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Meydenbauer Bay Yacht Club

ANCHOR QEA

Sediment Characterization Report for Proposed Maintenance Dredging

Prepared for
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ABBREVIATIONS

µg/kg	microgram per kilogram
ASTM	ASTM International
BT	bioaccumulation trigger
CDPE	chlorinated diphenyl ether
COE	Corps of Engineers Datum
CSL	cleanup screening level
D/F	dioxins/furans
DGPS	differential global positioning system
DMMP	Dredged Material Management Program
DMMU	Dredged Material Management Unit
HPAH	high-molecular-weight polycyclic aromatic hydrocarbon
LPAH	low-molecular-weight polycyclic aromatic hydrocarbon
MBYC	Meydenbauer Bay Yacht Club
mg/kg	milligram per kilogram
ML	maximum level
MLLW	mean lower low water
MS	matrix spike
MSD	matrix spike duplicate
ng/kg	nanogram per kilogram
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCDPE	polychlorinated diphenyl ether
Project	Meydenbauer Bay Yacht Club Maintenance Dredging Evaluation
QC	quality control
SAP	Sampling and Analysis Plan
SCR	Sediment Characterization Report
SCO	sediment cleanup objective
SL	screening level
SMS	Sediment Management Standards
TEQ	toxic equivalency
USACE	U.S. Army Corps of Engineers
WAC	Washington Administrative Code

1 Introduction

This Sediment Characterization Report (SCR) presents the characterization findings for subsurface sediments proposed for removal during future maintenance dredging at the Meydenbauer Bay Yacht Club (MBYC) marina. The MBYC marina is located in Whalers Cove, the southern portion of Meydenbauer Bay, Lake Washington (Figure 1).

This characterization of subsurface sediments was performed in accordance with the dredge material management program (DMMP)-approved Sampling and Analysis Plan (SAP; Appendix A) to inform planning efforts for material dredging and disposal. Dredging is anticipated to be performed in the near future following completion of design and permitting activities in order to remove recent sedimentation and restore operational depths within the MBYC marina.

This SCR details the results of the sediment characterization investigation conducted in September 2023 and follow-up testing of archived sediment samples analyzed during 2024.

The SCR is organized into the following sections:

- Section 1: Introduction (this section)
- Section 2: Background
- Section 3: Sediment Testing Results
- Section 4: Data Quality Assessment
- Section 5: Discussion
- Section 6: References

2 Background

This section describes the property location, history, and the purpose of the sediment characterization effort.

2.1 Property Description

The marina is located on MBYC-owned second class shorelands in Lake Washington. Figure 2 shows the MBYC property boundary based on a 2022 property survey. Properties located in the vicinity of MBYC include the following:

- The areas offshore of the marina are state-owned lands administered by the Washington Department of Natural Resources.
- Shorelands located immediately to the north of MBYC are owned by the City of Bellevue. The first 30-foot portion located immediately north of MBYC is a platted extension of Southeast Bellevue Place. The aquatic lands further to the north include a City-owned marina located on the site of a former Bellevue ferry terminal. That ferry was operated by King County from just after 1917 until 1940 when the first floating bridge was constructed across Lake Washington. The City-owned shorelands to the north of the ferry terminal included pier structures that were used to moor the Pacific Whaling Company vessels during the winter season.
- Shorelands located to the south of MBYC are owned by the 101 Meydenbauer Bay Condominiums.

A large municipal storm drain owned and operated by the City of Bellevue (City) is located along the Lake Washington shoreline along the southern edge of the MBYC property. This storm drain was installed in 1982 after execution of a 1981 easement agreement between the City and MBYC.

2.2 MBYC History

Prior to construction of the MBYC, the MBYC shorelands were undeveloped. The adjacent upland property included a former dance hall.

The MBYC was incorporated in 1946 and purchased the waterfront property and former dance hall building in that year. That original MBYC building has been remodeled and expanded several times and is one of the oldest buildings in the City of Bellevue.

The shoreline was bulkheaded and the first MBYC marina floats were installed in 1949, providing moorage for approximately 30 boats. A minor amount of dredging was performed in 1949 as part of that construction, and some additional dredging was performed in 1950 to improve access at low water levels. Additional slips were added in 1954 under authorization from the U.S. Army Corps of Engineers.

Dredging was conducted in the winter of 1966 to improve (deepen) the operational depths at the marina. A dredging plan from November of 1965 shows the dredging neatline elevation to have been +13.5 feet U.S. Army Corps of Engineers (USACE) Lake Washington Datum (COE) with an additional overdredge allowance.

The MBYC float structures were replaced that same year (1966), adding covered moorage and increasing moorage to the current mix of 106 slips. No dredging has been conducted within the MBYC moorage areas by MBYC or by any other party since 1966.

2.3 City of Bellevue Outfall

A 60-inch City of Bellevue stormwater outfall (Outfall) is located along the shoreline at the southern edge of the MBYC property. The Outfall was constructed in 1982 after execution of a formal easement agreement between the City of Bellevue and MBYC in 1981. The easement anticipated maintenance dredging to be performed by the City to prevent shoaling of the marina from deposition of solids from the Outfall:

> "Grantee accepts responsibility for sediment discharged from the energy dissipator and deposited offshore to the extent that said sediment may adversely impact Grantor's customary use of its shorelands and boat moorage facilities. If and when sedimentation originating from the new pipeline energy dissipator system should cause the lake bottom of Grantor's shorelands to rise by more than two inches, on average, then Grantee will remove said sediment, or at Grantee's option Grantee may remove more than said accumulation from said shoreland."

Beginning in 1982, monitoring of water depths was performed by a licensed surveyor on behalf of MBYC. The water depth monitoring documented shoaling, with the greatest shoaling occurring in the vicinity of the Outfall.

The City has implemented three dredging events in the immediate vicinity of the Outfall in response to the observed shoaling:

- 1997 Dredging: In 1995 the City retained Hartman Associates to evaluate the area of shoaling around the Outfall. Hartman estimated that 2,600 cubic yards of sediment need to be dredged to restore marina operational depths and remove sediment accumulation. These sediments were characterized under a 1996 SAP. In the 1997 suitability determination, the sediments were found to be unsuitable for open water disposal due to the presence of elevated lead, zinc, and polycyclic aromatic hydrocarbons (PAH) compounds. Other compounds (PCBs, pesticides, D/F compounds, other heavy metals) were not analyzed at that time. Hartman and the City reduced the proposed dredging quantities to 150 cubic yards, focusing dredging on sandy materials located immediately offshore of the Outfall and not restoring conditions throughout the balance of the marina. The dredged sediments were removed and disposed in an upland disposal facility during the 1997-98 dredging season.

- 2010 Dredging: A second round of City dredging was conducted between 2009 and 2011. Details of that dredging event have not yet been provided by the City.
- 2017 Dredging: The third dredging event was designed and permitted between 2014 and 2017. Sediment testing included analysis for petroleum hydrocarbons. The sediments were found to contain elevated oil-range petroleum hydrocarbons, with concentrations up to 5,700 milligrams per kilogram (mg/kg), which exceeded the numeric criteria developed by Ecology for the protection of benthic organisms (Ecology 2021). Sediments were removed by hydraulic dredging and managed by upland disposal.

MBYC has observed evidence of non-stormwater discharges and/or hazardous materials discharging from the Outfall. Photograph 1 was taken during 2018 when an oily sheen was observed discharging from the Outfall. Photograph 2 was taken during August 2024 when a thick layer of foam was observed on the water discharging from the Outfall.

Photograph 1

On January 13, 2018, a thick layer of oily scum was observed discharging from the City Outfall into the lake at the MBYC. City staff deployed sorbent booms in an attempt to recover some of the oil.

Figure 2

During August of 2024, a thick layer of foam was observed discharging from the City of Bellevue Outfall.

No data other than those collected as part of the above-listed dredging events has been provided or evaluated to date, and no data has been made available regarding testing of storm drain sediments associated with the Outfall or sediment traps leading to the Outfall.

2.4 Planned Maintenance Dredging

The current sediment characterization effort will support planned maintenance dredging to restore the MBYC marina basin to the original 1966 dredge elevations. This dredging effort will include removal of high spots of sediment accumulation to allow for safe passage and moorage of vessels within the MBYC marina and associated aisleways located immediately north, south, and west of the MBYC property.

