Prepared by:
Dredged Material Management Office
Seattle District, U.S. Army Corps of Engineers

MEMORANDUM FOR: RECORD **August 8, 2019**

SUBJECT: DETERMINATION REGARDING THE SUITABILITY OF PROPOSED DREDGED MATERIAL FROM THE NORTH MERCER ISLAND INTERCEPTPR AND ENATAI INTERCEPTOR UPGRADE PROJECT FOR OPEN-WATER DISPOSAL AT THE ELLIOTT BAY NON-DISPERSIVE SITE.

1. **Introduction**. This memorandum reflects the consensus determination of the Dredged Material Management Program (DMMP) agencies (U.S. Army Corps of Engineers, Washington Departments of Ecology and Natural Resources, and the Environmental Protection Agency) regarding the suitability of up to 32,000 cubic yards (CY) of dredged material parallel to and north of the I-90 bridge at the east channel of Lake Washington for open-water disposal. Proposed disposal is at the Elliott Bay open-water disposal site.

2. **Background**. The North Mercer Island and Enatai Interceptors are part of King County's regional wastewater system that convey wastewater from North Mercer Island, the southwest portion of the City of Bellevue, and the Town of Beaux Arts Village. The existing system, constructed in the 1960s, is not providing the level of service that meets County standards. King County is planning upgrades to the two interceptors to support current peak and future projected wastewater flows.

   As part of this project, the County proposes to install a new buried conveyance system across the East Channel between North Mercer Island and the eastern shore of Lake Washington (Figures 1 and 2). A continuous trench will be dredged/excavated across the channel and backfilled with approximately 2 feet of cover material after the new pipeline has been installed. In the process, the County proposes to dispose of an estimated 12,124 CY of excess material at the Elliott Bay open-water disposal site.

   The dredge length for the trench in which new pipes and cables will be laid spans approximately 1,400 feet with a target depth of 4 feet below mudline. The County estimates that 7,846 CY of the total proposed excess material proposed for open-water will come from the top 4 feet; the remaining 4,327 CY will be derived from subsurface material deeper than 4 feet below mudline (Figure 3).

   Dredging for this project will likely be performed using a barge-mounted crane and a clamshell bucket. The material will be placed into a bottom-dump barge and transported to the Elliott Bay open-water disposal site from Lake Washington through the Ballard Locks.

3. **Project Summary**. Table 1 below provides project summary and tracking information.

Table 1. Project Summary

Project ranking	Moderate
Proposed surface layer dredging volume (0 to 4 feet)	7,846 CY

Proposed subsurface dredging volume (4-7 ft)	4,327 CY
Proposed total dredging volume	12,124 CY
Characterized Volume	16,000 CY
Proposed dredging depth (ft below mudline)	4 ft
Proposed subsurface dredging depth	Varies, depth not provided.
SAP received	August 10, 2017
DMMP comments on 1st draft	November 24, 2017
SAP approved[1]	Not approved; SAP was prepared after sampling occurred
Sampling date[1]	August 10, 2016
Draft Sediment Characterization Report (SCR) received	August 10, 2018
DMMP comments on 1st draft SCR	September 7, 2018
Second draft SCR received	June 14, 2019
DMMP comments on 2nd draft SCR	June 25, 2019
Final SCR received	June 26, 2019
SCR approved	June 25, 2019
DMMO tracking number	NMERC-1-A-F-389
EIM study ID	NMERC16
Recency Determination (moderate rank = 5 years)	August 2021

4. **Project Ranking and Sampling Requirements**. Sediments in Lake Washington are currently ranked "moderate" (DMMP, 2016). For a moderate-ranked project with heterogeneous sediment, the number of samples and analyses are calculated using the following guidelines (DMMP, 2016):
   - Maximum volume of sediment represented by each field sample = 4,000 cy
   - Maximum volume of sediment represented by each composite sample = 16,000 cy

   The sampling frequency meets the DMMP requirements. The project proponent chose to subdivide the project into two DMMUs, representing a surface (NME:0-4C) and subsurface (NME:4-8C) layer respectively. Four samples were collected and composited to form each DMMU composite. The number of field samples (4) was selected by the County's consultant based on 2014 geotechnical survey data. Assuming heterogeneous sediment, the maximum volume allowed for a moderate-ranked surface and subsurface DMMUs is 16,000 and 24,000 CY, respectively. Given the number of field samples and the maximum sediment volume represented by a single field sample (4,000 CY), each DMMU will be sufficiently sampled to represent up to 16,000 CY per DMMU or 32,000 CY for the entire project. Given the age of the bathymetric survey data (2014) and likelihood of some additional deposition since that survey, the DMMP agencies recommend that the full maximum possible characterization volume of 32,000 CY be considered for this suitability evaluation.

