed in 5-1 above both discussed the prevalence of false positives resulting from using NTU to monitor turbidity, including exceedances seen when no dredging was occurring. Regardless, the Corps has agreed to conduct daily monitoring for this project. Monitoring will shift to weekly if no exceedances occur..

5-3: The Corps recently provided the Water Board staff the paper on which the use of light transmittance and the 40% reduction in light transmittance was presented and discussed as being protective of water quality. The document also discussed the predictive qualities of light transmittance for turbidity levels as opposed to the NTU method. The standards used by the Water Board in 2012 are not appropriate for or binding on this project. However, the USACE has agreed to include turbidity monitoring using NTU for comparison purposes.

5-4: The water quality monitoring plan will be written to ensure that all water quality monitoring is performed only when dredging is occurring. Two exceptions will be the pre-and post-dredge monitoring used to establish baseline conditions in the bay. In addition, monitoring at the nearshore placement site will be limited to within an hour of placement in order to ensure that the results of the placement are monitored. The "downstream" sample will be collected down current from the dredge with the direction of the current established at the time monitoring is conducted by identifying the tidal stage as either ebb or flood and locating the stations appropriately.

5-5: While silt curtains are one if the measures described for turbidity exceedances, this method has not been needed in the past. Use of silt curtains in the Entrance Channel would not be effective due to the ocean and tidal currents expected in the Entrance Channel that would result in silt curtains being ineffective. The use of silt curtains in the Main Channel Balboa Reach would also be highly unlikely as any turbidity exceedances are expected (based on past experience) to be slight and easily controlled by other methods involving modifications to the dredging method. A detailed discussion of the feasibility and effectiveness of using silt curtains is not warranted here in light of the highly unlikely need for their use. Controls include modifications to the operations of the clamshell such as slowing any or all of the process to reduce chances of excess sediment entering the water column. These controls will be dependent on the nature and observed cause of any turbidity or other water quality problems observed.

5-6: Monitoring for bacteria, such as Enterococci is considered to be unnecessary. These bacteria in salt water have a short time before the bacteria are killed. The two dredge areas are far enough away from any sources of bacteria that bacteria are not expected to be present in any of the sediments. In addition, the sediments will be placed into the nearshore and not directly on to the beach. Any bacteria present would be killed long before any of the sediments end up on the beach. They likelihood of bacteria entering the water column is also considered unlikely. The time lapse between sampling and testing also renders this testing meaningless as any positive results will likely not be identified until after dredging is complete.

5-7: This comment refers to one of the environmental commitments included in section 6.2 of the Draft EA. This was inadvertently left in place from an earlier version of the document and should have been deleted. As the comment correctly points out, there are expected impacts to eelgrass from the current project.

5-8: As stated in the Draft EA (Section 4.2.1), there is no eelgrass found within the Main Channel Balboa Reach. There will be no impacts to eelgrass in this section of the channel.

5-9: The term “maximum extent practicable” is used to define practicable as areas where dredging can be delayed or avoided without impacting navigational safety. This is described more fully in the Final EA (Section 4.2.3).

5-10: The Corps does not prepare detailed mitigation plans until actual acreages and location of eelgrass losses are determined through pre- and post-construction surveys. However, the Corps has developed and incorporated into the Final EA a description of its conceptual mitigation plan for this project. The complete mitigation plan will be prepared in consultation with the Water Board and other agencies following the post-construction survey. Actual transplants will not occur until the start of the next eelgrass growing season in April 2021 for reasons discussed in the Final EA. Mitigation methodology, monitoring requirements, and success criteria will be established consistent with the CEMP to the greatest extent practicable. The conceptual mitigation plan is contained in Appendix H.

5-11: The Corps acknowledges that the Water Board’s comments on the EA are limited to the dredge areas proposed for this project, the Entrance Channel and Main Channel Balboa Reach. Any future dredging in other sections of Newport Bay would require preparation of a new NEPA document and an additional Water Quality Certification request if regulated discharges would occur as part of those projects.

5-12: The Corps has elected to use a two-foot overdepth allowance due to the methodology selected and the difficulty of dredging in the Entrance Channel if overdepth is reduced to one-foot. Eelgrass in the Entrance Channel has been found as deep as -24 ft MLLW, which is two feet below the proposed overdepth. Dredge contractors rarely dredge the entire overdepth limit, so the bottom is expected to remain well within eelgrass limits in the Entrance Channel.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

August 4, 2020

Mr. Eduardo T. De Mesa
Chief, Planning Division
U.S. Army Corps of Engineers
Los Angeles District
ATTN: Mr. Larry Smith, CESPL-PDR-Q
915 Wilshire Boulevard, Suite 930
Los Angeles, California 90017-3849

Dear Mr. De Mesa:

NOAA's National Marine Fisheries Service (NMFS) has reviewed the U.S. Army Corps of Engineers' (USACE) Draft Environmental Assessment (DEA) regarding the Lower Newport Bay Maintenance Dredging Project and the accompanying letter dated June 26, 2020, requesting essential fish habitat consultation. In addition, NMFS has reviewed project information provided by USACE senior staff via telephone and email. NMFS offers the following comments pursuant to our responsibilities under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), Endangered Species Act (ESA), and Marine Mammal Protection Act (MMPA).

In summary, NMFS requests expanded EFH consultation because additional information and analysis is needed to assess the effects of the action, and determine whether additional conservation measures are appropriate. NMFS recommends the USACE address the information needs and impact concerns we describe below in a revised EFH assessment and/or final National Environmental Policy Act (NEPA) document. Based upon the limited information and effects analysis provided by the USACE, NMFS has determined that the proposed project would adversely affect EFH and offers EFH conservation recommendations to avoid, minimize, mitigate, or otherwise offset the adverse effects to EFH. Lastly, we provide some background on ESA and MMPA responsibilities, and offer our assistance with compliance.

Consultation Background

NMFS previously submitted comments and conservation recommendations on July 11, 2011, to the USACE regarding maintenance dredging in Lower Newport Bay. We noted inconsistencies in their 2011 DEA and did not concur that dredging impacts would be insignificant. In addition, we noted the USACE had made previous environmental commitments for various maintenance dredging projects (e.g., Morro Bay, Mission Bay) to comply with established eelgrass mitigation policy, yet had failed to do so during project implementation. In addition, we specifically noted that approximately 1 acre of eelgrass habitat impacts had not been offset from the USACE's previous 2003 maintenance dredging event.

Despite their previous environmental commitment to comply with established eelgrass mitigation policy, NMFS has not received all the eelgrass monitoring reports for the USACE's previous maintenance dredging mitigation projects in a timely manner. Regardless, we have reviewed the five-year eelgrass monitoring report for the 2011 maintenance dredging event and the five-year eelgrass monitoring report for the 2003 maintenance dredging event. Although final monitoring results indicated that the transplant site for the 2011 maintenance dredging project had been determined to have met its mitigation requirement, the four-year eelgrass monitoring report for the 2003 maintenance dredging event indicated that the mitigation site did not meet performance standards. Furthermore, eelgrass mitigation efforts associated with the 2012 City of Newport Beach (City)/County of Orange (County) maintenance dredging have also failed to meet their performance standards. Thus, previous adverse impacts to eelgrass associated with maintenance dredging have not been adequately offset by USACE or local government.

On June 15, 2020, NMFS and USACE staff conversed by phone regarding anticipated eelgrass habitat impacts associated with the USACE's proposed maintenance dredging in the Newport Bay Entrance Channel. In addition, staff discussed a preliminary approach to addressing these impacts via preservation of eelgrass habitat that was previously established in the Bolsa Chica Lowlands Project. Subsequent to that discussion, the USACE provided a DEA and requested EFH consultation via electronic mail on June 26, 2020. USACE staff followed up by email on July 7, 2020, indicating that they were on a tight timeline for awarding the dredging contract and requested whether they should expect any EFH conservation recommendations. NMFS staff responded on July 9, 2020, indicating that NMFS intended to provide comments and preliminary EFH recommendations, but the DEA did not provide sufficient information to initiate EFH consultation. Moreover, NMFS staff clarified that they did not concur with the proposed mitigation strategy as USACE staff had described.

USACE staff followed up by email on July 14, 2020, with additional information and a revised mitigation approach. Specifically, they estimated a potential loss of 4 acres of eelgrass habitat, based on an eelgrass survey performed by the City of Newport Beach (City) in 2015, and assumed the affected eelgrass is *Zostera pacifica*. In addition, they indicated that the USACE was no longer pursuing eelgrass habitat preservation at Bolsa Chica. Furthermore, they indicated that eelgrass is expected to revegetate impacted areas over time, and they are considering eelgrass transplants in the impacted areas as a measure to reduce this temporal loss and provide in-kind compensatory mitigation. USACE staff indicated they planned to conduct pre-construction eelgrass and *Caulerpa taxifolia* surveys in the Entrance Channel prior to the start of dredging. Following the completion of dredging, they also planned to conduct a post-construction eelgrass survey and use the results of their two surveys to calculate actual eelgrass losses from the dredging. Once the impact is determined, they planned to enter into a contract for mitigating eelgrass losses. The contract would include preparation of a detailed mitigation and monitoring plan, which would be shared with NMFS prior to the start of any transplant activities. The transplant would be conducted at the start of the next growing season in April 2021. They would propose a two-year monitoring program following the transplant after which they would depend on the City's eelgrass monitoring program to track development of the transplanted areas. In addition, USACE staff specifically indicated they would not carry forward an approach that involved the minimum California Eelgrass Mitigation Policy (CEMP) mitigation ratio of 1.2:1 and five years of post-transplant monitoring, and/or an approach involving suitable eelgrass habitat establishment elsewhere. Lastly, they indicated this approach meant future eelgrass losses in this area associated with future dredging would have to be mitigated.