A preliminary dredge plan was developed as part of the SAP (Appendix A) to inform the sediment characterization effort. That conceptual dredge design included a permitted elevation of +13.5 feet COE datum with 1 foot of advanced maintenance and 1-foot allowable overdredge to elevation +11.5 feet COE. Up to 18,500 cubic yards of sediment could be removed during dredging, depending on the final design. Under the current plan, the newly exposed Z-layer would be the first 2 feet of sediment beyond the overdredge elevation, from elevation +11.5 to +9.5 feet COE for this Project (Project).

2.5 Sediment Characterization Program

The sampling and testing program was design to characterize dredge material that could be generated during dredging to the permitted elevation plus 2 feet overdredge. The testing program also included sampling to characterize the Z-layer interval located below those sediments, as described in the SAP.

The dredge material management units (DMMUs), sampling location, target sample depth, and chemical testing methods were selected in accordance with the most recent DMMP guidance (DMMP 2021) and *Sediment Cleanup User's Manual II* (Ecology 2021). The established DMMUs and sampling locations are shown in Figure 2.

- DMMU 1: This DMMU includes offshore portions of the MBYC marina. Sampling included compositing of three cores (C-1, C-2, and C-3).
- DMMU 2: This DMMU is located in the shoreline areas within the MBYC marina. Sampling included compositing of three cores (C-4, C-5, and C-6).
- DMMU 3: This DMMU is located in the area where the City previously performed localized sediment removal during 1997, 2010, and 2017 dredging events (Section 2.3). Sampling included a single core (C-7).

In addition to the planned sampling of DMMU testing composites, this characterization report presents the findings of chemical analysis of archived discrete samples from the different core locations. The discrete sample analysis was performed to better understand the lateral distribution of D/F compounds that were detected in the DMMU testing composites.

No sampling of surface sediments (0 to 10 cm) has been performed as part of this characterization effort. Surface testing is typically performed to evaluate compliance with applicable sediment cleanup levels promulgated under the Sediment Management Standards regulations (Washington Administrative Code [WAC] 173-204).

3 Sediment Testing Results

This section summarizes the results of subsurface sediment collection, processing, and analyses. The investigation methodology is detailed in the SAP (Appendix A). This section also provides a summary of field activities. No deviations from the SAP occurred during sample collection and analyses, other than the analysis of archived discrete samples for D/Fs.

3.1 Sampling Methods

An overview of sediment testing methods is provided below. Refer to the SAP for detailed methods.

3.1.1 Sampling Vessel, Navigation, and Positioning

Sampling was conducted on September 18 and 19, 2023, using vibracoring equipment aboard a research vessel operated by Gravity Marine Services. A differential global positioning system (DGPS) unit located on top of the vibracore A-frame was used for positioning (accuracy ±2 feet). The DGPS software was used to navigate to the proposed sampling stations and record the actual sampling position at the time of sampling. Coordinates were recorded digitally and on core collection field logs in latitude and longitude as decimal minutes using North American Datum of 1983 (Appendix B).

Water depth was measured using a lead line from the bow (right next to the vibracore cable) and using an onboard depth sounder. The water elevation (feet mean lower low water [MLLW]) at each station was measured using a survey package that included a real-time kinematic survey DGPS. A survey reference marker was identified from the Washington State reference marker network and used to calibrate the onboard real-time kinematic DGPS for measurement of water elevation. The mudline elevation (feet MLLW) was calculated by subtracting the water depth from the water level. At each sampling station, water depth, water level, and elevation to the nearest tenth of a foot were recorded on core collection logs and are summarized in Table 1. Sample locations are presented in Figures 2, and sample coordinates, mudlines, penetrations, recoveries, and depths are listed in Table 1. Sediment core logs, field forms, and photographs are included in Appendix B.

3.1.2 Core Collection and Processing

Subsurface sediment cores were collected as required per the SAP. Dredge areas were divided into three DMMUs, three cores were collected from DMMU-1 and DMMU-2, and one core was collected from DMMU-3. All sediment cores met acceptance criteria, and all cores achieved the required depth to meet Project objectives.

During processing, field staff re-measured the core and delineated sampling intervals with no correction for compaction. All cores were logged for major lithological features in accordance with

ASTM International (ASTM) procedures (ASTM D 2488 and ASTM D 2487—United Soil Classification System) and photographed (Appendix B).

Material encountered was primarily soft silt from the surface to the bottom of the cores. Abundant organic matter (decayed vegetation and organic-rich lake mud) was observed in a majority of the cores at depths starting from approximately 2 to 4 feet below mudline. A sand layer from 3 to 4 feet below mudline was also observed in core C-5 from DMMU-2.

Cores were processed into dredge material ("A") intervals from the mudline to +11.5 feet COE and a 2-foot Z-layer sample ("Z") from +11.5 to +9.5 feet COE. Proportionate volumes from each core within the same DMMU were placed in decontaminated stainless-steel pots and mixed until homogenous in color and texture using a decontaminated stainless-steel spoon. The sediment was then spooned into laboratory-supplied jars for analyses.

In addition to the composite samples, samples of individual cores were retained for archiving to support contingent analysis of discrete testing samples.

3.1.3 Analytical Testing

Samples were submitted to Analytical Resources, LLC, in Tukwila, Washington, for the chemical analyses defined in the SAP. Analytical results were screened against DMMP marine criteria, and Z-layer samples were screened against Sediment Management Standards (SMS) freshwater criteria.

Analyses of discrete core samples were later initiated on frozen archive samples. These samples were analyzed for selected test parameters, primarily D/Fs. Discrete sample analysis was performed on the A-samples from cores C-1 through C-6 and the Z-sample from core C-3.

3.2 DMMU Composite Results

In accordance with the SAP, one composite sample was collected for each DMMU. Table 2 presents the analytical results for each of these three DMMU composite samples, and comparison to the applicable screening levels (SLs). The laboratory analytical report and data validation report are included in Appendix C and Appendix D, respectively.

Metals

Results were below DMMP SLs for all metals except for mercury and zinc.

- Mercury results were above the SL (0.41 mg/kg) but below the DMMP bioaccumulation trigger (BT: 1.5 mg/kg) in the dredge material sample collected from DMMU-1 in the A interval.
- Zinc results were above the SL (410 mg/kg) in the dredge material samples collected from DMMU-1 and DMMU-3 in interval A.

SVOCs

All three DMMU composite samples exceeded SLs for bis(2-ethylhexyl)phthalate and butylbenzylphthalate.

PAHs

Results for several PAHs were above DMMP SLs.

- Total HPAH results exceeded the SL (12,000 micrograms per kilogram [µg/kg]) but were below the ML (maximum level; 69,000 µg/kg) in all three DMMU composites. All three composites also exceeded one or more SLs for individual PAH compounds, including benzo(a)anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-c,d)pyrene, phenanthrene, pyrene, total benzofluoranthenes (b,j,k). DMMU-3 had additional screening level exceedances for acenaphthene and total LPAH.
- All three DMMU composites exceeded the bioaccumulation trigger for fluoranthene (4,600 µg/kg).

Pesticides

All three DMMU composite samples exceeded SLs for 4,4'-DDE (p,p'-DDE), and total chlordane. DMMU-1 and DMMU-3 results for total chlordane are above the bioaccumulation trigger.

D/Fs

All three DMMU composite samples had significant levels of total D/Fs with each exceeding the screening level and bioaccumulation trigger level.

PCBs

All three DMMU composite samples exceeded SLs for total PCB Aroclors.

Contingent Bioassay Testing

Contingent bioassay testing was not performed for the following reasons: 1) SLs were exceeded for multiple different contaminants, and 2) bioaccumulation triggers were exceeded for PAHs, D/Fs, chlordane, and PCBs. Anchor QEA concluded that the dredge materials would not be suitable for open water disposal.

3.3 Z-Layer Sediment Sampling Results

Since results of the initial DMMP testing indicated that contamination is present in the A-interval (i.e., the material to be dredged), analytical testing was conducted for the Z-layer samples to understand the quality of the sediment surface that would be exposed through dredging. As described in the DMMP User Manual, sediment exposed through dredging must meet the antidegradation policy under the state of Washington SMS (DMMP 2021, WAC 173-204-120). If it does not meet the policy, a clean sand layer is typically required to be placed following dredging.

Table 4 presents the analytical results for each sample and a summary of the different SMS SLs (i.e., sediment cleanup objective [SCO] and CSL). The following is a summary of the DMMU composite samples for the Z-layer per SMS freshwater requirements. Note that different SLs apply for the Z-layer comparison because the newly exposed sediment will be in a freshwater environment (i.e., Lake Washington).

DMMU-1

The Z-layer sample from DMMU-1 (labeled DU-1Z-20230919 in Table 4) had three SCO exceedances (bis(2-ethylhexyl) phthalate, total PAHs, and total PCB Aroclors) and 1 CSL exceedance (DDE).