5. **Sampling & Analysis**. It should be noted that sampling and analysis were conducted without preparing and submitting a Sampling and Analysis Plan (SAP) to the DMMP agencies for review and approval. The DMMP strongly discourages this decision, as chemical data generated by a project

[1] The consultant conducted sampling before the SAP was finalized and approved by the DMMP agencies.

without an approved SAP may be insufficient for the DMMP agencies to provide a suitability determination. Furthermore, overall project costs may be increased by the need for additional sampling and analysis to fulfil the DMMP-required analyses.

Sampling occurred August 10, 2016 at the four locations NME-17, NME-18, NME-19, and NME-20 shown in Figure 4. Sediment coring location details are summarized in Table 2. Sediment cores were collected by Holt, Inc. using sonic drilling. Borings were drilled to depths ranging from 15.8 to 16.5 feet below mudline.

The field samples from the four surface (mudline to 4 ft depth) and subsurface (4 to 7 ft depth) intervals were composited into two DMMU samples (NME:0-4C and NME:4-7C) prior to delivery to the laboratory for analysis (Table 3).

Fremont Analytical analyzed the two sediment DMMU samples for metals, pesticides, polychlorinated biphenyls (PCBs), and semi-volatile organic compounds. Dioxins/furans and tributyltin analyses were subcontracted to Analytical Resources, Inc.

6. **Sediment Chemistry Results.** The chemical results for the two DMMU composite samples are summarized in Tables 4 and 5. The two DMMU composites were analyzed for grain size, but the remaining required conventional analyses (total organic carbon, total solids, total volatile solids, ammonia, and sulfides) were omitted, likely due to the lack of pre-sampling coordination with the DMMP. All chemical data were compared to DMMP marine screening levels for evaluation for open-water placement in a marine environment.

   Data Validation Findings. All data were reviewed for quality control and quality assurance procedures. Multiple elevated non-detect reporting limits were flagged during data validation, but the elevated reporting limits were still below the DMMP marine screening levels. One chemical, pentachlorophenol, was flagged rejected by the data validator due to poor recovery in the Laboratory Control Sample (LCS).

   Puget Sound Sediment Reference Material (PS-SRM) was analyzed within batch with the samples for dioxin/furan analyses. All PS-SRM congener results were within the DMMP-recommended quality control limits except for 1,2,3,7,8,9-HxCDF; any associated detects were considered estimated, biased high.

   Sediment Conventionals. As mentioned previously, grain size was the only conventional measured. The missing conventional analyses were: Total organic carbon (TOC), total solids (TS), Total volatile solids (TVS), ammonia, and sulfides.

   Grain size was measured individually for each core (not by DMMU composite). The grain size results indicate that the proposed dredged material is primarily gravel (7 to 56%) and sand (28 to 74%) with fines (silt and clay) ranging from 15 to 27%.

   Standard Marine DMMP Chemicals of Concern. Metals and some semi-volatile organic chemicals were detected at low levels, but not in excess of the screening levels. All non-detect reporting limits were below marine screening levels

Pentachlorophenol data was rejected in both DMMUs due to poor LCS recovery. However, given that other chlorinated COCs were either not detected (PCB Aroclors) or detected at very low concentrations (dioxins; see below), the likelihood of concentrations of PCP at levels of concern is low.

Organometallics. Tributyltin (TBT) was not detected at concentrations well below the Bioaccumulation Trigger (BT). There is no DMMP SL for TBT.

Dioxins/furans. The dioxin/furan toxicity equivalents (TEQ, with U = ½ estimated reporting limit) for NME 0-4C and NME 4-7C were 1.12 and 1.05 parts per trillion (pptr) TEQ, respectively. Both results are well below the 4 pptr disposal site management objective for dredging projects in Puget Sound. The DMMP agencies concur that the material from both DMMUs passes the DMMP dioxin/furan guidelines for open-water disposal in Puget Sound.

7. **Biological Testing**. There were no marine SL exceedances for the standard COCs. No marine bioaccumulation triggers were exceeded. Therefore, bioassays and bioaccumulation testing are not required.

8. **Sediment Exposed by Dredging**. Sediment exposed by dredging must meet either the State of Washington Sediment Quality Standards (SQS) (Ecology, 2013) or the State's anti-degradation standard (DMMP, 2008b). The project proposes to backfill the excavated trench after the new pipeline is installed; thus, no new surface will be exposed.