In response, NMFS staff indicated by email on July 15, 2020, that the mitigation proposal, as described in email communication, did not adequately address the anticipated eelgrass impacts and was not consistent with CEMP. In addition, NMFS staff posed a number of preliminary questions to better understand the USACE's mitigation approach and underlying justification. USACE staff subsequently responded on July 21, 2020, indicating that the dredge prism had been changed to reduce eelgrass impacts and avoid some small areas that have potential cultural resource issues. Based on their recalculation of potential impacts and a reduction in size of the proposed dredge area, USACE staff anticipated that the impact to eelgrass habitat would be reduced to 1.5 acres. In addition, they provided a revised map showing the revised Entrance Channel dredge prism overlying eelgrass habitat, and provided revised dredging volume estimates. Specifically, the revised dredging volumes are 68,000 cubic yards (cy) for the Entrance Channel, and 77,000 cy for the Main Channel Balboa Reach, which totals to 145,000 cy. Lastly, USACE senior staff provided additional project information on July 24, 2020, regarding the proposed dredging depth. Specifically, the proposed project includes a two-foot overdepth allowance for the dredge contractor, which allows the dredging contractor to exceed the authorized depth of -20 feet (ft) Mean Lower Low Water (MLLW) to a depth of -22 ft MLLW. The USACE indicated that the only way to achieve the minimum depth of -20 ft MLLW is to allow overdepth dredging, for which the contractor is paid.

Proposed Action and Action Area

The purpose of the proposed project is to dredge and dispose sediment from the Entrance Channel and the Main Channel Balboa Reach of Newport Bay in order to maintain authorized depths of -20 feet Mean Lower Low Water. The Entrance Channel sediments will be placed at the Newport Beach Nearshore Placement Area, which is just offshore the Balboa Peninsula. The Main Channel Balboa Reach sediments will be disposed of at the LA-3 Ocean Dredged Material Disposal Site (ODMDS). The DEA indicated that dredging volumes were 70,000 cy for the Entrance Channel, 90,000 cy for the Main Channel Balboa Reach, totaling 160,000 cy. The USACE plans to mechanically dredge sediment with a clamshell and scow or a barge-mounted excavator and scow. Construction could begin as early as October 2020. 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.

Section 6.2 identifies a number of environmental commitments. The following are most relevant to effects of concern to EFH:

- 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.
- 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 NMFS.
- Prior to dredging at the Entrance Chanel 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/California Department of Fish and Wildlife (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.

In contrast to the environmental commitments disclosed in the DEA, USACE senior staff indicated by email that dredging would directly impact eelgrass habitat, and shared basic elements of a conceptual eelgrass mitigation plan.

Background and Action Agency's Effects Determination

The relevant EFH sections within the DEA indicated the project is located within an area designated as EFH for two Fishery Management Plans (FMP): Coastal Pelagic Species and Pacific Coast Groundfish, and that many of the 86 species federally managed under these FMPs are known to occur in the area and could be affected by the proposed project. The USACE determined that the proposed action would not have a substantial, adverse impact to any species covered under the two FMPs 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 of the DEA, pre-construction surveys for *Caulerpa taxifolia* would be conducted, and dredging shall not begin should *Caulerpa taxifolia* be identified until cleared to do so by NMFS.

The DEA indicated that all practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan, and no compensatory mitigation was required as part of the recommended plan. In addition, one of the factual Clean Water Act 404(b)(1) determinations indicated that no special aquatic sites (e.g., eelgrass) were in the project area. In other sections of the DEA, the USACE indicates that impacts to eelgrass beds 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 NMFS using guidance from the California Eelgrass Mitigation Policy (CEMP), and impacts to eelgrass would be temporary.

6-1 **Magnuson-Stevens Fishery Conservation and Management Act**

Essential Fish Habitat Affected by the Project

The proposed project occurs within EFH for various federally managed fish species within the Pacific Coast Groundfish, Coastal Pelagic Species, and Highly Migratory Species Fishery Management Plans (FMP). In addition, the project occurs within the vicinity of estuarine and seagrass habitat, which are all considered habitat areas of particular concern (HAPC) for various federally managed fish species within the Pacific Coast Groundfish FMP. HAPC are described in the regulations as subsets of EFH which are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area. Designated HAPC are not afforded any additional regulatory protection under MSA; however, federally permitted projects with potential adverse impacts to HAPC will be more carefully scrutinized during the consultation process.

Of particular concern to NMFS is the potential for adverse impacts to eelgrass habitat. Coastal Resources Management, Inc. (CRM) (2017) mapped eelgrass throughout Lower Newport Bay and found eelgrass habitat within and/or adjacent to the proposed dredging footprint. In addition, CRM (2017) observed both the narrow bladed and wide bladed morphology in the Entrance Channel of Newport Bay. Olsen *et al* (2014) recommended that the presence of the two different *Zostera* species must be considered when evaluating and implementing eelgrass mitigation projects. In addition, they found that eelgrass specimens obtained from the Newport Bay Entrance Channel revealed a hybrid signature of *Zostera marina* and *Z. pacifica*.

Adequacy of EFH Assessment

Based upon the EFH finding established in 2000 between our agencies, NMFS determined that the USACE's existing NEPA environmental review process can be used to satisfy the EFH consultation requirements of the MSA provided that we adhere to particular steps identified in the 2000 finding. NEPA documents prepared by the USACE should contain sufficient information to satisfy the requirements in Section 600.920(e) for EFH Assessments. EFH Assessments must include: 1) a description of the proposed action; 2) an analysis of individual and cumulative effects of the action on EFH, the managed species, and associated species such as major prey species, including affected life history stages; 3) the district's views regarding effects on EFH; and, 4) a discussion of proposed mitigation, if applicable. Additional information which may be appropriate to include in an EFH assessment is listed in 50 CFR 600.920(e)(4). The level of detail in the EFH assessment should be commensurate with the level of threat to EFH. The information must be easily found, and should include both an identification of affected EFH and an assessment of impacts.

NMFS believes that the USACE has not provided sufficient information to satisfy the EFH consultation requirements. Therefore, we are requesting expanded EFH consultation because additional information and analysis is needed to assess the effects of the action, and determine whether additional measures are appropriate to avoid, minimize, mitigate, and/or otherwise offset adverse effects to EFH. Consistent with the intent of the 2000 EFH finding, NMFS believes the USACE may utilize the final NEPA document to provide a revised EFH Assessment and response to our preliminary conservation recommendations. Pursuant to 50 CFR 600.920(d), the USACE must use the best scientific information available regarding the effects of the action on EFH and the measures that can be taken to avoid, minimize, or offset such effects. We may provide additional conservation recommendations and/or take action consistent with 50 CFR 600.925(k)(2) regarding further review of decisions inconsistent with NMFS recommendations.

The project description and mitigation measures, as described by USACE staff and the DEA, have changed multiple times since the initial, pre-consultation staff contact on June 15, 2020. In addition, preliminary questions posed by NMFS staff have not been fully addressed. Specifically, NMFS staff requested the analysis and underlying information that supported the eelgrass impact estimate, a spatial layer of the proposed dredge footprint, the USACE's assumptions regarding temporal loss, an explanation of how the mitigation proposal addresses the loss in temporal function, and how the proposal addresses mitigation success uncertainty. Below we summarize our information needs and concerns regarding the adequacy of the DEA and its EFH assessment, and proposed eelgrass mitigation approach. NMFS recommends the USACE address these issues in a revised EFH assessment and/or final NEPA document.

Project and Environmental Background Clarification

As noted above, information provided by USACE senior staff is inconsistent with that disclosed in the DEA. Therefore, NMFS requests that the USACE clarify the description of the proposed action. Specifically, NMFS requests the following information:

- Quantify the area of EFH and HAPC (e.g., eelgrass) affected by dredging and disposal operations, and quantify the volume of sediment proposed for dredging and disposal.

- Characterize affected habitat by summarizing sediment characteristics, depth, and presence of sensitive biological communities within the proposed dredge and disposal footprints.
- Provide revised map(s) that clearly delineate the dredge and disposal footprints in relation to available bathymetry, coastline, eelgrass habitat, and any other HAPC data in the project vicinity. Also, please provide underlying spatial data used for developing the revised maps in an electronic format that is compatible with readily available geographic information system software.

Revised impact assessment

The DEA contained inconsistent language regarding the presence of eelgrass in the project vicinity. Eelgrass presence and associated impacts were not disclosed in the EFH sections of the DEA. The presence of special aquatic sites (e.g., eelgrass) in the Federal Channel was noted in one section of the DEA, but, elsewhere, one of the factual Clean Water Act 404(b)(1) determinations indicated that no special aquatic sites were in the project area. Furthermore, the DEA did not disclose that eelgrass habitat would be directly impacted by dredging operations. In contrast to the eelgrass avoidance commitment described in the DEA, verbal communication from USACE staff on June 15, 2020, indicated eelgrass habitat loss was expected, and subsequent email communication after the release of the DEA reaffirmed the anticipated eelgrass loss.

Therefore, NMFS recommends the USACE provide a revised impact assessment that clarifies the anticipated impacts to eelgrass habitat. Specifically, the USACE should explain their methodology for evaluating direct and/or indirect dredging effects. In addition, they should explain the underlying assumptions that supported their determination that eelgrass impacts would be temporary, and quantify the anticipated impact duration. Lastly, the USACE should update their cumulative effects analysis to account for the mitigated and unmitigated eelgrass impacts associated with dredging. The USACE cited the City's regional dredging permit, but did not describe the associated eelgrass impacts. Furthermore, the USACE should update their cumulative effect analysis to account for eelgrass mitigation shortfalls associated with their 2003 maintenance dredging event and the City/County eelgrass mitigation project identified in the consultation background section.