The D/F levels in this sample (42.4 nanograms per kilogram [ng/kg]) remained elevated, similar to those measured in the A-layer sample from DMMU-1. The results indicate that contaminant levels extend deeper into the soft sediments of DMMU-1.

DMMU-2

PCBs were detected at elevated concentrations in the Z-layer sample from DMMU-2 (labeled DU-2Z-20230919 in Table 4). Because the result only slightly exceeded the SMS SCO screening level (112 µg/kg versus an SCO of 110 µg/kg), the sample was reanalyzed to confirm the results. The result of the reanalysis (16.8 µg/kg; labeled DU-2Z-20230919-RE in Table 4) was well below the SCO. The average of the two values (64 µg/kg) was also well below the SCO, indicating that the PCB concentrations do not in fact exceed the SCO.

DMMU-3

No exceedances were detected in the Z-layer at DMMU-3 (DU-3Z-20230918).

3.4 D/F Testing of Discrete Core Samples

To better define the distribution and potential source of the D/F compounds detected in the sediments, each discrete "A" interval sample from cores C-1 through C-6 was tested for D/Fs. Discrete testing data were already available for core C-7, as it was the only core included for DMMU-3.

Figure 3 summarizes the D/F results from the discrete sample testing by location, and Table 3 presents the analytical results for each sample. The highest concentrations were detected in DMMU-3 (core sample C-7) located adjacent to the Outfall. Concentrations generally decreased with distance from the Outfall.

One archived Z-sample was analyzed from core C-3 for D/Fs, PCBs, and pesticides. The Z-sample D/F result (95 ng/kg toxic equivalency [TEQ]) was approximately twice the concentration measured in the upper A sample interval (47 ng/kg TEQ) from that core. The increase in concentration with depth indicates that the source of the dioxin contamination may be predominantly historic in nature, with less contaminated sediment depositing over time. The sample also contained an SCO exceedance for total PCB Aroclors and a CSL exceedance for DDE.

4 Data Quality Assessment

This section provides information on data quality, including field and laboratory quality control (QC) measures, data validation findings, and completeness.

4.1 Field Data Quality

Anchor QEA personnel labeled samples in a consistent manner to ensure that field samples were traceable. Chain-of-custody forms were appropriately populated to provide all information necessary for the laboratory to conduct required analyses properly. All samples arrived at the laboratory within temperature requirements. Extra volume was provided for laboratory replicates, matrix spike (MS), and matrix spike duplicate (MSD) samples, as required in the SAP.

4.2 Analytical Data Quality

Data quality objectives and quality assurance procedures are provided in the SAP. Laboratory data reports are provided in Appendix C, and the data validation reports are provided in Appendix D. All data qualifiers applied to the data during final validation have been incorporated into the database for this Project. All data were considered usable as reported or as qualified. Data qualifiers assigned during data validation include the following:

- "J" indicates the associated numerical value is an estimated concentration.
- "U" indicates that the result is non-detect.
- "UJ" indicates an approximate reporting limit below which the analyte was not detected.
- "EMPC" indicates estimated maximum possible concentration.

Analytical data were validated at a Stage 2B (EPA 2009) level following procedures and requirements listed in the SAP. The validation process resulted in some additional J and UJ qualified data (estimated values) beyond those assigned by the laboratory, based on specified protocol or technical advisory, as stated in the data validation report (Appendix D), including the following key findings:

- One mercury result and seven semivolatile organic compound results were qualified as non-detects due to detections in associated method or calibration blanks.
- Some metal, mercury, semivolatile organic compound, polyaromatic hydrocarbon, PCB, pesticide, total organic carbon, total solids, total volatile solids, and D/F results were qualified as estimated due to calibration or laboratory QC results outside of method, laboratory, or Project-specified control limits.
- Some D/F congener results were qualified because they were reported as estimated maximum potential concentration results by the laboratory.
- All D/F analyte results for five samples were qualified due to polychlorinated diphenyl ether (PCDPE) interference.
- Two D/F results were qualified due to chlorinated diphenyl ether (CDPE) interference.

- Some semivolatile organic compound, organochlorine pesticide, sulfide, total solids, and total organic carbon results were qualified because they were analyzed outside of technical holding times.

No data were rejected, and all results are usable as reported or qualified. Some semivolatile organic compound results were not reported due to another result being more technically sound.

4.3 Data Completeness

Data completeness includes collection of required samples in the field and laboratory analysis for target chemicals as outlined in the Project SAP (Appendix A). All target samples were collected and submitted for the full suite of physical and chemical testing.

Laboratory data completeness was measured by percentage of results reported by the analytical laboratory. Data completeness levels were set at 95% for all parameters, according to data quality objectives specified in the SAP. All requested chemical results were reported and deemed usable.

5 Discussion

The sediment characterization was successfully completed, and all target samples were collected and analyzed following the procedures and methods outlined in the SAP (Appendix A). Project data quality objectives were met.

Key conclusions with respect to the proposed maintenance dredging Project include the following:

- Taken together, the data collected are sufficient to conclude that the recent accumulations of sediment within the MBYC marina are not suitable for open water disposal. This conclusion is based on the most recent DMMP guidance (DMMP 2021) and Anchor QEA's experience and best professional judgment developed through the implementation of similar dredge characterization projects. Contaminants driving this conclusion include PAHs, PCBs, D/Fs, phthalates, mercury, zinc and the pesticides DDE and chlordane.
- Sampling of the Z-layer samples demonstrated that the Z-layer sediments remain uncontaminated in DMMU-2 and DMMU-3. However, deeper contamination is present in DMMU-1, extending into the Z-layer as analyzed during this effort.

The characterization data also provided information on the potential source of the contamination detected in the MBYC core samples:

- The detected contaminants do not reflect a typical marina contaminant signature but rather are representative of urban stormwater runoff as measured in many of the urban bays around Puget Sound, Lake Washington, and Lake Union. Phthalates, PAHs, and zinc are common in roadway runoff. PCBs, D/Fs, mercury, DDE and chlordane are common urban legacy pollutants. Though source reduction efforts have reduced the abundance of PCBs, D/Fs, and mercury compounds, these contaminants commonly remain within older urban stormwater drainages. The manufacture and use of DDT (the parent compound of DDE) and chlordane have both been banned, but these chemicals were commonly used prior to that point for control of pests in residential and commercial settings.
- Discrete sampling of the A-layer sediments was performed throughout the potential MBYC dredging footprint. The highest D/F concentrations were measured in the discrete samples collected adjacent to the Outfall, despite this area having been dredged in 1997 and 2017. The results indicate that the Outfall is the likely source of this sediment contamination. Based on the distribution of D/F contamination observed, the contamination likely extends outside of the characterized area into other areas of Whalers Cove.
- No stormwater solids data are currently available for the City storm drains leading to the Outfall. As such, it is not possible currently to assess the current or historic levels of PCBs, heavy metals, PAH compounds, pesticides, or D/Fs in the City storm drain solids that have been discharged to the MBYC sediments from the Outfall. However, analysis of discrete

samples in core C-3 provides information useful in documenting the potential trends of the D/F pollution over time. The presence of higher D/F concentrations in the deeper sample from this core indicates that sediment quality may be improving over time and that recontamination inputs from stormwater are likely decreasing in comparison to historical levels.

This sediment characterization effort did not set out to assess the quality of exposed surface sediments within or adjacent to the MBYC property to evaluate compliance with sediment cleanup levels promulgated under Washington’s Sediment Management Standards. Doing so would require the collection of surface sediment samples rather than the collection of subsurface core samples as performed in this characterization effort.

6 References

DMMP (Dredged Material Management Program), 2021. *Dredged Material Evaluation and Disposal Procedures User Manual.* Dredged Material Management Program: U.S. Army Corps of Engineers, Seattle District; Environmental Protection Agency, Region 10; Washington State Department of Natural Resources; and Washington State Department of Ecology. Accessed October 23, 2024. July 2021. Available at: https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll11/id/5397.

Ecology (Washington State Department of Ecology), 2021. *Sediment Cleanup User's Manual (SCUM): Guidance for Implementing the Cleanup Provisions of the Sediment Management Standards, Chapter 173–204 WAC.* Third Revision. Toxics Cleanup Program Publication No. 12-09-057. December 2021.

EPA (U.S. Environmental Protection Agency), 2009. *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use.* EPA Office of Solid Waste and Emergency Response. USEPA 540-R-08-005. January 2009.