9. **Debris Management Evaluation**. The DMMP agencies implemented a debris screening requirement following the 2015 SMARM in order to prevent the disposal of solid waste and large debris at open-water disposal sites in Puget Sound (DMMP, 2015). The following information was used to evaluate current debris concerns and debris management practices.

   Geographically, the project area is located immediately north of the East Channel Bridge of Interstate 90. The current interstate highway bridges, constructed in 1980 and 1988, replaced the original wooden bridge. The original wooden bridge, constructed in1923, consisted of wooden piles and trusses and was located south of the existing bridge structure, thus south of the proposed dredge area.

   Furthermore, the core logs and photos from the 2016 sampling generally showed clean sand and gravel. No indications of debris encounters were noted.

   Based on the above information, the DMMP agencies concur that the dredge area is of low concern for debris and a screening grid is not required for this project. However, if any large debris is encountered, it must be segregated and disposed of in an upland landfill or other appropriate use. At no time may any debris greater than one foot in any dimension be disposed at an open-water disposal site.

10. **Suitability Determination**.
    Based on the results of the previously described testing, the DMMP agencies have concluded that up to 32,000 CY of dredged material from the project site **are suitable for open-water disposal at the Elliott Bay non-dispersive disposal site.**

    A pre-dredge meeting with DNR, Ecology, EPA and the Corps of Engineers is required at least 7 days prior to dredging. A dredging and disposal quality control plan must be developed and submitted to the

Regulatory Branch of the Seattle District Corps of Engineers at least 7 days prior to the pre-dredge meeting. Dredging, positioning, and disposal will all need to be addressed with enough detail to provide assurance to the agencies that the dredge plan will be properly implemented.

This suitability determination does ***not*** constitute final agency approval of the project. During the public comment period that follows a public notice, the resource agencies will provide input on the overall project. A final decision will be made after full consideration of agency input, and after an alternatives analysis is done under section 404(b)(1) of the Clean Water Act.

10. References.

DMMP, 2008b. *Quality of Post-Dredge Sediment Surfaces (Updated).* A Clarification Paper Prepared by David Fox (USACE), Erika Hoffman (EPA) and Tom Gries (Ecology) for the Dredged Material Management Program, June 2008.

DMMP, 2015. *Debris Screening Requirements for Dredged Material Disposed at Open-Water Sites*. Prepared by Erika Hoffman (EPA), Celia Barton (WA DNR), and David Fox (USACE) for the DMMP agencies.

DMMP, 2016. *Dredged Material Evaluation and Disposal Procedures (User Manual)*. Prepared by the Seattle District Dredged Material Management Office for the Dredged Material Management Program, August 2016.

Ecology, 2013. *Sediment Management Standards – Chapter 173-204 WAC*. Washington State Department of Ecology, February 2013.

Tetra Tech, 2017. Draft *Sampling and Analysis Plan, East Channel,* King County Department of Natural Resources and Parks Wastewater Treatment Division, 201 South Jackson Street, MS KSC-NR-0507 Seattle, Washington. Draft dated August 10, 2017.

Shannon & Wilson, Inc., 2019. *East Channel Sediment Characterization Report*, North Mercer Island Interceptor and Enatai Interceptor Upgrade Project, King County, Washington. Prepared by Shannon & Wilson, Inc., for Tetra Tech, Inc., Dated June 26, 2019.

11. Agency Signatures.

signed copy on file in DMMO - Seattle District office

Concur:

_____ _____
Date Heather Whitney Fourie – U.S. Army Corps of Engineers, Seattle District

_____ _____
Date Erika Hoffman - Environmental Protection Agency

_____ _____
Date Laura Inouye, Ph.D. - Washington Department of Ecology

_____ _____
Date Shannon Soto - Washington Department of Natural Resources

Copies furnished:
DMMP signatories
USACE, Seattle District Regulatory
Jacob Sheppard – King County

Table 2. Sample locations, depths, and mudline elevations

Boring	Boring Depth (ft)	Boring Location				Mudline Elevation	
		Plane Coordinates		Geographic Coordinates		Mudline Elevation (KC Datum)	Mudline Elevation (NAVD88)
		Northing	Easting	Latitude	Longitude		
NME-17	**16.5**	214098	1302296	47° 34′ 43.21943″ N	122° 12′ 12.14125″ W	99.88	3.45
NME-18	**15.8**	214184	1302584	47° 34′ 44.14169″ N	122° 12′ 07.85998″ W	92.36	-4.07
NME-19	**16.4**	214284	1302919	47° 34′ 45.15613″ N	122° 12′ 03.01618″ W	75.82	-20.61
NME-20	**15.8**	214384	1303255	47° 34′ 46.25512″ N	122° 11′ 58.20848″ W	91.9	-4.53

Notes:

Average depth of trench below the mudline is approximately 8 feet.