Alternatives analysis

The DEA indicated that all practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. In addition, the DEA indicated that alternative dredge footprints were generally not considered because navigational safety requires the entire channel to be at its authorized depth. In contrast, email communication from USACE senior staff indicated that the USACE had revised their dredge volume estimates to reflect changes to the proposed dredge prism. The dredge prism was changed to reduce eelgrass impacts and eliminate some small areas that have potential cultural resource issues. According to USACE staff communication, dredging along the west side of the Entrance Channel was removed from the proposed dredge template, which avoids impacts to the eelgrass in this area without compromising navigational safety concerns. USACE senior staff indicated by email that shoaling is not a frequent problem in the Entrance Channel. They indicated that it has not been dredged since 2003 and the shoal is now beginning to encroach on the center of the channel. In addition, they indicated that dredging will eventually need to be performed to maintain navigability, and impacts to eelgrass beds will be greater than what is currently proposed with a larger dredge footprint.

The email communication subsequent to release of the DEA suggested that the USACE had conducted an alternative analysis that was not disclosed in the DEA. Consistent with 50 CFR 600.920(e)(4), NMFS requests the USACE provide an alternatives analysis that explains the alternatives considered to avoid and/or minimize impacts to eelgrass habitat, and the specific criteria used for determining navigational safety concerns and dredging thresholds in the Newport Bay Entrance Channel. NMFS understands the general goal of achieving the authorized design depth -20 ft MLLW, and the basic evaluation criteria used to evaluate potential alternatives. However, the DEA does not fully explain the evaluation process and the rationale for considering alternative dredge footprints.

Mitigation Plan

The DEA indicated that no compensatory mitigation was required as part of the recommended plan. However, USACE staff indicated that dredging would adversely affect eelgrass habitat and proposed a basic mitigation approach via email. As described by USACE staff, eelgrass transplants would be used in the impacted areas as a measure to reduce temporal loss and provide in-kind compensatory mitigation. In addition, USACE staff specifically indicated they would not carry forward an approach that involved the standard minimum CEMP mitigation ratio of 1.2:1 and five years of post-transplant monitoring, and/or an approach involving suitable eelgrass habitat establishment elsewhere.

NMFS has determined that the proposed mitigation approach is not consistent with our California Eelgrass Mitigation Policy (CEMP). It is the intent of this policy to ensure that there is no loss associated with delays in establishing compensatory mitigation. This should be accomplished by creating a greater amount of eelgrass than is lost, if the mitigation is performed contemporaneously or after the impacts occur. To achieve this, NMFS, in most instances, should recommend compensatory mitigation be successfully completed at a ratio of at least 1.2:1 mitigation area to impact area. This ratio assumes that restored eelgrass habitat achieves habitat function comparable to existing eelgrass habitat within a period of three years or less. NMFS notes that little is known about *Z. pacifica* ecology, and there have been few restoration and/or mitigation attempts for this species. The underlying assumptions that informed the standard minimum CEMP mitigation ratio were based upon our fuller understanding of *Z. marina.* Therefore, the underlying assumptions associated with recovery time and transplant success may not be justified in this instance. Moreover, NMFS notes that previous mitigation efforts conducted by the USACE (e.g., Mission Bay and Newport Bay) involved initial transplant areas that far exceeded a 1:1 ratio. Thus, the proposed transplant approach at a 1:1 ratio is not adequately justified.

Given previous planning and eelgrass mitigation shortfalls associated with USACE maintenance dredging projects in southern California, and consistent with 50 CFR 600.920(e)(4), NMFS recommends that the USACE develop and include a conceptual eelgrass mitigation plan in their revised EFH Assessment that is consistent with CEMP, and ensure adequate funding is available to conduct the appropriate surveys and implement successful mitigation. The USACE has repeatedly had difficulty following through on their environmental commitments to comply with established eelgrass mitigation policy. Therefore, it is important that a mitigation plan be part of the consultation initiation package when impacts to HAPC and/or special aquatic sites are anticipated. NMFS identifies below a few specific issues for the USACE to address in the conceptual eelgrass mitigation plan.

According to the DEA, impacts to eelgrass would be temporary and there would be no net loss. Similarly, USACE senior staff indicate that their proposed approach would address temporary losses. However, the USACE has not successfully offset eelgrass impacts from previous maintenance dredging events in Newport Bay. Moreover, the proposed approach to transplant at a 1:1 ratio does not account for the temporal loss of function associated with the planned 2020 dredging. Therefore, NMFS requests that the USACE clearly describe their assumptions regarding temporal loss, an explanation of how their mitigation proposal addresses the loss in temporal function, and how the proposal addresses mitigation success uncertainty. In addition, the USACE should describe their approach to monitoring and include a contingency plan given the multiple eelgrass mitigation failures and implementation problems in the past.

EFH Conservation Recommendations

Based upon the limited information and effects analysis provided by the USACE, NMFS has determined that the proposed project would adversely affect EFH for various federally managed fish species under the Coastal Pelagic Species, Pacific Coast Groundfish Species, and Highly Migratory Species FMPs. Therefore, pursuant to section 305(b)(4)(A) of the MSA, NMFS offers the following EFH conservation recommendations to avoid, minimize, mitigate, or otherwise offset the adverse effects to EFH.

1. The USACE should develop and implement a supplemental eelgrass mitigation plan to offset the mitigation failure associated with adverse impacts to eelgrass habitat from previous maintenance dredging in Newport Bay. The supplemental mitigation plan should be provided in the revised EFH Assessment and/or final NEPA document.
2. If dredging is not currently necessary to maintain safe navigation in the Entrance Channel, NMFS recommends the USACE avoid all eelgrass habitat during the upcoming dredge cycle, which is consistent with the DEA's environmental commitment.
3. If avoidance of eelgrass habitat is not feasible, the USACE should develop and implement a mitigation plan to offset the anticipated impacts consistent with CEMP. NMFS recognizes that there are limited options for providing in-kind mitigation within the Entrance Channel. However, NMFS believes there may be an opportunity to modify shallow water habitat elsewhere in the Entrance Channel to increase the habitat suitability for eelgrass, and recommends the USACE more carefully evaluate such an alternative mitigation approach. If deemed infeasible, and there is no practicable means to offset temporary losses of *Z. pacifica*, the USACE should address temporal loss by 1) advancing understanding of *Z. pacifica* to better inform long-term conservation and management and 2) offsetting functional loss through out of kind rocky reef enhancement activities. The mitigation plan should be provided in the revised EFH Assessment and/or final NEPA document.

Statutory Response Requirement

Please be advised that regulations at section 305(b)(4)(B) of the MSA and 50 CFR 600.920(k) of the MSA require your office to provide a written response to this letter within 30 days of its receipt and at least 10 days prior to final approval of the action. A preliminary response is acceptable if final action cannot be completed within 30 days. Your final response must include a description of measures to be required to avoid, mitigate, or offset the adverse impacts of the activity. If your response is inconsistent with our EFH conservation recommendations, you must provide an explanation of the reasons for not implementing those recommendations. The reasons must include the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

Supplemental Consultation

Pursuant to 50 CFR 600.920(l), the USACE must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH conservation recommendations. As previously stated, NMFS believes additional consultation will be necessary to address outstanding information needs and eelgrass mitigation obligations associated with maintenance dredging in Newport Bay.

6-2 **Endangered Species Act Comments**

As a federal agency and pursuant to section 7 of the ESA of 1973, as amended (16 U.S.C. § 1531 et. seq.), the USACE shall, in consultation with and with the assistance of NMFS, insure that any action it authorizes, funds, or carries out, does not jeopardize the continued existence of any species listed as threatened or endangered, or result in the destruction or adverse modification of designated critical habitat. According to the DEA, USACE determined that the recommended plan will have no effect on federally listed species or their designated critical habitat. However, no listed species under NMFS jurisdiction were identified in the DEA despite their potential occurrence in the action area. Therefore, NMFS recommends that the USACE engage in consultation with NMFS Protected Resources Division in Long Beach, California, for assistance with ESA compliance. Upon request, NMFS staff may be able to help in the determination of how ESA-listed species may be directly or indirectly affected by the Project. NMFS staff may also be able to assist in the development of protective measures that can help minimize the potential for adverse effects to ESA-listed species.

6-3 **Marine Mammal Protection Act**

According to the DEA, the only marine mammals expected in the dredging area would be California sea lions (*Zalophus caliornianus*) and harbor seals (*Phoca vitulina*). Specifically, the DEA indicates that harbor seals and sea lions are expected to forage in the harbor and rest on the breakwater jetties, and navigational buoys. 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. In addition, the DEA indicates that 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.

Marine mammals are protected under the Marine Mammal Protection Act (MMPA; 16 U.S.C. § 1361 et. seq.). Under the MMPA, it is generally illegal to "take" a marine mammal without prior authorization from NMFS. "Take" is defined as harassing, hunting, capturing, or killing, or attempting to harass, hunt, capture, or kill any marine mammal. Except with respect to military readiness activities and certain scientific research conducted by, or on behalf of, the Federal Government, "harassment" is defined as any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal in the wild, or has the potential to disturb a marine mammal in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering.

If the USACE anticipates the incidental take of marine mammals as a result of the project, the USACE should apply for an Incidental Harassment Authorization (IHA) or Letter of Authorization (LOA) from NMFS well in advance of any work. NMFS staff is available to assist with this assessment and compliance with the MMPA, including any IHA or LOA applications, upon request from the USACE. If it becomes apparent to the USACE that impacts to marine mammals in the form of "take" that hasn't been authorized by NMFS may be occurring as a result of any project activities, the USACE should cease operations and contact NMFS immediately to discuss appropriate steps going forward. In the unlikely event of an injury or mortality of a marine mammal due to project activities, please immediately contact our regional stranding coordinator, Justin Viezbicke, at (562) 980-3230.

Thank you for considering our comments. Please contact Mr. Bryant Chesney at (562) 980-4037, or via email at Bryant.Chesney@noaa.gov if you have any questions concerning our comments.