Tables

Table 1
Core Collection Data

Station ID	Attempts	Accepted Attempt Number	Date Collected	Location		Water Depth (feet)	Observed Water Level (feet)	Mudline Elevation (feet)	Recovery (feet)	Drive Penetration (feet)	Core Recovery (percent)
				Easting	Northing						
C-1	4	4	9/19/23	122.20914	47.60854	6.9	20	13.1	4.25	5	85
C-2	3	3	9/19/23	122.20875	47.60813	7.1	20	12.9	4.7	5	94
C-3	2	2	9/19/23	122.20796	47.60781	5.5	20	14.5	5.2	6	86
C-4	1	1	9/19/23	122.20859	47.60904	5.7	20	14.3	5.8	6	97
C-5	1	1	9/19/23	122.20800	47.60881	7	20	13.0	4.5	5	90
C-6	2	2	9/19/23	122.20766	47.60841	7.4	20	12.6	5.6	5	112
C-7	2	2	9/18/23	122.20744	47.60811	5.7	20	14.3	7	8	88

Notes:
Datum COE

Table 2

Composite Sediment Core Sample Analytical Results Compared to DMMP Criteria

				Task	MBYC_2023	MBYC_2023	MBYC_2023
				Location ID	DU-1A-20230919	DU-2A-20230919	DU-3A-20230919
				Sample ID	DU-1A-20230919	DU-2A-20230919	DU-3A-20230918
				Sample Date	9/19/2023	9/19/2023	9/18/2023
				Depth	0 - 2 ft	0 - 1.8 ft	0 - 2.8 ft
				Sample Type	N	N	N
				Matrix	SE	SE	SE
		DMMPSL2021	DMMPBT2021	DMMPML2021			
Conventional Parameters (mg/kg)							
Ammonia as nitrogen	SM4500NH3H				**83.7**	**15**	**16.5**
Sulfide	SM4500S2D				**193 J**	**96.3 J**	**122 J**
Conventional Parameters (pct)							
Total organic carbon	SW9060AM				**17.4 J**	**13 J**	**16.4 J**
Total solids	D2216				**16.43**	**22.89**	**22.56**
Total solids	SM2540G				**14.04 J**	**24.37 J**	**22.99 J**
Total volatile solids	PSEP-TVS				**27.54 J**	**22.18 J**	**23.57 J**
Grain Size (pct)							
Gravel	PSEP-PS				**12.5**	**7.8**	**6**
Gravel, very coarse	PSEP-PS				**10.9**	**3.6**	**3.8**
Gravel, coarse	PSEP-PS				**0.3**	**0.8**	**0.4**
Gravel, medium	PSEP-PS				**1.3**	**3.4**	**1.8**
Sand	PSEP-PS				**25.5**	**56.3**	**34**
Sand, very coarse	PSEP-PS				**3.2**	**5**	**3.1**
Sand, coarse	PSEP-PS				**3.8**	**9.8**	**3.8**
Sand, medium	PSEP-PS				**5.1**	**25.1**	**12.3**
Sand, fine	PSEP-PS				**5.7**	**8.8**	**3.8**
Sand, very fine	PSEP-PS				**7.7**	**7.6**	**11**
Silt	PSEP-PS				**35.2**	**29.7**	**52.3**
Silt, coarse	PSEP-PS				**9.3**	**16.1**	**28.5**
Silt, medium	PSEP-PS				**11.2**	0.1 U	**3.1**
Silt, fine	PSEP-PS				**6.5**	**8.1**	**11.4**
Silt, very fine	PSEP-PS				**8.2**	**5.5**	**9.3**
Clay	PSEP-PS				**26.8**	**6.3**	**7.6**
Clay, coarse	PSEP-PS				**12.3**	**1.7**	**2.4**
Clay, medium	PSEP-PS				**8.1**	**1**	**1.1**
Clay, fine	PSEP-PS				**6.4**	**3.6**	**4.1**
Metals (mg/kg)							
Antimony	SW6020	150		200	1.4 UJ	0.78 UJ	0.86 UJ
Arsenic	SW6020	57	507.1	700	**17.9 J**	**15.5 J**	**14.9 J**
Cadmium	SW6020	5.1		14	**1.9**	**0.54**	**1.87**
Chromium	SW6020	260			**51.7**	**32.4**	**42.9**
Copper	SW6020	390		1300	**127 J**	**59.3 J**	**92.9 J**
Lead	SW6020	450	975	1200	**356**	**161**	**369**
Mercury	SW7471B	0.41	1.5	2.3	**0.438 J**	**0.132 J**	**0.361 J**
Selenium	SW6020		3		3.5 U	1.95 U	2.14 U
Silver	SW6020	6.1		8.4	**0.98 J**	**0.19 J**	**0.78 J**
Zinc	SW6020	410		3800	**523**	**258**	**473**
Volatile Organics (µg/kg)							
Hexachlorobutadiene (Hexachloro-1,3-butadiene)	SW8270ESIM	11		270	20.9 U	15.5 U	14.5 U
Semivolatile Organics (µg/kg)							
1,2,4-Trichlorobenzene	SW8270ESIM	31		64	20.9 U	15.5 U	14.5 U
1,2-Dichlorobenzene	SW8270ESIM	35		110	20.9 U	15.5 U	14.5 U
1,4-Dichlorobenzene	SW8270ESIM	110		120	**5.2 J**	15.5 U	14.5 U

Table 2

Composite Sediment Core Sample Analytical Results Compared to DMMP Criteria

				Task	MBYC_2023	MBYC_2023	MBYC_2023
				Location ID	DU-1A-20230919	DU-2A-20230919	DU-3A-20230919
				Sample ID	DU-1A-20230919	DU-2A-20230919	DU-3A-20230918
				Sample Date	9/19/2023	9/19/2023	9/18/2023
				Depth	0 - 2 ft	0 - 1.8 ft	0 - 2.8 ft
				Sample Type	N	N	N
				Matrix	SE	SE	SE
		DMMPSL2021	DMMPBT2021	DMMPML2021			
2,4-Dimethylphenol	SW8270ESIM	29		210	83.5 UJ	62.1 UJ	58 UJ
2-Methylphenol (o-Cresol)	SW8270E	63		77	83.5 UJ	62.1 UJ	58 UJ
4-Methylphenol (p-Cresol)	SW8270E	670		3600	**79.8 J**	62.1 UJ	58 UJ
Benzoic acid	SW8270E	650		760	**182 J**	621 UJ	580 UJ
Benzyl alcohol	SW8270E	57		870	83.5 U	62.1 U	58 U
Bis(2-ethylhexyl)phthalate	SW8270E	1300		8300	**3080 J**	**1690 J**	**4010 J**
Butylbenzyl phthalate	SW8270E	63		970	**231**	**78.4**	**208**
Diethyl phthalate	SW8270E	200		1200	209 U	155 U	145 U
Dimethyl phthalate	SW8270E	71		1400	83.5 U	62.1 U	58 U
Di-n-butyl phthalate	SW8270E	1400		5100	**52.9 J**	62.1 U	**75**
Di-n-octyl phthalate	SW8270E	6200		6200	**80.9 J**	**68.1 J**	58 UJ
Hexachlorobenzene	SW8270ESIM	22	168	230	20.9 U	15.5 U	14.5 U
n-Nitrosodiphenylamine	SW8270ESIM	28		130	20.9 U	15.5 U	14.5 U
Pentachlorophenol	SW8270E	400	504	690	417 U	311 U	290 U
Phenol	SW8270E	420		1200	**41.6 J**	**28.1 J**	**33.5 J**
Polycyclic Aromatic Hydrocarbons (µg/kg)							
1-Methylnaphthalene	SW8270E				83.5 U	**24.9 J**	**44.8 J**
2-Methylnaphthalene	SW8270E	670		1900	**36 J**	**40 J**	**75.1**
Acenaphthene	SW8270E	500		2000	**323**	**185**	**1340**
Acenaphthylene	SW8270E	560		1300	**36.7 J**	**27.6 J**	**38.1 J**
Anthracene	SW8270E	960		13000	**454**	**448**	**912**
Benzo(a)anthracene	SW8270E	1300		5100	**2250**	**1860 J**	**3310**
Benzo(a)pyrene	SW8270E	1600		3600	**2910**	**2320 J**	**4060**
Benzo(b,j,k)fluoranthenes	SW8270E				**5340**	**4110**	**6580**
Benzo(g,h,i)perylene	SW8270E	670		3200	**1080**	**1020 J**	**1240**
Carbazole	SW8270E				**207**	**210**	**331**
Chrysene	SW8270E	1400		21000	**3710**	**2930 J**	**5130**
Dibenzo(a,h)anthracene	SW8270E	230		1900	**402**	**374 J**	**414**
Dibenzofuran	SW8270E	540		1700	**61.5 J**	**54.3 J**	**126**
Fluoranthene	SW8270E	1700	4600	30000	**5780**	**5800 J**	**10200**
Fluorene	SW8270E	540		3600	**67.1 J**	**103**	**209**
Indeno(1,2,3-c,d)pyrene	SW8270E	600		4400	**1150**	**1070**	**1390**
Naphthalene	SW8270E	2100		2400	**66.3 J**	**51.7 J**	**113**
Phenanthrene	SW8270E	1500		21000	**2910**	**3060 J**	**5270**
Pyrene	SW8270E	2600	11980	16000	**5000**	**4720 J**	**8870**
Total Benzofluoranthenes (b,j,k) (U = 0)		3200		9900	**5340**	**4110**	**6580**
Total HPAH (DMMP) (U = 0)		12000		69000	**28000**	**24000 J**	**41200**
Total LPAH (DMMP) (U = 0)		5200		29000	**3860 J**	**3880 J**	**7880 J**
Pesticides (µg/kg)							
2,4'-DDD (o,p'-DDD)	SW8081B				208 U	136 U	181 U
2,4'-DDE (o,p'-DDE)	SW8081B				5.21 U	3.88 U	3.62 U
2,4'-DDT (o,p'-DDT)	SW8081B				5.21 U	3.88 U	3.62 U
4,4'-DDD (p,p'-DDD)	SW8081B	16			224 U	97.1 UJ	217 U
4,4'-DDE (p,p'-DDE)	SW8081B	9			**26.2**	**10.8**	**25.6**
4,4'-DDT (p,p'-DDT)	SW8081B	12			5.21 U	3.88 U	181 U