Boring depths are below mudline.

Maximum depth of the trench below the mudline is approximately 12 feet.

ft = Feet

KC = King County

NAVD = North American Vertical Datum

N = North

W = West

Source: Table 1 of East Channel Sediment Characterization Report (Shannon & Wilson, 2019)
North Mercer Island Interceptor and Enatai Interceptor Upgrade Project

Table 3. Sample Compositing Scheme

DMMU/ Sample ID	Calculated DMMU Volume (CY)	Boring	Core Length (feet below mudline)	Elevations in KC Datum (MLLW Datum)	Mudline Elevation (ft KC Datum)	Volume Represented by Sample (CY)	Core Run No.	Material
NME:0-4C	7,846	NME-17	0′ – 4′	99.88′ – 95.88′ (5.8′ – 1.8′)	99.88	1,962	1	Surface Layer
		NME-18	0′ – 4′	92.36′ – 88.36′ (-1.72′ – -5.72′)	92.36	1,962	1	
		NME-19	0′ – 4′	75.82′ – 71.82′ (-18.26′ – -22.26′)	75.82	1,962	1	
		NME-20	0′ – 4′	91.90′ – 87.90′ (-2.18′ – -6.18′)	91.9	1,962	1	
NMW:4-7C	4,328	NME-17	4′ – 7′	95.88′ – 92.88′ (1.8′ – -1.2′)	99.88	1,082	1 & 2	Subsurface Layer
		NME-18	4′ – 7′	88.36′ – 85.36′ (-5.72′ – -8.72′)	92.36	1,082	1 & 2	
		NME-19	4′ – 7′	71.82′ – 68.82′ (-22.26′ – -25.26′)	75.82	1,082	1 & 2	
		NME-20	4′ – 7′	87.90′ – 84.90′ (-6.18′ – -9.18′)	91.9	1,082	1 & 2	

Notes:
DMMU = Dredged Material Management Unit
ID = identification
KC = King County
MLLW = mean lower low water

Source: Table 2 of East Channel Sediment Characterization Report (Shannon & Wilson, 2019)
North Mercer Island Interceptor and Enatai Interceptor Upgrade Project

Table 4. Chemical analysis results

Analyte	Analytical Method	CAS	Units	Marine DMMP SL	SMS Freshwater		*NME 0-4C*	*NME 4-7C*
					SL1	SL2	8/10/2016 11:30 AM	8/10/2016 11:50 AM
Total Metals								
Antimony	SW6020A	7440-36-0	mg/kg	150	---	---	<0.191 UJ	<0.176
Arsenic		7440-38-2	mg/kg	57	14	120	4.75	3.71
Cadmium		7440-43-9	mg/kg	5.1	2.1	5.4	<0.191	<0.176
Chromium		7440-47-3	mg/kg	260	72	88	45.9 J*	39.4
Copper		7440-50-8	mg/kg	390	400	1,200	25.2	15.0
Lead		7439-92-1	mg/kg	450	360	>1,300	3.23	2.40
Selenium		7782-49-2	mg/kg	---	11	>20	1.65	1.06
Silver		7440-22-4	mg/kg	6.1	0.57	1.7	<0.0956	<0.0882
Zinc		7440-66-6	mg/kg	410	3,200	>4,200	42.0 J+*	32.2
Mercury	SW7471B	7439-97-6	mg/kg	0.41	0.66	0.8	<0.264	<0.270
Organometallic Compounds								
Tributyltin Ion	SW8270D-SIM	36643-28-4	µg/kg	---	47	320	<3.72	<3.86
Chlorinated Hydrocarbons								
1,2,4-Trichlorobenzene	SW8270D	120-82-1	µg/kg	31	---	---	<2.52	<2.33
1,2-Dichlorobenzene		95-50-1	µg/kg	35	---	---	<4.63 UJ	<4.28
1,4-Dichlorobenzene		106-46-7	µg/kg	110	---	---	<4.17	<3.86
Hexachlorobenzene		118-74-1	µg/kg	22	--	--	<2.48 UJ	<2.29
Phthalates								
Bis (2-ethylhexyl) phthalate	SW8270D	117-81-7	µg/kg	1,300	500	22,000	<31.6	<29.2
Butyl benzyl phthalate		85-68-7	µg/kg	63	---	---	<18.2	<16.8
Diethyl phthalate		84-66-2	µg/kg	200	---	---	<3.76 UJ	<3.48 UJ
Dimethyl phthalate		131-11-3	µg/kg	71	---	---	<11.5 B*	<2.37 UJ
Di-n-butyl phthalate		84-74-2	µg/kg	1,400	380	1,000	<10	<9.26
Di-n-octyl phthalate		117-84-0	µg/kg	6,200	39	>1,100	<16.4	<15.1
Phenols								
2,4-Dimethylphenol	SW8270D	105-67-9	µg/kg	29	---	---	<3.37	<3.12 UJ
2-Methylphenol		95-48-7	µg/kg	63	---	---	<2.55 UJ	<2.36