Sincerely,

Penny Ruvelas
for

Chris Yates
Assistant Regional Administrator
for Protected Resources

cc: Administrative File: 150316WCR2020PR00161
Marc Brown, Santa Ana Regional Water Quality Control Board
Larry Simon, California Coastal Commission
Eric Wilkins, California Department of Fish and Wildlife
Morgan Capilla, Environmental Protection Agency
Jon Avery, U.S. Fish and Wildlife Service

National Marine Fisheries Service Letter dated August 4, 2020

6-1: A detailed response to EFH comments, including conservation recommendations, is provided in the attached letter. Furthermore, in response to NMFS's comments, the Corps updated multiple portions of the EA and appended to the EA a conceptual eelgrass mitigation plan (Appendix H).

6-2: The Corps appreciates the NMFS's offers of assistance with Endangered Species Act (ESA) issues. However, the USACE has not identified any listed species and/or critical habitat that may be present in the project area subject to NMFS jurisdiction. Therefore, the Corps has made a no affect determination on listed species and/or critical habitat.

6-3: The Corps appreciates the NMFS's offers of assistance with Marine Mammal Protection Act (MMPA) issues. However, the Corps has determined that the proposed project would not affect marine mammals in the project area and that there would be no take/harassment of marine mammals.

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
915 WILSHIRE BOULEVARD, SUITE 930
LOS ANGELES, CALIFORNIA 90017-3489

September 2, 2020

Mr. Chris Yates
Assistant Regional Administrator for Protected Resources
National Oceanic and Atmospheric Administration (NOAA)
Fisheries West Coast Region
Attention: Mr. Bryant Chesney
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

Dear Mr. Yates:

The U.S. Army Corps of Engineers, Los Angeles District (USACE) has carefully reviewed your letter dated August 4, 2020 (reference: 150316WCR2020PR00161), providing the National Marine Fisheries Service's (NMFS) formal response to the USACE's request for consultation on the Lower Newport Bay Maintenance Dredging Project (Project) pursuant to the essential fish habitat (EFH) provisions of the Magnuson-Stevens Fishery Conservation and Management Act. In accordance with the applicable regulations at 50 CFR 600.920(k)(1), this letter contains the USACE's response to the NMFS's EFH conservation recommendations. It also provides a response to the NMFS's request for expanded EFH consultation pursuant to 50 CFR 600.920(i) and replies to the NMFS's comments and concerns related to the sufficiency of the USACE's EFH assessment and plan for mitigating impacts to eelgrass. Additional NMFS comments will be addressed and responded to in our final environmental assessment (EA) for the Project.

Through your letter the NMFS concurs with the USACE's conclusion that the Project would adversely affect EFH and offers three EFH conservation recommendations to avoid, minimize, mitigate, or otherwise offset the adverse effects to EFH. Detailed responses to each conservation recommendation are contained in Enclosure 1, titled *USACE Response to NMFS EFH Conservation Recommendations*.

Your letter expresses the NMFS's concerns with the accuracy and completeness of the EFH assessment reflected in the USACE's draft EA for the Project and requests the USACE initiate expanded EFH consultation under 50 CFR 600.920(i)(1) because "additional information and analysis are needed to assess the effects of the action, and determine whether additional conservation measures are appropriate." The USACE respectfully declines the NMFS's request because the USACE and the NMFS concur that the Project would cause only "adverse" impacts to EFH – not "substantially adverse" impacts - and the USACE is providing herein additional information and analysis to address the NMFS's outstanding concerns and complete this consultation.

This additional information includes: (1) an analysis and underlying information that supports the current impact estimate conducted by the USACE, (2) a spatial layer of the proposed dredge footprint, (3) a list of the USACE assumptions regarding temporal losses in eelgrass resources and how the current impact assessment addresses the loss in temporal function, (4) a more detailed description of the USACE approach to address eelgrass mitigation success uncertainty, and (5) a discussion of shoaling and why complete avoidance to eelgrass is not feasible for this Project. See Enclosure 1 for a complete discussion of all conservation recommendations and the rationale behind the USACE's intended actions, and Enclosure 2 for the USACE's proposed conceptual eelgrass mitigation plan. Given the need to get this work under contract this fiscal year, the USACE is supplying this additional information to supplement the information presented in the draft EA to address the NMFS's concerns.

In response to other questions or requests for information contained in the August 4, 2020 letter, the area of eelgrass estimated to be impacted by dredging operations is approximately 1.5 acres. This impact is confined to the Entrance Channel. No eelgrass impacts are expected in the Main Channel Balboa Reach or at the Newport Beach Nearshore Placement Area. The Project has been modified to avoid several acres of eelgrass within areas of the federal channels that we had initially planned to dredge. Eelgrass is the only Habitat Area of Particular Concern (HAPC) within or adjacent to the project area. Descriptions of the habitat outside the eelgrass can be found in Section 4.2 of the final EA, a copy of which will be provided to the NMFS. The final EA will update the reduced volume of sediment proposed for dredging and disposal. Maps showing the extent of eelgrass and the overlap of dredging are attached to Enclosure 1 of this letter.

The USACE is fully committed to offsetting eelgrass impacts caused by the Project. Your letter notes that the USACE has failed to meet its mitigation commitments for other projects. The USACE concedes that some of its mitigation for other projects have not performed as planned but would like to clarify that the USACE has demonstrated such commitment by successfully completing the vast majority of its eelgrass mitigation associated with USACE maintenance dredging projects in southern California. Previous maintenance dredging projects having successfully completed mitigation requirements include, but are not limited to, Morro Bay and Mission Bay, as well as Newport Bay. The NMFS letter incorrectly refers to these efforts as examples where the USACE had failed to meet its mitigation commitments.

The two currently unsuccessful eelgrass mitigation projects cited in your letter are not reflective of a pattern of failure or a lack of commitment to fulfilling mitigation commitments. One of the eelgrass mitigation projects you cited is not related to a USACE project; it is a city of Newport Beach project (the City of Newport Beach and County of Orange Linda Isle and Harbor Island Maintenance Dredging Project). The USACE acknowledges that the other project, related to the USACE's 2003 maintenance dredging project, has not yet achieved its target performance level pursuant to the Southern California Eelgrass Mitigation Policy (SCEMP), the policy in effect at the time of impact in 2003, and agrees with the NMFS that mitigation commitments for the USACE's 2011 maintenance dredging project met and fully complied with success criteria in the SCEMP. The USACE remains committed to seeing the 2003 project's mitigation commitments through to success and will study lessons learned from it and other projects to inform the mitigation plan for this Project. Furthermore, the USACE is committed to addressing temporal losses of EFH caused by past shortfalls by implementing additional mitigation, if needed, for any shortfall in achieving mitigation success related to the 2003 maintenance dredging project for mitigation per the SCEMP.

With respect to the NMFS's request for a spatial layer that supports the current eelgrass impact estimate, separate GIS shape files for the dredge prism and eelgrass map have been provided as e-mail attachments - as part of this response submittal package. Please note that this is only a preliminary estimate for purposes of the NEPA evaluation and does not represent the actual acreage for the required mitigation. The USACE will provide that level of detail based on data from the two additional eelgrass surveys. This information will allow the NMFS to independently evaluate the impact assessment on which future mitigation will be based.

The USACE has a long history of working with the NMFS on various past projects and values the relationship that our agencies have developed over the years. We strive to improve upon our respective processes to avoid future misalignments and ensure that the NMFS has the adequate information it requires to effectively respond in an expedited fashion to USACE requests. The USACE is committed to participating in future discussions with the NMFS at a yet undetermined frequency to address the interagency consultation process and identify collaboration improvements on a program-wide basis.

Thank you for your time and attention to this very important issue. If you have any questions regarding our response, please contact Mr. Larry Smith, Project Biologist, at (213) 452-3846 or via email at lawrence.j.smith@usace.army.mil.

Thank you for your attention to this document.

Sincerely,

Eduardo T. De Mesa
Chief, Planning Division

Enclosure(s)

Enclosure 1: USACE Response to NMFS EFH Conservation Recommendations

EFH Conservation Recommendation #1.

The USACE should develop and implement a supplemental eelgrass mitigation plan to offset the mitigation failure associated with adverse impacts to eelgrass habitat from previous maintenance dredging in Newport Bay. The supplemental mitigation plan should be provided in the revised EFH Assessment and/or final NEPA document.

USACE Response to EFH Conservation Recommendation #1.

This conservation recommendation is outside of the scope of this EFH consultation, which is specific to the current Lower Newport Bay Maintenance Dredging Project. This conservation recommendation does not propose measures to avoid, mitigate, or otherwise offset adverse effects on EFH resulting from the proposed Project; it attempts to revisit EFH conservation recommendations applicable to prior projects' eelgrass impacts.

The USACE is not responsible for all of the mitigation failures associated with adverse impacts to eelgrass habitat from the maintenance dredging activities in Newport Bay that the NMFS identifies in its letter. Of the three prior dredging projects and associated eelgrass mitigation commitments discussed in the August 4, 2020, EFH Consultation letter, one is the sole responsibility of the city of Newport Beach (City of Newport Beach and County of Orange Linda Isle and Harbor Island Maintenance Dredging Project). The USACE acknowledges that one of the other mitigation projects, related to the USACE's 2003 maintenance dredging project, has not yet achieved its target performance level, and agrees with the NMFS that mitigation commitments for the 2011 maintenance dredging project met and fully complied with success criteria in the SCEMP.

Impacts to approximately 0.80 acres of eelgrass occurred as a result of the 2003 USACE maintenance dredging project. The dredging impacted shallow water habitat and eelgrass meadows in Lower Newport Bay offshore of the east end of Balboa Island. Mitigation was initially attempted by creating a 1.0 acre eelgrass bed (allowing for a 1.2:1 ratio) in the upper bay just north of the Pacific Coast Highway Bridge. The transplant initially responded well during the first six months, indicating that conditions were favorable for growth and that it would be a viable transplant area. It appeared that the transplant location and prognosis for success was good. It should have resulted in a robust eelgrass bed by the 12-month survey with the transplant progressing to a successful eelgrass bed. However, significant rainfall (the highest since 1884) and accompanying turbidity and scour during the winter of 2004-2005 combined resulting in the total loss of eelgrass at the mitigation bed and at the nearby natural eelgrass beds.