Table 2

Composite Sediment Core Sample Analytical Results Compared to DMMP Criteria

				Task	**MBYC_2023**	**MBYC_2023**	**MBYC_2023**
				Location ID	**DU-1A-20230919**	**DU-2A-20230919**	**DU-3A-20230919**
				Sample ID	**DU-1A-20230919**	**DU-2A-20230919**	**DU-3A-20230918**
				Sample Date	**9/19/2023**	**9/19/2023**	**9/18/2023**
				Depth	**0 - 2 ft**	**0 - 1.8 ft**	**0 - 2.8 ft**
				Sample Type	**N**	**N**	**N**
				Matrix	**SE**	**SE**	**SE**
		DMMPSL2021	**DMMPBT2021**	**DMMPML2021**			
Aldrin	SW8081B	9.5			2.6 U	1.94 U	1.81 U
Chlordane, alpha- (Chlordane, cis-)	SW8081B				2.6 U	1.94 U	1.81 U
Chlordane, beta- (Chlordane, trans-)	SW8081B				**24.5**	**13.2 J**	**32.2**
Dieldrin	SW8081B	1.9		1700	5.21 U	3.88 U	3.62 U
Endrin ketone	SW8081B				5.21 U	3.88 U	3.62 U
Heptachlor	SW8081B	1.5		270	2.6 U	1.94 U	1.81 U
Hexachlorocyclohexane (BHC), beta-	SW8081B				2.6 U	1.94 UJ	1.81 U
Nonachlor, cis-	SW8081B				208 U	69.9 U	149 U
Nonachlor, trans-	SW8081B				**27.7**	**12.9**	**34.5**
Oxychlordane	SW8081B				5.21 U	3.88 U	3.62 U
Sum 4,4 DDT, DDE, DDD (U = 0)			50	69	**26.2**	**10.8 J**	**25.6**
Total Chlordane (DMMP) (U = 0)		2.8	37		**52.2**	**26.1 J**	**66.7**
Dioxin Furans (ng/kg)							
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	E1613B				**2.05**	0.339 U	0.625 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	E1613B				**11.9**	**6.17**	**10.2**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	E1613B				**14.4**	**7.49**	**12.4**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	E1613B				**55.9**	**27.2**	**53**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	E1613B				**32.3**	**16.7**	**28.2**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	E1613B				**1090**	**628**	**1150**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	E1613B				**7540 J**	**4770 J**	**8920 J**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	E1613B				**28.6**	**4.69 J**	**17.5**
Total Pentachlorodibenzo-p-dioxin (PeCDD)	E1613B				**58.2**	**27.3 J**	**47.6**
Total Hexachlorodibenzo-p-dioxin (HxCDD)	E1613B				**422**	**245**	**406**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	E1613B				**2460**	**1510**	**2660**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	E1613B				**11.5 J**	**6.01 J**	**8.13 J**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	E1613B				**8.54**	**3.52**	**8.12**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	E1613B				**9.33**	**4.12 J**	**9.03 J**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	E1613B				**23.7**	**10.1**	**24.7**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	E1613B				**21.2**	**10**	**22**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	E1613B				**7.73**	**4.03**	**8.66**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	E1613B				**19 J**	**6.82**	**12.9**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	E1613B				**277**	**157**	**351**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	E1613B				**17.6**	**11.7**	**22.4**
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	E1613B				**412**	**270**	**318**
Total Tetrachlorodibenzofuran (TCDF)	E1613B				**159**	**52.5**	**86.4**
Total Pentachlorodibenzofuran (PeCDF)	E1613B				**266**	**110 J**	**138**
Total Hexachlorodibenzofuran (HxCDF)	E1613B				**536**	**289**	**596**
Total Heptachlorodibenzofuran (HpCDF)	E1613B				**737**	**408**	**903**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)		4	10		**51.8 J**	**26 J**	**48.5 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)		4	10		**51.8 J**	**26 J**	**48.2 J**
PCB Aroclors (µg/kg)							
Aroclor 1016	SW8082A				20.9 U	15.5 U	14.5 U
Aroclor 1221	SW8082A				20.9 U	15.5 U	14.5 U
Aroclor 1232	SW8082A				20.9 U	15.5 U	14.5 U
Aroclor 1242	SW8082A				20.9 U	15.5 U	14.5 U

Table 2
Composite Sediment Core Sample Analytical Results Compared to DMMP Criteria

					Task	MBYC_2023	MBYC_2023	MBYC_2023
					Location ID	DU-1A-20230919	DU-2A-20230919	DU-3A-20230919
					Sample ID	DU-1A-20230919	DU-2A-20230919	DU-3A-20230918
					Sample Date	9/19/2023	9/19/2023	9/18/2023
					Depth	0 - 2 ft	0 - 1.8 ft	0 - 2.8 ft
					Sample Type	N	N	N
					Matrix	SE	SE	SE
		DMMPSL2021	DMMPBT2021	DMMPML2021				
Aroclor 1248	SW8082A					**212**	**78.5 J**	**127 J**
Aroclor 1254	SW8082A					**305 J**	**159**	**133**
Aroclor 1260	SW8082A					**130**	**86.5**	**95**
Total DMMP PCB Aroclors (U = 0)		130		3100		**650 J**	**324 J**	**355 J**
PCB Aroclors (mg/kg-OC)								
Total DMMP PCB Aroclors (U = 0)			38			**3.7 J**	**2.49 J**	**2.16 J**

Notes:
Detected concentration is greater than DMMPSL2021 screening level
Detected concentration is greater than DMMPBT2021 screening level
Detected concentration is greater than DMMPML2021 screening level
Bold: Detected result
Calculated values have been rounded to laboratory-reported significant digits.
J: Estimated value
U: Compound analyzed for, but not detected above detection limit
UJ: Compound analyzed for, but not detected above estimated detection limit