Analyte	Analytical Method	CAS	Units	Marine DMMP SL	SMS Freshwater		*NME 0-4C*	*NME 4-7C*
					SL1	SL2	8/10/2016 11:30 AM	8/10/2016 11:50 AM
4-Methylphenol		106-44-5	µg/kg	670	260	2,000	<1.52 UJ	<1.40 UJ
Pentachlorophenol		87-86-5	µg/kg	400	1,200	>1,200	R*	R*
Phenol		108-95-2	µg/kg	420	120	210	<5.80	<5.37
Miscellaneous Extractables								
Benzoic acid		65-85-0	µg/kg	650	2,900	3,800	<612	<566 J*
Benzyl alcohol		100-51-6	µg/kg	57	---	---	<1.98	<1.83
Dibenzofuran		132-64-9	µg/kg	540	200	680	<2.46 UJ	<2.28 UJ
Diphenylamine	SW8270D	122-39-4	µg/kg	---	---	---	<3.18	<2.94
Hexachlorobutadiene		87-68-3	µg/kg	11	---	---	<3.14	<2.91 UJ
N-Nitrosodiphenylamine		86-30-6	µg/kg	28	---	---	<3.18	<2.94
Polynuclear Aromatic Hydrocarbons (PAHs)								
2-Methylnaphthalene		91-57-6	µg/kg	670	---	---	<3.09 UJ	<2.86 UJ
Acenaphthene		83-32-9	µg/kg	500	---	---	<59.8 UJ	<55.3 UJ
Acenaphthylene		208-96-8	µg/kg	560	---	---	<2.71 UJ	<2.51 UJ
Anthracene		120-12-7	µg/kg	960	---	---	<2.70 UJ	<2.50 UJ
Fluorene		86-73-7	µg/kg	540	---	---	<2.64 UJ	<2.44 UJ
Naphthalene		91-20-3	µg/kg	2,100	---	---	<33.7 UJ	<31.2 UJ
Phenanthrene		85-01-8	µg/kg	1,500	---	---	<3.88 UJ	<3.59 UJ
Total LPAH		---	µg/kg	5,200	---	---	<59.8	<55.3
Benzo(a)anthracene		56-55-3	µg/kg	1,300	---	---	<5.17	<4.78
Benzo(a)pyrene	SW8270D	50-32-8	µg/kg	---	---	---	<3.34 UJ	<3.09
Benzo(b)fluoranthene		205-99-2	µg/kg	---	---	---	<5.00 UJ	<4.62
Benzo(g,h,i)perylene		191-24-2	µg/kg	670	---	---	<4.33 UJ	<4.00 UJ
Benzo(j)fluoranthene		205-82-3	µg/kg	---	---	---	<3.58	<3.31
Benzo(k)fluoranthene		207-08-9	µg/kg	---	---	---	<3.58 UJ	<3.31
Chrysene		218-01-9	µg/kg	1,400	---	---	<5.12 UJ	<4.73
Dibenzo(a,h)anthracene		53-70-3	µg/kg	230	---	---	<2.55 UJ	<2.36 UJ
Fluoranthene		206-44-0	µg/kg	1,700	---	---	<6.39	<5.91
Indeno(1,2,3-cd)pyrene		193-39-5	µg/kg	600	---	---	<4.02 UJ	<3.72 UJ
Pyrene		129-00-0	µg/kg	2,600	---	---	<26.0	<24.1
Total HPAH		---	µg/kg	12,000	17,000	30,000	<26.0	<24.1
Polychlorinated Biphenyls (PCBs)								
Aroclor-1016	SW8082	12674-11-2	µg/kg	---	---	---	<6.11 UJ	<5.72