Completion of the USACE's 2011-2012 Lower Newport Bay Maintenance Dredging resulted in impacts to 1.5 acres of eelgrass habitat. The USACE prepared and implemented a 1.8-acre mitigation program for impacts to eelgrass. A 2.8-acre eelgrass transplant was conducted within a predominately unvegetated 2.8-acre site located adjacent to the Main Channel Balboa Reach.

As part of this effort, the USACE prepared and implemented an additional 1.0-acre eelgrass mitigation program for impacts to eelgrass resources resulting from completion of the USACE's 2003 Lower Newport Bay Federal Dredging Project due to the failure of the 2003 mitigation effort. The attached map shows the locations of the various eelgrass sites that were part of this mitigation effort, including the independent city of Newport Beach mitigation site (Attachment 1).

All mitigation efforts were evaluated in 2017, at the five-year post mitigation point. Collectively, eelgrass within the transplant areas for the USACE's 2011-12 and 2003 maintenance dredging mitigation totals 0.58 acre. The cumulative basic mitigation need for these sites is 1.36 acres; however, the reference-site-performance-adjusted mitigation requirement was only 0.82 acre. The net deficit of eelgrass between the two sites totals 0.78 acre of the basic mitigation requirement, and 0.24 acre of the reference-adjusted mitigation requirement for the 2003 maintenance dredging. The site failed to achieve the 60-month success milestones under the SCEMP for both cover and density. However, it was not clear that the site would continue to fail to meet success objectives going forward or if this failure is the result of recent climatic and disease conditions affecting eelgrass in the bay. USACE decided to extend monitoring to determine if the shortfalls are a continued effect of the environmental conditions and recovery will occur and to what degree prior to implementation of a supplemental transplant. Eelgrass surveys throughout the entire lower bay are currently being conducted by the City of Newport Beach. Once the surveys are completed, the status of the mitigation site will be evaluated by the USACE, in coordination with NMFS. Depending on the outcome of that evaluation, USACE will, if needed, identify a location or plan to modify the site to accept additional transplant and implement a supplemental restoration project on the modified site to enhance restoration suitability.

The original and subsequent replanting for the 2003 impacts were subject to the SCEMP. Any planting associated with this effort will also be made under provisions of the SCEMP, including monitoring and success criteria. Transplants will be made either in or immediately adjacent to the 2012 mitigation site shown on the attached map (Attachment 1). Source material will come from beds located outside the Main Channel Balboa Reach and Balboa Island.

Once any outstanding mitigation from the 2003 impacts has been determined, a mitigation contract will be developed. A single contract is anticipated to be awarded for this effort and the mitigation effort associated with the proposed Project. The first task of the contract will be to prepare a detailed mitigation plan detailing all procedures to be used. Donor beds located outside the Main Channel Balboa Reach and Balboa Island would be used to provide the necessary transplant material. Standard measures for eelgrass transplant would be utilized to transplant *Zostera marina*. Transplant operations would be conducted in the spring of 2021, most likely in April. Timing is in accordance with SCEMP recommendations for transplant operations to take place during the eelgrass growing season of March-September. Monitoring would be conducted for a five-year period per the SCEMP, including surveys at 0, 6, 12, 24, 36, 48, and 60 months.

EFH Conservation Recommendation #2.

If dredging is not currently necessary to maintain safe navigation in the Entrance Channel, NMFS recommends the USACE avoid all eelgrass habitat during the upcoming dredge cycle, which is consistent with the DEA's environmental commitment.

USACE Response to EFH Conservation Recommendation #2.

The USACE has determined that dredging is necessary to maintain safe navigation in the Entrance Channel. The USACE's initial estimate of potential eelgrass losses was four (4) acres, based on an eelgrass survey performed by the City of Newport Beach in 2016. Based on a recalculation of potential impacts and a reduction in size of the proposed dredge area, the impact assessment was reduced to 1.5 acres. Unfortunately, complete avoidance is not feasible. A revised map showing the revised Entrance Channel dredge prism overlying the eelgrass map is attached (Attachments 2 and 3). Shoaling occurs at a rate such that dredging every year is not necessary. The Entrance Channel was last dredged in 2003, and the shoal is now beginning to encroach on the center of the channel. Dredging every 15-20 years is infrequent compared to other west coast harbors. If dredging does not occur now, the shoal volume will continue to grow and further encroach on the channel. A temporary delay in dredging now would result in a larger dredge footprint to maintain navigability, and with the larger dredge footprint, impacts to eelgrass beds will be greater than what is currently proposed. The USACE has avoided to the maximum extent practicable all eelgrass impacts in the Entrance Channel commensurate with the maintenance of safe navigation.

EFH Conservation Recommendation #3.

If avoidance of eelgrass habitat is not feasible, the USACE should develop and implement a mitigation plan to offset the anticipated impacts consistent with CEMP. NMFS recognizes that there are limited options for providing in-kind mitigation within the Entrance Channel. However, NMFS believes there may be an opportunity to modify shallow water habitat elsewhere in the Entrance Channel to increase the habitat suitability for eelgrass, and recommends the USACE more carefully evaluate such an alternative mitigation approach. If deemed infeasible, and there is no practicable means to offset temporary losses of Z. pacifica, the USACE should address temporal loss by 1) advancing understanding of Z. pacifica to better inform long-term conservation and management and 2) offsetting functional loss through out of kind rocky reef enhancement activities. The mitigation plan should be provided in the revised EFH Assessment and/or final NEPA document.

USACE Response to EFH Conservation Recommendation #3.

As explained above, complete avoidance of eelgrass is not feasible. The USACE is committed to developing and implementing a mitigation plan to offset adverse effects to eelgrass resulting from the Project. The USACE's conceptual mitigation plan is provided in Enclosure 2 to the response letter, and is also summarized here. The conceptual plan reflects the USACE's current plan for mitigating eelgrass impacts. A draft and final mitigation plan will be developed by the USACE, in coordination with NMFS, during and after dredging.

As part of the mitigation plan, the USACE will perform pre- and post-dredging eelgrass surveys to identify the exact acreage and location of all eelgrass impacts. Because the USACE's estimated 1.5 acres of impact is based on 2016 data, it may not accurately reflect the current extent of eelgrass in the Project area. In addition, unanticipated results, such as slope failure or other direct and/or indirect impacts could influence the final impact evaluation. The results of the two surveys will be used to prepare the draft mitigation plan.

The Entrance Channel is the only area in Lower Newport Bay with *Zostera pacifica*. This complicates in-bay mitigation efforts. Additionally, this area is rarely dredged. Because dredging the Entrance Channel is not expected for 15-20 years, the USACE expects the current impacts to eelgrass to be strictly a loss of temporal value (in-between dredge episodes), and not the total loss of eelgrass presumed for mitigation in the CEMP. Eelgrass is expected to re-vegetate impacted areas over time, potentially within five years, with or without intervention. Based on this assumption, the USACE is proposing a two-pronged mitigation approach meant to reduce the temporal loss of function as much as possible.

The primary element includes replanting the acreage of eelgrass impacted during dredging, currently estimated to be 1.5 acres, within the same footprint to ensure there is no net loss of eelgrass. Standard monitoring and success criteria would be applied to this area to ensure successful recovery. The USACE proposes to follow general transplant procedures in the CEMP, modified as needed for *Zostera pacifica,* and perform a five-year monitoring program following the transplant. The transplant would be conducted at the start of the next growing season in April 2021 (growing season March-October) to allow for maximum chances of success and to get better weather for the transplant activities while taking place before summer recreational boating season. Under this strategy, it is assumed future eelgrass losses in this area associated with future dredging would have to be mitigated in a similar fashion.

The second element includes exploring opportunities to enlarge the mitigation area and hopefully achieve a 1.2:1 replacement value by transplanting an additional 0.3 acre of eelgrass into unvegetated areas within the Entrance Channel, subject to determining that such transplanting is not inconsistent with the function of the Navigation Project. Actual acreage to be determined based on future pre- and post-dredge surveys, and would equate to a 0.2:1 ratio of the impacted acreage. Unvegetated areas in, or adjacent to, the Entrance Channel will be evaluated for potential suitability for eelgrass expansion in terms of depth, currents and other habitat characteristics. The purpose of this second element is to offset temporal loss of eelgrass habitat (achieve an ecological outcome similar to what's expected utilizing the CEMP's recommended 1.2:1 ratio) and to increase our understanding of *Z. pacifica* restoration. To that end, the USACE would not subject the additional areas to the usual success criteria of the CEMP as they are unvegetated for unknown reasons that could result in the failure of any transplant effort, although five years of monitoring would be performed. Instead, this element of the mitigation effort would be responsive to the NMFS's recommendation for "advancing understanding of Z. pacifica to better inform long-term conservation and management." The 1.5 acre primary mitigation area would be subject to success criteria and thus to the possibility of transplanting additional eelgrass should these areas fail to meet those criteria within the five year monitoring period. Furthermore, the USACE would not plan to mitigate for losses to the expanded 0.3 acre area during future dredging.

In addition to a reduction in the temporal losses, re-planting the channel also results in an in-kind mitigation. If plantings occurred outside of the Entrance Channel, beyond the current limits of *Zostera pacifica*, a different eelgrass species (*Zostera marina*) may need to be used in order to achieve success. In-kind mitigation is generally considered preferable.