Table 3

Discrete Sediment Core Sample Analytical Results Compared to DMMP Criteria

					Task	MBYC_2023	MBYC_2023	MBYC_2023	MBYC_2023	MBYC_2023	MBYC_2023
					Location ID	C-1-A-20230919	C-2-A-20230919	C-3-A-20230919	C-4-A-20230919	C-5-A-20230919	C-6-A-20230919
					Sample ID	C-1-A-20230919	C-2-A-20230919	C-3-A-20230919	C-4-A-20230919	C-5-A-20230919	C-6-A-20230919
					Sample Date	9/19/2023	9/19/2023	9/19/2023	9/19/2023	9/19/2023	9/19/2023
					Depth	0 - 1.6 ft	0 - 1.4 ft	0 - 3 ft	0 - 2.8 ft	0 - 1.5 ft	0 - 1.1 ft
					Sample Type	N	N	N	N	N	N
					Matrix	SE	SE	SE	SE	SE	SE
					X	122.2091369	122.2087499	122.2079577	122.2085854	122.2079996	122.2076603
					Y	47.60853875	47.60812778	47.6078145	47.60904344	47.60880553	47.60840789
		DMMPSL2021	DMMPBT2021	DMMPML2021							
Conventional Parameters (pct)											
Total solids	D2216					**15.21**	**15.84**	**25.97**	**31.62**	**26.77**	**20.67**
Dioxin Furans (ng/kg)											
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD	E1613B					**2.27**	**1.55 EMPC**	1.05 U	**0.95 J**	0.704 U	0.957 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (Pe(	E1613B					**5.81 EMPC**	**10**	**12.6 EMPC**	**8.08**	**2.05 EMPC**	**7.17**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (H>	E1613B					**8.8**	**15.1**	**17.4**	**11.8**	**2.56**	**11.3**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (H>	E1613B					**34.5**	**50.4**	**59.6**	**36**	**28.5**	**35.7**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (H>	E1613B					**15.9**	**32.4**	**39.6**	**22.4**	**7.66**	**23.8**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	E1613B					**968**	**1080**	**973**	**731**	**909**	**950**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	E1613B					**8100**	**8650**	**6860**	**5860**	**7530**	**7080**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	E1613B					**12**	**23.5**	**14.2**	**3.59**	**6.7**	0 U
Total Pentachlorodibenzo-p-dioxin (PeCDD	E1613B					**8.5**	**46.3**	**25.5**	**30.6**	**6.81**	**9.63**
Total Hexachlorodibenzo-p-dioxin (HxCDD	E1613B					**524**	**505**	**444**	**385**	**203**	**529**
Total Heptachlorodibenzo-p-dioxin (HpCD	E1613B					**4720**	**3120**	**1930**	**1810**	**1910**	**3140**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	E1613B					**10.3**	**9.11**	**10.1**	**5.32 EMPC**	**1.81 EMPC**	**4.1 EMPC**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	E1613B					**5.03**	**5.6**	**6.17**	**4.42**	**1.35**	**3.53**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	E1613B					**7.76**	**5.95**	**7.51**	**3.99**	**1.99 EMPC**	**4.17 EMPC**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDI	E1613B					**21.7**	**16.7**	**19.1**	**11**	**10**	**10.6**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDI	E1613B					**11.3**	**14.2**	**16.9**	**10.7**	**11.5**	**9.6**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDI	E1613B					**5.16 EMPC**	**4.78**	**4.63**	**2.65**	**2.01**	**2.72 EMPC**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDI	E1613B					**8.5 EMPC**	**8.38**	**12.1**	**7.05**	**10.1**	**5.27**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (Hp(	E1613B					**177**	**201**	**232**	**164**	**317**	**149**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (Hp(	E1613B					**11.4**	**13.2**	**15**	**11.6**	**11.6**	**10.7 EMPC**
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OC	E1613B					**201**	**336**	**344**	**269**	**434**	**251**
Total Tetrachlorodibenzofuran (TCDF)	E1613B					**97.2**	**114**	**135**	**53.2**	**33.7**	**45.4**
Total Pentachlorodibenzofuran (PeCDF)	E1613B					**192**	**186**	**186**	**95.9**	**74.7**	**65.6**
Total Hexachlorodibenzofuran (HxCDF)	E1613B					**312**	**409**	**455**	**364**	**353**	**281**
Total Heptachlorodibenzofuran (HpCDF)	E1613B					**442**	**533**	**573**	**432**	**715**	**378**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)		4	10			**36.2292**	**44.2478**	**47.8673**	**31.9563 J**	**25.2187**	**32.6107**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)		4	10			**36.2292**	**44.2478**	**47.3423**	**31.9563 J**	**24.8667**	**32.1322**

Notes:

Detected concentration is greater than DMMPSL2021 screening level

Detected concentration is greater than DMMPBT2021 screening level

Detected concentration is greater than DMMPML2021 screening level

Bold: Detected result

Calculated values have been rounded to laboratory-reported significant digits.

J: Estimated value

U: Compound analyzed for, but not detected above detection limit

Table 4

Sediment Core Z-Sample Analytical Results Compared to SMS Criteria

			Task	**MBYC_2023**	**MBYC_2024**	**MBYC_2024**	**MBYC_2024**	**MBYC_2024**
			Location ID	**C-3-Z-20230919**	**DU-1Z-20230919**	**DU-2Z-20230919**	**DU-2Z-20230919**	**DU-3Z-20230918**
			Sample ID	**C-3-Z-20230919**	**DU-1Z-20230919**	**DU-2Z-20230919**	**DU-2Z-20230919-RE**	**DU-3Z-20230918**
			Sample Date	**9/19/2023**	**8/16/2024**	**8/16/2024**	**8/16/2024**	**8/16/2024**
			Depth	**3 - 5 ft**	**2 - 4 ft**	**1.8 - 3.8 ft**	**1.8 - 3.8 ft**	**2.8 - 4.8 ft**
			Sample Type	**N**	**N**	**N**	**N**	**N**
			Matrix	**SE**	**SE**	**SE**	**SE**	**SE**
			X	**122.2079577**				
			Y	**47.6078145**				
		SMS_Fresh_SCO_SCUMII_2019	**SMS_Fresh_CSL_SCUMII_2019**					
Conventional Parameters (pct)								
Total organic carbon	SW9060AM			**10.6**	**22.4**	**19.1**	--	**35.3**
Total solids	D2216			**18.97**	**14.33**	**20.65**	--	**10.55**
Total solids	SM2540G			**19.89**	**13.72**	**20.86**	--	**10.52**
Metals (mg/kg)								
Mercury	SW7471B	0.66	0.8	**0.298**	**0.32**	**0.212**	--	**0.181 J**
Zinc	SW6020	3200	4200	**268**	**262**	**51**	--	56.2 U
Semivolatile Organics (µg/kg)								
Bis(2-ethylhexyl)phthalate	SW8270E	500	22000	--	**6840**	**373**	--	49.9 U
Butylbenzyl phthalate	SW8270E			--	**349**	132 U	--	20.0 U
Polycyclic Aromatic Hydrocarbons (µg/kg)								
1-Methylnaphthalene	SW8270E			50.3 U	99.6 U	132 U	--	20.0 U
2-Methylnaphthalene	SW8270E			**120**	**63.6 J**	132 U	--	20.0 U
Acenaphthene	SW8270E			**442**	**177**	132 U	--	20.0 U
Acenaphthylene	SW8270E			50.3 U	99.6 U	132 U	--	20.0 U
Anthracene	SW8270E			**1930**	**843**	132 U	--	20.0 U
Benzo(a)anthracene	SW8270E			--	**1120**	132 U	--	20.0 U
Benzo(a)pyrene	SW8270E			--	**665**	132 U	--	20.0 U
Benzo(b,j,k)fluoranthenes	SW8270E			--	**1570**	263 U	--	39.9 U
Benzo(g,h,i)perylene	SW8270E			--	**633**	132 U	--	20.0 U
Chrysene	SW8270E			--	**1570**	**95.3 J**	--	20.0 U
Dibenzo(a,h)anthracene	SW8270E			--	99.6 U	132 U	--	20.0 U
Fluoranthene	SW8270E			--	**9020**	**174**	--	**16.3 J**
Fluorene	SW8270E			**176**	99.6 U	132 U	--	20.0 U
Indeno(1,2,3-c,d)pyrene	SW8270E			--	**524**	132 U	--	20.0 U
Naphthalene	SW8270E			**90.4**	99.6 U	132 U	--	20.0 U
Phenanthrene	SW8270E			**7610**	**4030**	132 U	--	20.0 U
Pyrene	SW8270E			--	**6560**	**176**	--	**16.9 J**
Total PAH (SMS Freshwater 2019) (U = 0 max limit)		17000	30000	**10000**	**26800 J**	**445 J**	--	**33.2 J**
Pesticides (µg/kg)								
2,4'-DDD (o,p'-DDD)	SW8081B			10.0 U	**27.4 J**	61.9 U	--	9.99 U
2,4'-DDE (o,p'-DDE)	SW8081B			10.0 U	46.8 U	61.9 U	--	9.99 U
2,4'-DDT (o,p'-DDT)	SW8081B			10.0 U	46.8 U	61.9 U	--	9.99 U
4,4'-DDD (p,p'-DDD)	SW8081B			**276**	--	--	--	--
4,4'-DDE (p,p'-DDE)	SW8081B			**84.5 J**	**42.3 J**	61.9 U	--	9.99 U
4,4'-DDT (p,p'-DDT)	SW8081B			10.0 U	--	--	--	--
Chlordane, alpha- (Chlordane, cis-)	SW8081B			**77.7**	**24.3**	**15.7 J**	--	4.99 U
Chlordane, beta- (Chlordane, trans-)	SW8081B			**92.9 J**	**34.2**	30.9 U	--	4.99 U
Nonachlor, cis-	SW8081B			10.0 U	46.8 U	61.9 U	--	9.99 U
Nonachlor, trans-	SW8081B			10.0 U	46.8 U	61.9 U	--	9.99 U
Oxychlordane	SW8081B			10.0 U	46.8 U	61.9 U	--	9.99 U
Sum DDD (U = 0 max limit)		310	860	**276**	**27.4 J**	61.9 U	--	9.99 U
Sum DDE (U = 0 max limit)		21	33	**84.5 J**	**42.3 J**	61.9 U	--	9.99 U
Sum DDT (U = 0 max limit)		100	8100	10.0 U	46.8 U	61.9 U	--	9.99 U