Analyte	Analytical Method	CAS	Units	Marine DMMP SL	SMS Freshwater		*NME 0-4C*	*NME 4-7C*
					SL1	SL2	8/10/2016 11:30 AM	8/10/2016 11:50 AM
Aroclor-1221		11104-28-2	µg/kg	---	---	---	<6.11	<5.72
Aroclor-1232		11141-16-5	µg/kg	---	---	---	<6.11	<5.72
Aroclor-1242		53469-21-9	µg/kg	---	---	---	<6.11	<5.72
Aroclor-1248		12672-29-6	µg/kg	---	---	---	<6.11	<5.72
Aroclor-1254		11097-69-1	µg/kg	---	---	---	<6.11	<5.72
Aroclor-1260		11096-82-5	µg/kg	---	---	---	<6.11 UJ	<5.72
Arochlor-1262		37324-23-5	µg/kg	---	---	---	<6.11	<5.72
Arochlor-1268		11100-14-4	µg/kg	---	---	---	<6.11	<5.72
Total PCBs		---	µg/kg	130	110	2,500	<6.11	<5.72
Organochloride Pesticides								
4,4´-DDD		72-54-8	µg/kg	16	---	---	<1.22	<1.14
4,4´-DDE		72-55-9	µg/kg	9	---	---	<1.22	<1.14
4,4´-DDT		50-29-3	µg/kg	12	---	---	<1.22	<1.14
Sum of 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT		---	µg/kg	---	---	---	<1.22	<1.14
Aldrin		309-00-2	µg/kg	9.5	---	---	<0.611	<0.571
cis-Chlordane	SW8081A	5103-71-9	µg/kg	---	---	---	<0.611	<0.571
cis-Nonachlor		5103-73-1	µg/kg	---	---	---	<0.171	<0.160
Dieldrin		60-57-1	µg/kg	1.9	4.9	9.3	<0.611	<0.571
gamma-Chlordane		5566-34-7	µg/kg	---	---	---	<0.611	<0.571
Heptachlor		76-44-8	µg/kg	1.5	---	---	<0.611	<0.571
Oxycchlordane		27304-13-8	µg/kg	---	---	---	<0.171	<0.160
trans-Nonachlor		39765-80-5	µg/kg	---	---	---	<0.171	<0.160
Total Chlordane		---	µg/kg	2.8	---	---	<0.611	<0.571
Grain Size Range								
Gravel - >2,000 microns (2mm)	---	---	---	---			---	7% to 56%
Sand - 62.5 to 2,000 microns	---	---	---	---			---	28% to 74%
Silt and Clay - 0 to 62.5 microns	---	---	---	---			---	15% to 27%

Notes:
The Analytical Resources, Incorporated laboratory provided the Adjusted Dioxin/Furan TEQ results, per the DMMP Manual dated August 2016.
All non-detect dioxin/furan data were reported at the method detection limit; all orther non-detect data were reported at the reporting limit
* Analyte not detected; listed as less than the reporting limit (RL), unless otherwise flagged due to quality-control failures.
B* = Result is considered not detected due to quality control failures; see checklist for details. Flag applied by Shannon & Wilson, Inc.
J = Estimated concentration, detected greater than the detection limit (DL) and less than the RL. Flag applied by the laboratory.
UJ = Estimated concentration with elevated detection limit. Flag applied by Shannon & Wilson, Inc.
J+* = Estimated concentration, biased high due to quality control failures. Flag applied by Shannon & Wilson, Inc.
R* = Rejected result due to severe quality control failures; see checklist for details. Flag applied by Shannon & Wilson, Inc.
CAS = Chemical Abstract Registry Number
DMMP = Dredge Material Management Plan
EDL = estimated detection limit
EMPC = Estimated maximum possible concentration. Flag applied by the laboratory.
EPA = U.S. Environmental Protection
Agency
mg/kg = milligram per kilogram
µg/kg = microgram per kilogram
ND = non-detect results
ng/kg = nanogram per kilogram
SL = screening level
TEQ = Toxicity
Equivalence

Source: Table 3 of East Channel Sediment Characterization Report (Shannon & Wilson, 2019)
North Mercer Island Interceptor and Enatai Interceptor Upgrade Project