In response to the recommendation to explore opportunities to modify shallow water habitat to increase habitat suitability, the USACE is open to exploring this concept further in coordination with the NMFS during development of the draft and final mitigation plan, but is not currently proposing to incorporate it into our mitigation approach, as we believe our mitigation approach is sufficient to achieve desired results. Because impacts are considered to be temporary, the USACE proposes to re-plant the estimated 1.5 acres of eelgrass within the impacted areas of the channel as described above. At this time, the proposed replanting plan is considered more cost effective and lower risk than modification of soft-bottom habitat outside of the channel in an attempt to establish *Zostera pacifica* outside of its current range. However, if additional funds are identified and if risks to successful establishment can be minimized, the USACE would be willing to explore this concept further while dredging proceeds. Therefore, USACE plans to implement the proposed replanting plan as outlined in the Conceptual Eelgrass Mitigation Plan below, unless we identify alternative planting locations or other appropriate modifications in coordination with NMFS during the development of the draft and final mitigation plans.

For similar cost and practicability reasons, the NMFS's other suggestion of offsetting functional loss through out-of-kind rocky reef enhancement is not currently proposed or under consideration for this project but may be considered for future dredging or rockwork activities that may affect eelgrass.

ATTACHMENT 1 – 2003 LNB Transplant Sites Map

ATTACHMENT 2 – Eelgrass/Dredge Footprint Overlap Map

ATTACHMENT 3 – 2020 Proposed Dredge Areas

Enclosure 2: USACE Conceptual Eelgrass Mitigation Plan

INTRODUCTION

The USACE proposes to mitigate for the loss of eelgrass in the Entrance Channel to Lower Newport Bay expected to result as a consequence of the USACE's 2020 Lower Newport Bay Maintenance Dredging Project (Project).

Overall Approach

A detailed Eelgrass Mitigation Plan will be prepared for the USACE by a qualified contractor following identification of the location, acreage, and extent of actual mitigation requirements following completion of dredging for eelgrass losses in the Entrance Channel and following an analysis of the city of Newport Beach's 2020 eelgrass surveys. The plan will include monitoring of the transplants.

The USACE will be conducting separate eelgrass surveys in the Entrance Channel prior to the start of dredging to include a survey for *Caulerpa taxifolia*. Following the completion of dredging, the USACE will also be conducting a post-construction eelgrass survey and use the results of our two surveys to calculate actual eelgrass losses from the dredging. At this point, the USACE will enter into a contract for mitigating eelgrass losses. That contract will include preparation of a detailed mitigation plan for USACE approval prior to the start of any transplant activities. Authorized channel depth in the Entrance Chanel is -20 ft MLLW. Dredging along the west side of the Entrance Channel between Stations 23+00 to 40+00 has been removed from the proposed dredge template. This avoids impacts to the eelgrass in this area without compromising navigational safety concerns.

The detailed mitigation plan will be prepared in coordination with the NMFS for planting in spring 2021 to take advantage of the growing season for eelgrass, spring weather conditions, and reduced recreational boating.

PROJECTED EELGRASS IMPACTS

Preliminary estimates of eelgrass loss from the maintenance dredging is approximately 1.5 acres. This acreage was determined by overlapping the dredge prism over a map of eelgrass provided by the city of Newport Beach from a survey conducted in 2016. A figure showing this overlap is attached to Enclosure 1 of the USACE response letter. The overlap area was based on the authorized depth of -20 ft MLLW. One area along the west side of the channel was excluded from the dredge prism for purposes of reducing the eelgrass impacts. The exact area and locations of eelgrass losses will be determined based on pre- and post-construction surveys in the Entrance Channel. The loss attributable to the Project will be determined by a direct comparison of the pre- and post-construction surveys. Normally, a control location is also mapped to allow for natural dieback of eelgrass that would not be due to the dredging activities. That may not be possible in this case as there is only the single bed of *Zostera pacifica* present in the bay.

However, the bed is large enough and the time period between surveys short enough that any natural decline should be readily apparent in the surveys.

ALTERNATIVE MITIGATION APPROACHES CONSIDERED BUT NOT PROPOSED

The USACE has considered other mitigation options. The first was the standard type of CEMP mitigation with creation of an eelgrass bed in the lower bay with a mitigation ratio of 1.2:1, standard success criteria and five years of post-transplant monitoring. The USACE decided not to carry this option forward at this time due to lack of available space in the lower bay to construct a 1.8 acre mitigation site, the assumption that "out of kind" restoration would be required if planting occurs outside of the channel limits (assuming that *Zostera marina* would need to be planted in lieu of the species that is being impacted, *Zostera pacifica*, which does not currently inhabit areas outside of the channel), and costs. However, this option will be further explored during preparation of the draft and final mitigation plan in coordination with NMFS, if suitable locations can be identified. The advantage of this option would be to remove the need to mitigate for future losses during future dredging events, as this option would mitigate for permanent impacts.

The second option included modifying shallow water habitat to increase eelgrass habitat suitability by dredging to create a bench similar to what was done in Morro Bay. The area in the Entrance Channel to the east of the federal navigation channel in the center portion of the entrance is a bench with shallow waters (current depths range from -5 to -13 ft MLLW) that is not currently vegetated. The option would include dredging a portion of this bench to a depth of -18 to -20 ft MLLW followed by transplant. The USACE decided not to pursue this option at this time for a variety of reasons, including concerns about the USACE's ability to carry out this option in a manner consistent with the authorized Navigation Project, the cost of the option, and the uncertain likelihood of success. The area is currently not vegetated for some reason, either depth, current velocity, temperature, etc., which could result in failure of the transplant in this area, even if it is deepened. Another reason is that dredging of a bench would be expensive as would transplant activities, and may not be the most efficient or cost-effective way of achieving desired results. Finally, dredging could also affect the hydrodynamics of the Entrance Channels in unknown ways that could negatively impact the existing eelgrass beds or adjacent shoreline structures along the east bank, including the East Jetty.

Following conversations with the NMFS, State Lands Commission, and Coastal Commission, and consideration of USACE requirements for purchase of mitigation banking credits for USACE projects, the USACE has determined that purchasing eelgrass credits from the Bolsa Chica wetlands is not a feasible option.

PROPOSED MITIGATION APPROACH (IN-KIND)

Mitigation Plan for *Zostera pacifica*, Entrance Channel 2020

Location of Impact

This species is located in the Entrance Channel to Newport Bay. Dredging in the Entrance Channel will remove an estimated 1.5 acres of existing eelgrass habitat made up entirely of *Zostera pacifica*.

The exact area and locations of eelgrass losses will be determined based on pre- and post-construction surveys in the Entrance Channel. The map attached to Enclosure 1 shows the location of existing eelgrass beds and the overlap between dredging and eelgrass. This was used for the preliminary impact assessment of 1.5 acres.

Mitigation Methods, Ratios, Monitoring and Success Criteria

Once the location and areas of impact are verified by the pre- and post-dredge surveys, a mitigation contract will be assembled and awarded. The first task of the contract will be to prepare a detailed mitigation plan detailing all procedures to be used. Donor beds located in the Entrance Channel would be used to provide the necessary transplant material. Standard measures for eelgrass transplant would be utilized, modified as necessary to transplant *Zostera pacifica* instead of the usual *Zostera marina*. A contractor with experience with *Zostera pacifica* will be sought for this contract. A variety of transplant methods may be considered as a means of evaluating and identifying the best method for transplanting this species, including makeup of bundles, spacing of transplants, and transplants onto slopes. Transplant methods for both species are expected to be very similar, although *Zostera pacifica* may take longer to fill in. Basic knowledge on this process will be useful to the USACE and NMFS for future *Zostera pacifica* mitigation efforts and will offset some of the temporal loss.

The USACE proposes a two-pronged approach to mitigate eelgrass affected by dredging. The primary element is direct replacement. An amount of eelgrass equivalent to the acreage directly affected (currently estimated at 1.5 acres) will be transplanted back into the impacted footprint in areas surrounded by un-impacted eelgrass. Recovery is expected to be quicker than for "standard" mitigation site construction that involves establishing eelgrass beds in currently unoccupied areas. Conditions at the mitigation site (which is also the impact site) are known to be conducive to eelgrass due to the current beds located in the Entrance Channel. Expectations for successful restoration would be greater for this mitigation as it involves re-vegetating current eelgrass beds in areas and under conditions where it currently grows. Eelgrass would be expected to re-vegetate the impacted areas naturally and would have time to do so as the next dredging in this area is not expected for 15-20 years. Mitigation, in this case, is solely for temporal losses and not for any permanent loss of eelgrass habitat.

Standard monitoring and success criteria would be applied to this area to ensure successful recovery. The USACE proposes to follow general transplant procedures in the CEMP, modified as needed for *Zostera pacifica,* and perform a five-year monitoring program following the transplant. The transplant would be conducted at the start of the next growing season in April

2021 (growing season March-October) to allow for maximum chances of success and to get better weather for the transplant activities while taking place before summer recreational boating season. Under this strategy, it is assumed future eelgrass losses in this area associated with future dredging would have to be mitigated in a similar fashion.

The second element includes exploring opportunities to enlarge the mitigation area and hopefully achieve a 1.2:1 replacement value by transplanting an additional 0.3 acre of eelgrass into unvegetated areas within the Entrance Channel. Actual acreage to be determined based on future pre- and post-dredge surveys, and would equate to a 0.2:1 ratio of the impacted acreage. Unvegetated areas in, or adjacent to, the Entrance Channel will be evaluated for potential suitability for eelgrass expansion in terms of depth, currents and other habitat characteristics, and also assessed to ensure minimal or no conflict with the USACE's Navigation Project. The purpose of this second element is solely to offset temporal loss of eelgrass habitat (achieve an ecological outcome similar to what's expected utilizing the CEMP's recommended 1.2:1 ratio) and to increase our understanding of *Z. pacifica* restoration. To that end, the USACE would not subject the additional areas to the usual success criteria of the CEMP as they are unvegetated for unknown reasons that could result in the failure of any transplant effort, although five years of monitoring would be performed. Instead, success of the 0.3 acre mitigation effort would be assumed, based on the NMFS recommendation for "*advancing understanding of Z. pacifica to better inform long-term conservation and management.*" The 1.5 acre primary mitigation area would be subject to success criteria and thus to the possibility of transplanting additional eelgrass should these areas fail to meet those criteria within the five year monitoring period. Furthermore, the USACE would not plan to mitigate for losses to the expanded 0.3 acre area during future dredging.