Table 4

Sediment Core Z-Sample Analytical Results Compared to SMS Criteria

			Task	**MBYC_2023**	**MBYC_2024**	**MBYC_2024**	**MBYC_2024**	**MBYC_2024**
			Location ID	**C-3-Z-20230919**	**DU-1Z-20230919**	**DU-2Z-20230919**	**DU-2Z-20230919**	**DU-3Z-20230918**
			Sample ID	**C-3-Z-20230919**	**DU-1Z-20230919**	**DU-2Z-20230919**	**DU-2Z-20230919-RE**	**DU-3Z-20230918**
			Sample Date	**9/19/2023**	**8/16/2024**	**8/16/2024**	**8/16/2024**	**8/16/2024**
			Depth	**3 - 5 ft**	**2 - 4 ft**	**1.8 - 3.8 ft**	**1.8 - 3.8 ft**	**2.8 - 4.8 ft**
			Sample Type	**N**	**N**	**N**	**N**	**N**
			Matrix	**SE**	**SE**	**SE**	**SE**	**SE**
			X	**122.2079577**				
			Y	**47.6078145**				
		SMS_Fresh_SCO_SCUMII_2019	**SMS_Fresh_CSL_SCUMII_2019**					
Dioxin Furans (ng/kg)								
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	E1613B			**6.05**	**2.64**	1.69 U	--	0.434 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	E1613B			**18.8**	**7.94 EMPC**	1.64 U	--	0.813 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	E1613B			**19.2 EMPC**	**10.7**	1.60 U	--	0.953 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	E1613B			**81.1**	**38**	1.65 U	--	**0.839 J**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	E1613B			**45.6**	**23.5 EMPC**	1.76 U	--	1.03 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	E1613B			**1710**	**774**	**20.2**	--	**15.5**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	E1613B			**13400**	**6670**	**254**	--	**182**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	E1613B			**45.5**	**20.8**	0 U	--	**1.66 J**
Total Pentachlorodibenzo-p-dioxin (PeCDD)	E1613B			**84.9**	**17.7**	0 U	--	0 U
Total Hexachlorodibenzo-p-dioxin (HxCDD)	E1613B			**609**	**265**	**3.8**	--	**4.02**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	E1613B			**3790**	**1870**	**48.8**	--	**34.4**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	E1613B			**39.1**	**17.5**	2.76 U	--	0.632 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	E1613B			**14.8**	**6.23**	1.33 U	--	0.621 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	E1613B			**22.7**	**10.5**	1.39 U	--	**0.744 JEMPC**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	E1613B			**67.5**	**27.6**	1.03 U	--	0.489 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	E1613B			**44.7**	**19.1**	1.03 U	--	0.464 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	E1613B			**15.1**	**6.55 EMPC**	1.48 U	--	0.680 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	E1613B			**46.1**	**20.1**	1.08 U	--	0.482 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	E1613B			**568**	**223**	**8.50 EMPC**	--	**6.68**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	E1613B			**35.4**	**13.2**	1.82 U	--	1.49 U
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	E1613B			**840**	**309**	**14.6**	--	**3.67 J**
Total Tetrachlorodibenzofuran (TCDF)	E1613B			**511**	**187**	0 U	--	0 U
Total Pentachlorodibenzofuran (PeCDF)	E1613B			**864**	**308**	**17.4**	--	**8.43**
Total Hexachlorodibenzofuran (HxCDF)	E1613B			**1020**	**421**	**19**	--	**10.6**
Total Heptachlorodibenzofuran (HpCDF)	E1613B			**1350**	**532**	0 U	--	**6.68**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0 max limit)				**95**	**42.4**	**0.368**	--	**0.585 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2 max limit)				**95**	**42.4**	**2.89**	--	**1.46 J**
PCB Aroclors (µg/kg)								
Aroclor 1016	SW8082A			12.5 U	18.7 U	24.7 U	8.5 U	4.0 U
Aroclor 1221	SW8082A			12.5 U	18.7 U	24.7 U	8.5 U	4.0 U
Aroclor 1232	SW8082A			12.5 U	18.7 U	24.7 U	8.5 U	4.0 U
Aroclor 1242	SW8082A			12.5 U	18.7 U	24.7 U	8.5 U	4.0 U
Aroclor 1248	SW8082A			**517 J**	**273 J**	**30.9**	**16.8**	4.0 U
Aroclor 1254	SW8082A			**525 J**	**278**	**80.7 J**	8.5 U	**4.6**
Aroclor 1260	SW8082A			**284**	**121**	24.7 U	8.5 U	4.0 U
Total PCB Aroclors (SMS Freshwater 2019) (U = 0 max limit)		110	2500	**1330 J**	**672 J**	**112 J**	**16.8**	**4.6**

Notes:

present both

(yellow) Detected concentration is greater than SMS_Fresh_SCO_SCUMII_2019 screening level

(cyan) Detected concentration is greater than SMS_Fresh_CSL_SCUMII_2019 screening level

Bold: Detected result

Calculated values have been rounded to laboratory-reported significant digits

J: Estimated value

U: Compound analyzed for, but not detected above detection limit

Figures

SOURCE: National Geographic World Map - National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
HORIZONTAL DATUM: Washington State Plane North Zone, NAD83, U.S. Survey Feet

Publish Date: 2025/03/28 4:08 PM | User: jfoster
Filepath: K:\Projects\2595-Meydenbauer Yacht Club\MBYC Maintenance Dredging Eval\Sediment Characterization Report\2595-RP-001 (Vicinity Map).dwg Figure 1

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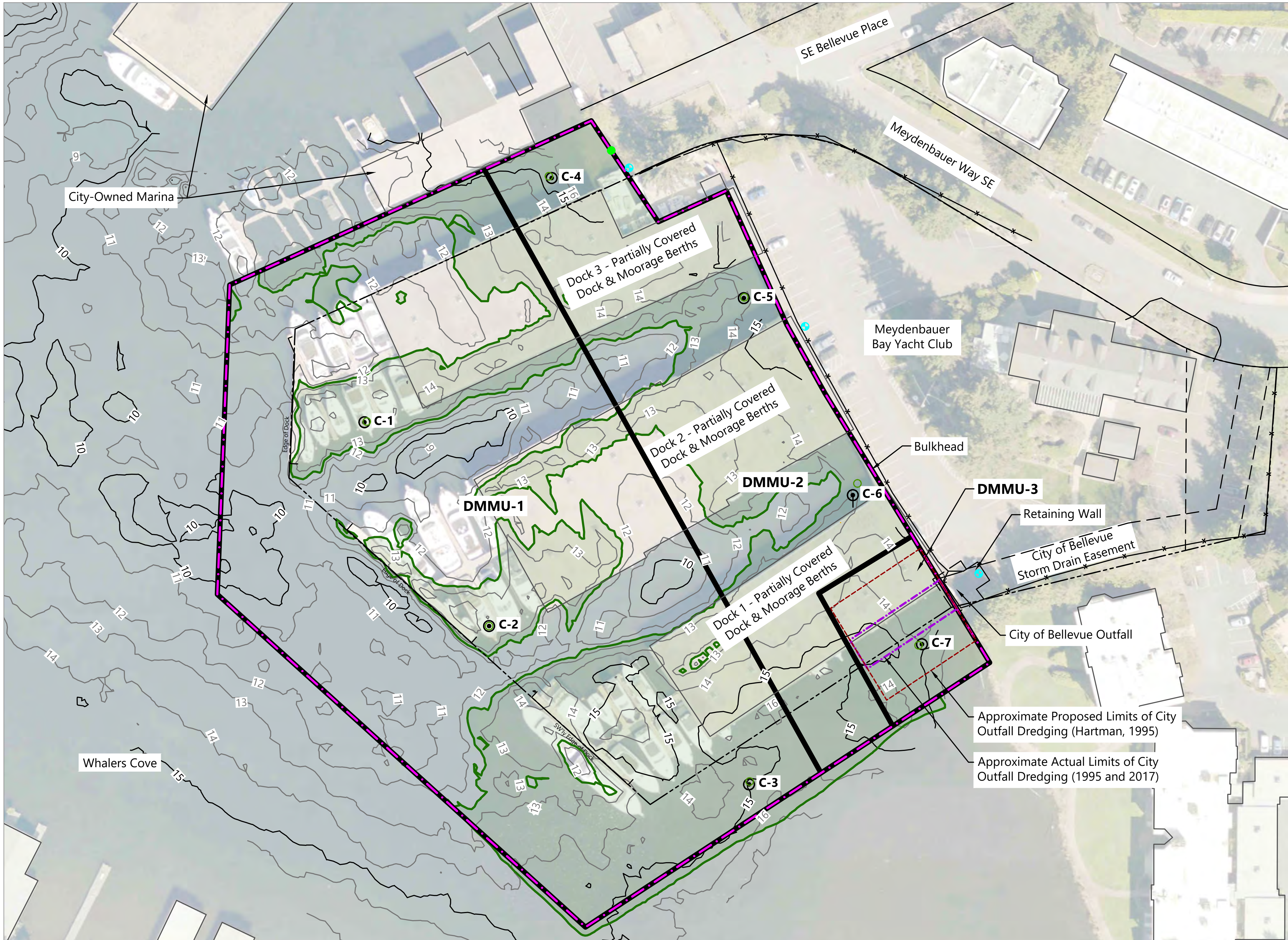
Figure 1
Vicinity Map