Table 4. Dioxin/furans Results

Sample NME 0-4C

Analyte	TEF	Result (ng/kg)	Flag	MDL (ng/kg)	1/2 MDL (ng/kg)	Adjusted Concentration (ND = 1/2 DL)	Adjusted Concentration (ND = 0)
Dioxins							
2,3,7,8-TCDD	1	ND		0.993	0.4965	0.4965	0
1,2,3,7,8-PCDD	1	0.114	EMPC, J	0.993	0.4965	0.114	0.114
1,2,3,4,7,8-HxCDD	0.1	0.082	EMPC, J	0.993	0.4965	0.0082	0.0082
1,2,3,6,7,8-HxCDD	0.1	0.163	EMPC, J	0.993	0.4965	0.0163	0.0163
1,2,3,7,8,9-HxCDD	0.1	0.303	EMPC, J, B	0.993	0.4965	0.0303	0.0303
1,2,3,4,6,7,8-HpCDD	0.01	3.81	B	0.993	0.4965	0.0381	0.0381
1,2,3,4,6,7,8,9-OCDD	0.0003	32.9	B	9.93	4.965	0.00987	0.00987
Furans							0
2,3,7,8-TCDF	0.1	ND		0.993	0.4965	0.04965	0
1,2,3,7,8-PCDF	0.03	0.044	J, B	0.993	0.4965	0.00132	0.00132
2,3,4,7,8-PCDF	0.3	ND		0.993	0.4965	0.14895	0
1,2,3,4,7,8-HxCDF	0.1	ND		0.993	0.4965	0.04965	0
1,2,3,6,7,8-HxCDF	0.1	ND		0.993	0.4965	0.04965	0
1,2,3,7,8,9-HxCDF	0.1	ND		0.993	0.4965	0.04965	0
2,3,4,6,7,8-HxCDF	0.1	ND		0.993	0.4965	0.04965	0
1,2,3,4,6,7,8-HpCDF	0.01	0.45	EMPC, J, B	0.993	0.4965	0.0045	0.0045
1,2,3,4,7,8,9-HpCDF	0.01	0.055	EMPC, J	0.993	0.4965	0.00055	0.00055
1,2,3,4,6,7,8,9-OCDF	0.0003	3.36	B	1.99	0.995	0.0010	0.001008
Sum TEQ						**1.12**	**0.22**

Table continues.

Sample NME 4-7C

Analyte	TEF	Result (ng/kg)	Flag	MDL (ng/kg)	1/2 MDL	Adjusted Concentration (ND = 1/2 DL)	Adjusted Concentration (ND = 0)
Dioxins							
2,3,7,8-TCDD	1	ND		0.996	0.498	0.498	0
1,2,3,7,8-PCDD	1	0.035	EMPC, J	0.996	0.498	0.035	0.035
1,2,3,4,7,8-HxCDD	0.1	ND		0.996	0.498	0.0498	0
1,2,3,6,7,8-HxCDD	0.1	ND		0.996	0.498	0.0498	0
1,2,3,7,8,9-HxCDD	0.1	0.16		0.996	0.498	0.016	0.016
1,2,3,4,6,7,8-HpCDD	0.01	1.73	B	0.996	0.498	0.0173	0.0173
1,2,3,4,6,7,8,9-OCDD	0.0003	17.5	B	9.96	4.98	0.00525	0.00525
Furans							0
2,3,7,8-TCDF	0.1	ND		0.996	0.498	0.0498	0
1,2,3,7,8-PCDF	0.03	ND		0.996	0.498	0.01494	0
2,3,4,7,8-PCDF	0.3	ND		0.996	0.498	0.1494	0
1,2,3,4,7,8-HxCDF	0.1	ND		0.996	0.498	0.0498	0
1,2,3,6,7,8-HxCDF	0.1	ND		0.996	0.498	0.0498	0
1,2,3,7,8,9-HxCDF	0.1	0.043	J, B	0.996	0.498	0.0043	0.0043
2,3,4,6,7,8-HxCDF	0.1	ND		0.996	0.498	0.0498	0
1,2,3,4,6,7,8-HpCDF	0.01	ND		0.996	0.498	0.00498	0
1,2,3,4,7,8,9-HpCDF	0.01	ND		0.996	0.498	0.00498	0
1,2,3,4,6,7,8,9-OCDF	0.0003	ND		1.99	0.995	0.0003	0
Sum TEQ						**1.05**	**0.08**

Notes:
B = The analyte was detected in the method blank
EMPC = Estimated maximum possible concentration
J = Estimated concentration value detected below the reporting limit
MDL = method detection limit
ND = not detected
ng/kg = nanograms per kilograms
TEF = toxicity equivalence factor
TEQ = toxic equivalence