In addition to a reduction in the temporal losses, re-planting the channel also results in an in-kind mitigation. If plantings occurred outside of the Entrance Channel, beyond the current limits of *Zostera pacifica*, a different eelgrass species (*Zostera marina*) may need to be used in order to achieve success. In-kind mitigation is generally considered preferable.

Transplant and long-term monitoring of *Zostera pacifica* mitigation should also provide the USACE and NMFS with new information on this particular species of eelgrass while remaining compliant with USACE policy on mitigation and maintenance dredging. This meets the recommendation of the NMFS to advance understanding of *Zostera pacifica* to better inform long-term conservation and management to address temporal loss.

Timing of Mitigation and Monitoring Period

Dredging is expected to be completed near the end of December 2020 with the post-construction surveyed conducted immediately thereafter. Coordination on the impact estimate will take place in January 2021 with preparation of the detailed mitigation plan to follow. Transplant operations would be conducted in the spring of 2021, most likely in April. Timing is in accordance with CEMP recommendations for transplant operations to take place during the eelgrass growing season of March-September.

Monitoring is proposed for the usual five-year period as recommended by the CEMP, including surveys at 0, 6, 12, 24, 36, 48, and 60 months.

Enclosure 3: SHAPE Files

See email attachments provided as part of the submittal package.

STATE OF CALIFORNIA – CALIFORNIA NATURAL RESOURCES AGENCY GAVIN NEWSOM, GOVERNOR

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September 10, 2020

Eduardo T. De Mesa
Chief, Planning Division
Los Angeles District
U.S. Army Corps of Engineers
ATTN: Larry Smith (CESPL-PDR-Q)
915 Wilshire Blvd., Suite 930
Los Angeles, CA 90017-3489

Subject: Negative Determination ND-0024-20 (Lower Newport Bay Maintenance Dredging, Newport Beach, Orange County)

Dear Mr. De Mesa:

The Coastal Commission staff has reviewed the above-referenced negative determination. The Corps of Engineers proposes maintenance dredging of approximately 145,000 cubic yards (cu.yds.) of sediment from the Lower Newport Harbor Entrance Channel and the Main Channel Balboa Reach to re-establish the authorized channel depth of -20 feet mean lower low water. All of the sediments to be dredged from the Entrance Channel, totaling approximately 68,000 cu.yds, are clean, beach compatible sands and will be beneficially reused and disposed at the Newport Beach Nearshore Placement Site, located upcoast from the harbor entrance in water depths between -25 and -40 feet. The remaining 77,000 cu.yds. of fine-grained sediment from the Balboa Reach, which are clean but unsuitable for beach nourishment, will be disposed at the EPA-designated LA-3 ocean disposal site located 4.3 miles southwest of the harbor entrance. The project could begin as early as October 2020 and will take between three and four months to complete. The Corps last conducted maintenance dredging of these two federal channels in 2003 and the proposed work is necessary to remove shoaling in the channels and maintain safe navigation for vessels transiting the channels.

The sediment sampling and analysis plan (SAP) and SAP results were reviewed and approved by the Southern California Dredged Material Management Team (SC-DMMT, which includes Coastal Commission staff and representatives from the U.S. Environmental Protection Agency and the Regional Water Quality Control Board) in May 2019. Based on the SAP test results, the SC-DMMT determined that the proposed dredged materials were physically and chemically suitable for disposal at LA-3 or the Newport Beach Nearshore Placement Site, depending on the grain size classification of sediments sampled within the two federal channels. Water quality monitoring of salinity, pH, temperature, dissolved oxygen, turbidity, and light transmissivity will occur during project operations. Temporary changes to water quality will be limited to the immediate dredge and nearshore disposal locations, and if necessary, project operations will be modified and silt curtains installed to minimize water quality impacts. In addition, the dredging contractor will implement a spill prevention and clean-up plan to further protect water quality during project operations, and ocean disposal will adhere to EPA's LA-3 site use conditions.

The Corps states that *Zostera pacifica* eelgrass beds (instead of the more common *Zostera marina*) are located in the Entrance Channel and that impacts to eelgrass "would be avoided to the maximum extent practicable commensurate with the maintenance of safe navigation." The Corps' negative determination stated that the initial estimate of the potential loss of eelgrass beds from dredging was four acres and was based on the most recent eelgrass survey of the area, performed by the City of Newport Beach in 2016. However, in late July the Corps submitted to the Commission staff an updated eelgrass impact assessment calculation based on the Corps' reduction in the footprint of the proposed dredge area. The Corps stated that dredging along the west side of the Entrance Channel between Stations 23+00 to 40+00 was removed from the proposed dredge footprint to avoid eelgrass beds in this area, and that this modification will not compromise navigational safety in the channel. With the reduction in the dredging footprint, the Corps now estimates that dredging will result in the loss of 1.5 acres of eelgrass, again based on the 2016 eelgrass survey. The Corps will conduct an eelgrass survey in the Entrance Channel prior to the start of the proposed dredging project and following the completion of dredging. The results from these two surveys will then be used to calculate actual eelgrass losses from the maintenance dredging project and guide the development of the required eelgrass mitigation program.

Previous Corps dredging projects that resulted in adverse impacts to and/or an unavoidable loss of eelgrass beds, even after avoidance and minimization measures are incorporated into the project, included a commitment to implement eelgrass mitigation measures consistent with the California Eelgrass Mitigation Policy (National Marine Fisheries Service, 2014). For this project, the Corps has prepared and submitted a conceptual eelgrass mitigation plan to the NMFS and stated that draft and final mitigation plans will be developed in coordination with the NMFS. The results of the pre- and post-project eelgrass surveys will be used to prepare the draft and final plans, with the objective of eelgrass plantings to occur in spring 2021.

The Corps' conceptual plan includes replanting eelgrass at the impact site as well as planting a currently unvegetated area within the channel. The plan states that eelgrass equivalent to the acreage directly affected by the maintenance dredging project (currently estimated at 1.5 acres) will be transplanted back into the impacted footprint in areas currently adjacent to eelgrass (i.e., a 1:1 mitigation ratio). The post-dredging depths of between -20 and -22 feet MLLW remain suitable for eelgrass habitat. The Corps expects that eelgrass regrowth at the mitigation site will be quicker than that which occurs at mitigation sites which involve establishing new eelgrass beds in currently unoccupied areas. The Corps also states that standard monitoring and success criteria will be applied to the mitigation area, including a five-year monitoring program and remedial work if required. Future eelgrass losses in this area associated with future dredging would need to be mitigated.

The conceptual plan also includes transplanting an additional 0.3 acres of eelgrass into nearby but currently unvegetated areas within the Entrance Channel. The actual acreage would be determined based on the pre- and post-dredge surveys in order for the combined mitigation plantings to equate to a 1.2:1 eelgrass replacement value. The Corps states that the purposes of this second element are to offset the temporal loss of eelgrass habitat, to achieve an ecological outcome similar to that which would occur using the California Eelgrass Mitigation Plan's (CEMP) recommended 1.2:1 ratio, and to increase the understanding of *Zostera pacifica* restoration. After discussion with the Commission staff, the Corps agreed to modify its conceptual plan and ensure that the monitoring, success criteria, and remediation (if necessary) associated with the primary mitigation area will also be applied to the additional eelgrass planting areas. The Corps states that it will undertake a single transplant event, if needed, at the end of the five-year monitoring period in coordination with the Commission, NMFS, and California Department of Fish and Wildlife. However, the Commission staff notes that successful mitigation by the Corps of project-related eelgrass impacts remains an ongoing requirement if the project is to meet the "coastal effects" test for negative determinations under the federal consistency provisions of the Coastal Zone Management Act (CZMA).

The NMFS has not yet reviewed the conceptual plan outlined above, although it did identify concerns with an earlier version of the plan. But, as described above, the Corps has committed to working with NMFS to develop the final plan and to ensure that impacts to eelgrass are sufficiently mitigated as required by CEMP. The Corps has also agreed to submit its draft and final eelgrass mitigation plans to the Executive Director for review and comments prior to the start of eelgrass plantings in spring 2021. However, should the final eelgrass mitigation plan not incorporate the above commitments, including adequate monitoring and remediation provisions, the Commission can use the federal consistency reopener provisions of the CZMA (15 CFR § 930.45 and 930.46) and determine whether the maintenance dredging project is adversely affecting eelgrass habitat in Lower Newport Bay in a manner different from that anticipated in the negative determination submitted by the Corps. Similarly, should implementation of the mitigation plan and/or any required remediation activities not adequately protect eelgrass beds at this location, the Commission can use the CZMA reopener provisions to determine whether project impacts are different than currently anticipated and if necessary request that the Corps submit a revised negative or consistency determination.

In conclusion, the Commission staff **agrees** that with the commitments made by the Corps regarding the development of an eelgrass mitigation plan in coordination with the NMFS and the Commission staff, the proposed maintenance dredging project will not adversely affect coastal resources, including eelgrass in the Lower Newport Harbor Entrance Channel. We therefore **concur** with your negative determination made pursuant to 15 CFR 930.35 of the NOAA implementing regulations. Please contact Larry Simon at Larry.Simon@coastal.ca.gov should you have any questions regarding this matter.

Sincerely,

LARRY Simon

(for) JOHN AINSWORTH
Executive Director

cc: CCC – South Coast District
National Marine Fisheries Service
California Department of Fish and Wildlife

APPENDIX H

CONCEPTUAL EELGRASS MITIGATION PLAN

USACE Conceptual Eelgrass Mitigation Plan

INTRODUCTION

The USACE proposes to mitigate for the loss of eelgrass in the Entrance Channel to Lower Newport Bay expected to result as a consequence of the USACE's 2020 Lower Newport Bay Maintenance Dredging Project (Project).