Sediment Characterization Report
MBYC Maintenance Dredging Evaluation



LEGEND:

- Meydenbauer Bay Yacht Club Property Line
- Footprint of 1965 MBYC Dredging
- Footprint of 1995 and 2017 City Outfall Dredging
- Proposed Footprint of 1995 City Outfall Dredging
- Dredge Material Management Unit (DMMU)
- Storm Drain Easement
- 6' Chain Link Fence
- Existing Contours (1' & 5' Intervals)
- Area of Sediment Shoaling Evaluated for Maintenance Dredging
- Proposed Sediment Sampling Location
- Actual Sediment Sampling Locations
- Storm Drain Discharge Point
- Sewer Overflow Discharge Point

SOURCE: Aerial photograph from King County, dated 2021. Property survey conducted by True North Land Surveying, dated July 12, 2022. Hydrographic survey conducted by Gravity Marine on May 12, 2022.
HORIZONTAL DATUM: Washington State Plane North Zone, NAD83, U.S. Survey Feet
VERTICAL DATUM: Corps of Engineers Lake Washington

0 80
Feet

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Filepath: K:\Projects\2595-Meydenbauer Yacht Club\MBYC Maintenance Dredging Eval\Sediment Characterization Report\2595-RP-002 (Proposed and Actual Sampling Locations).dwg Figure 2

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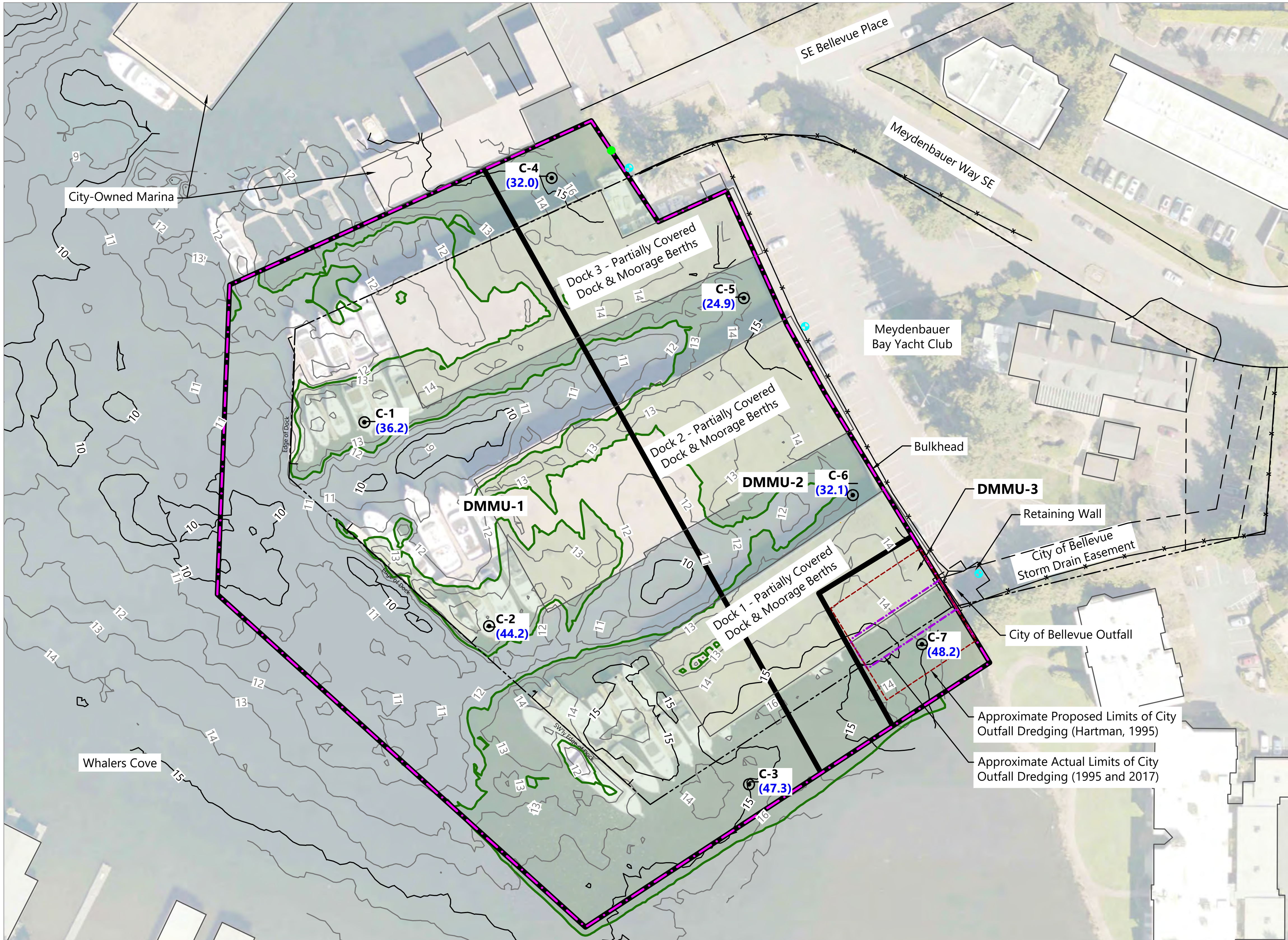
Figure 2
Proposed and Actual Sampling Locations



LEGEND:

- Meydenbauer Bay Yacht Club Property Line
- Footprint of 1965 MBYC Dredging
- Footprint of 1995 and 2017 City Outfall Dredging
- Proposed Footprint of 1995 City Outfall Dredging
- Dredge Material Management Unit (DMMU)
- Storm Drain Easement
- 6' Chain Link Fence
- 12 Existing Contours (1' & 5' Intervals)
- Area of Sediment Shoaling Evaluated for Maintenance Dredging
- Actual Sediment Sampling Location
- (32.1) Dioxin/Furan TEQ concentrations (ng/kg) in A-Layer Subsurface Sediments as Measured in Discrete Samples
- Storm Drain Discharge Point
- Sewer Overflow Discharge Point

SOURCE: Aerial photograph from King County, dated 2021. Property survey conducted by True North Land Surveying, dated July 12, 2022. Hydrographic survey conducted by Gravity Marine on May 12, 2022.
HORIZONTAL DATUM: Washington State Plane North Zone, NAD83, U.S. Survey Feet
VERTICAL DATUM: Corps of Engineers Lake Washington

0 80
Feet

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Filepath: K:\Projects\2595-Meydenbauer Yacht Club\MBYC Maintenance Dredging Eval\Sediment Characterization Report\2595-RP-003 (Results of Dioxin Furan).dwg Figure 3

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Figure 3
Results of Dioxin/Furan Testing in Discrete Core Samples

Appendix A
Sampling and Analysis Plan

Appendix B
Field Forms and Photographs

Appendix C
Laboratory Analytical Report

File included as separate attachment

Appendix D
Data Validation Report