Overall Approach

A detailed Eelgrass Mitigation Plan will be prepared for the USACE by a qualified contractor following identification of the location, acreage, and extent of actual mitigation requirements following completion of dredging for eelgrass losses in the Entrance Channel and following an analysis of the city of Newport Beach's 2020 eelgrass surveys. The plan will include monitoring of the transplants.

The USACE will be conducting separate eelgrass surveys in the Entrance Channel prior to the start of dredging to include a survey for Caulerpa taxifolia. Following the completion of dredging, the USACE will also be conducting a post-construction eelgrass survey and use the results of our two surveys to calculate actual eelgrass losses from the dredging. At this point, the USACE will enter into a contract for mitigating eelgrass losses. That contract will include preparation of a detailed mitigation plan for USACE approval prior to the start of any transplant activities. Authorized channel depth in the Entrance Chanel is -20 ft MLLW. Dredging along the west side of the Entrance Channel between Stations 23+00 to 40+00 has been removed from the proposed dredge template. This avoids impacts to the eelgrass in this area without compromising navigational safety concerns.

The detailed mitigation plan will be prepared in coordination with the NMFS for planting in spring 2021 to take advantage of the growing season for eelgrass, spring weather conditions, and reduced recreational boating.

PROJECTED EELGRASS IMPACTS

Preliminary estimates of eelgrass loss from the maintenance dredging is approximately 1.5 acres. This acreage was determined by overlapping the dredge prism over a map of eelgrass provided by the city of Newport Beach from a survey conducted in 2016. A figure showing this overlap is attached to Enclosure 1 of the USACE response letter. The overlap area was based on the authorized depth of -20 ft MLLW. One area along the west side of the channel was excluded from the dredge prism for purposes of reducing the eelgrass impacts. The exact area and locations of eelgrass losses will be determined based on pre- and post-construction surveys in the Entrance Channel. The loss attributable to the Project will be determined by a direct comparison of the pre- and post-construction surveys. Normally, a control location is also mapped to allow for natural dieback of eelgrass that would not be due to the dredging activities. That may not be possible in this case as there is only the single bed of *Zostera pacifica* present in the bay.

However, the bed is large enough and the time period between surveys short enough that any natural decline should be readily apparent in the surveys.

ALTERNATIVE MITIGATION APPROACHES CONSIDERED BUT NOT PROPOSED

The USACE has considered other mitigation options. The first was the standard type of CEMP mitigation with creation of an eelgrass bed in the lower bay with a mitigation ratio of 1.2:1, standard success criteria and five years of post-transplant monitoring. The USACE decided not to carry this option forward at this time due to lack of available space in the lower bay to construct a 1.8 acre mitigation site, the assumption that "out of kind" restoration would be required if planting occurs outside of the channel limits (assuming that Zostera marina would need to be planted in lieu of the species that is being impacted, Zostera pacifica, which does not currently inhabit areas outside of the channel), and costs. However, this option will be further explored during preparation of the draft and final mitigation plan in coordination with NMFS, if suitable locations can be identified. The advantage of this option would be to remove the need to mitigate for future losses during future dredging events, as this option would mitigate for permanent impacts.

The second option included modifying shallow water habitat to increase eelgrass habitat suitability by dredging to create a bench similar to what was done in Morro Bay. The area in the Entrance Channel to the east of the federal navigation channel in the center portion of the entrance is a bench with shallow waters (current depths range from -5 to -13 ft MLLW) that is not currently vegetated. The option would include dredging a portion of this bench to a depth of -18 to -20 ft MLLW followed by transplant. The USACE decided not to pursue this option at this time for a variety of reasons, including concerns about the USACE's ability to carry out this option in a manner consistent with the authorized Navigation Project, the cost of the option, and the uncertain likelihood of success. The area is currently not vegetated for some reason, either depth, current velocity, temperature, etc., which could result in failure of the transplant in this area, even if it is deepened. Another reason is that dredging of a bench would be expensive as would transplant activities, and may not be the most efficient or cost-effective way of achieving desired results. Finally, dredging could also affect the hydrodynamics of the Entrance Channels in unknown ways that could negatively impact the existing eelgrass beds or adjacent shoreline structures along the east bank, including the East Jetty.

Following conversations with the NMFS, State Lands Commission, and Coastal Commission, and consideration of USACE requirements for purchase of mitigation banking credits for USACE projects, the USACE has determined that purchasing eelgrass credits from the Bolsa Chica wetlands is not a feasible option.

PROPOSED MITIGATION APPROACH (IN-KIND)

Mitigation Plan for *Zostera pacifica*, Entrance Channel 2020

Location of Impact

This species is located in the Entrance Channel to Newport Bay. Dredging in the Entrance Channel will remove an estimated 1.5 acres of existing eelgrass habitat made up entirely of Zostera pacifica.

The exact area and locations of eelgrass losses will be determined based on pre- and post-construction surveys in the Entrance Channel. The map attached to Enclosure 1 shows the location of existing eelgrass beds and the overlap between dredging and eelgrass. This was used for the preliminary impact assessment of 1.5 acres.

Mitigation Methods, Ratios, Monitoring and Success Criteria

Once the location and areas of impact are verified by the pre- and post-dredge surveys, a mitigation contract will be assembled and awarded. The first task of the contract will be to prepare a detailed mitigation plan detailing all procedures to be used. Donor beds located in the Entrance Channel would be used to provide the necessary transplant material. Standard measures for eelgrass transplant would be utilized, modified as necessary to transplant *Zostera pacifica* instead of the usual *Zostera marina*. A contractor with experience with Zostera pacifica will be sought for this contract. A variety of transplant methods may be considered as a means of evaluating and identifying the best method for transplanting this species, including makeup of bundles, spacing of transplants, and transplants onto slopes. Transplant methods for both species are expected to be very similar, although *Zostera pacifica* may take longer to fill in. Basic knowledge on this process will be useful to the USACE and NMFS for future *Zostera pacifica* mitigation efforts and will offset some of the temporal loss.

The USACE proposes a two-pronged approach to mitigate eelgrass affected by dredging. The primary element is direct replacement. An amount of eelgrass equivalent to the acreage directly affected (currently estimated at 1.5 acres) will be transplanted back into the impacted footprint in areas surrounded by un-impacted eelgrass. Recovery is expected to be quicker than for "standard" mitigation site construction that involves establishing eelgrass beds in currently unoccupied areas. Conditions at the mitigation site (which is also the impact site) are known to be conducive to eelgrass due to the current beds located in the Entrance Channel. Expectations for successful restoration would be greater for this mitigation as it involves re-vegetating current eelgrass beds in areas and under conditions where it currently grows. Eelgrass would be expected to re-vegetate the impacted areas naturally and would have time to do so as the next dredging in this area is not expected for 15-20 years. Mitigation, in this case, is solely for temporal losses and not for any permanent loss of eelgrass habitat.

Standard monitoring and success criteria would be applied to this area to ensure successful recovery. The USACE proposes to follow general transplant procedures in the CEMP, modified as needed for *Zostera pacifica*, and perform a five-year monitoring program following the transplant. The transplant would be conducted at the start of the next growing season in April 2021 (growing season March-October) to allow for maximum chances of success and to get better weather for the transplant activities while taking place before summer recreational boating season. Under this strategy, it is assumed future eelgrass losses in this area associated with future dredging would have to be mitigated in a similar fashion.

The second element includes exploring opportunities to enlarge the mitigation area and hopefully achieve a 1.2:1 replacement value by transplanting an additional area of eelgrass into unvegetated areas within the Entrance Channel. Actual acreage to be determined based on future pre- and post-dredge surveys, would equate to a 0.2:1 ratio of the impacted acreage. Unvegetated areas in, or adjacent to, the Entrance Channel will be evaluated for potential suitability for eelgrass expansion in terms of depth, currents and other habitat characteristics, and also assessed to ensure minimal or no conflict with the USACE's Navigation Project. The purpose of this second element is solely to offset temporal loss of eelgrass habitat (achieve an ecological outcome similar to what's expected utilizing the CEMP's recommended 1.2:1 ratio) and to increase our understanding of *Z. pacifica* restoration. To that end, while the USACE would subject the additional areas to the usual success criteria of the CEMP any transplant efforts would be limited to one attempt following the five years of monitoring. Results of the added mitigation effort would advance "understanding of *Z. pacifica* to better inform long-term conservation and management." The primary mitigation area would be subject to success criteria and thus to the possibility of transplanting additional eelgrass should these areas fail to meet those criteria within the five year monitoring period. Furthermore, the Corps would not plan to mitigate for losses to the expanded added area during future dredging.

In addition to a reduction in the temporal losses, re-planting the channel also results in an in-kind mitigation. If plantings occurred outside of the Entrance Channel, beyond the current limits of *Zostera pacifica*, a different eelgrass species (*Zostera marina*) may need to be used in order to achieve success. In-kind mitigation is generally considered preferable.

Transplant and long-term monitoring of *Zostera pacifica* mitigation should also provide the USACE and NMFS with new information on this particular species of eelgrass while remaining compliant with USACE policy on mitigation and maintenance dredging. This meets the recommendation of the NMFS to advance understanding of Zostera pacifica to better inform long-term conservation and management to address temporal loss.

Timing of Mitigation and Monitoring Period

Dredging is expected to be completed near the end of December 2020 with the post-construction surveyed conducted immediately thereafter. Coordination on the impact estimate will take place in January 2021 with preparation of the detailed mitigation plan to follow. Transplant operations would be conducted in the spring of 2021, most likely in April. Timing is in accordance with CEMP recommendations for transplant operations to take place during the eelgrass growing season of March-September.

Monitoring is proposed for the usual five-year period as recommended by the CEMP, including surveys at 0, 6, 12, 24, 36, 48, and 60 months.