Figure 1. Project Location Map

Source: Figure 1 of East Channel Sediment Characterization Report (Shannon & Wilson, 2019)
North Mercer Island Interceptor and Enatai Interceptor Upgrade Project

Figure 2. Proposed Project Dredge Limits

Source: Figure 2 of East Channel Sediment Characterization Report (Shannon & Wilson, 2019)
North Mercer Island Interceptor and Enatai Interceptor Upgrade Project

Figure 3. Proposed Trench Profile (TetraTech, 2017)

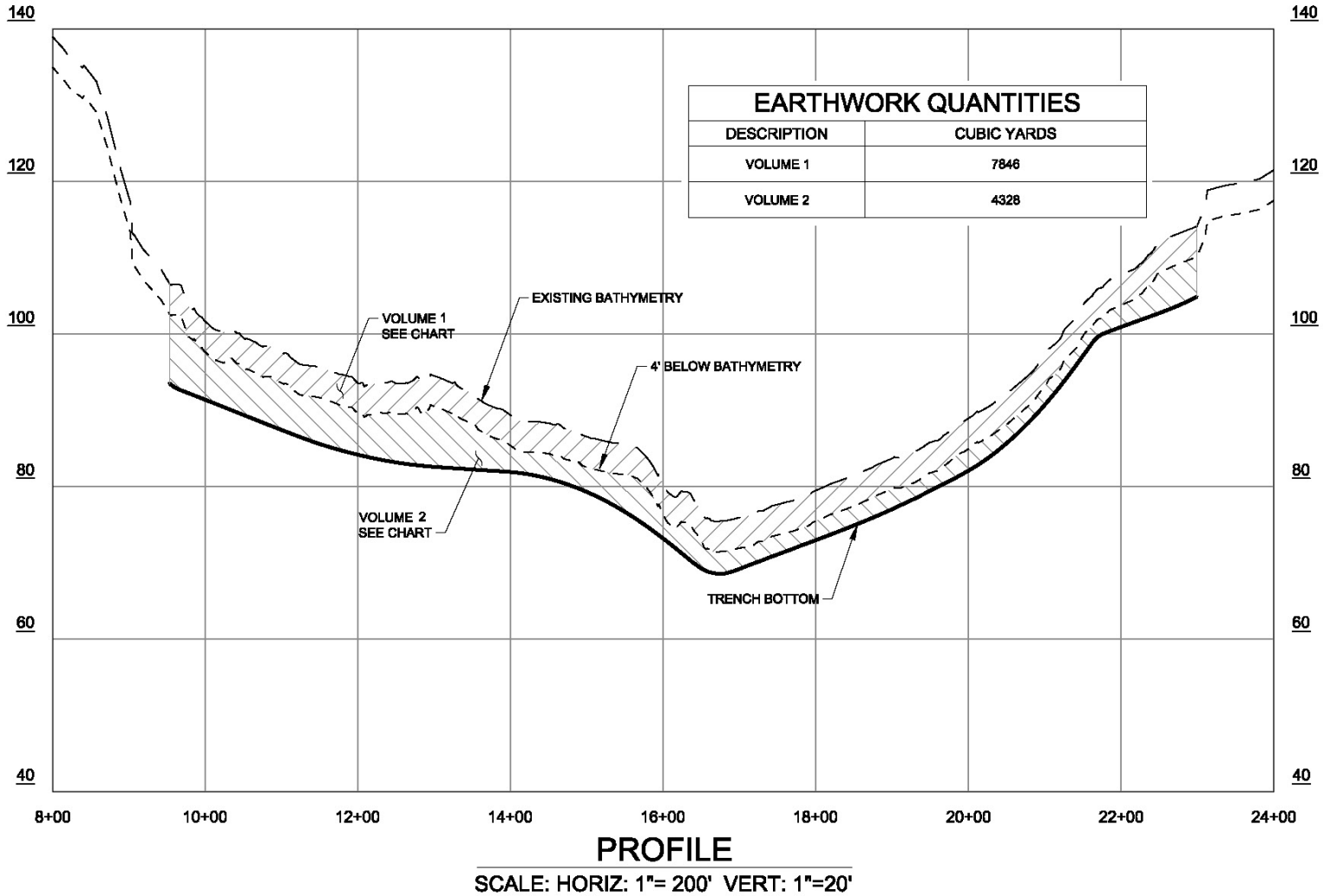
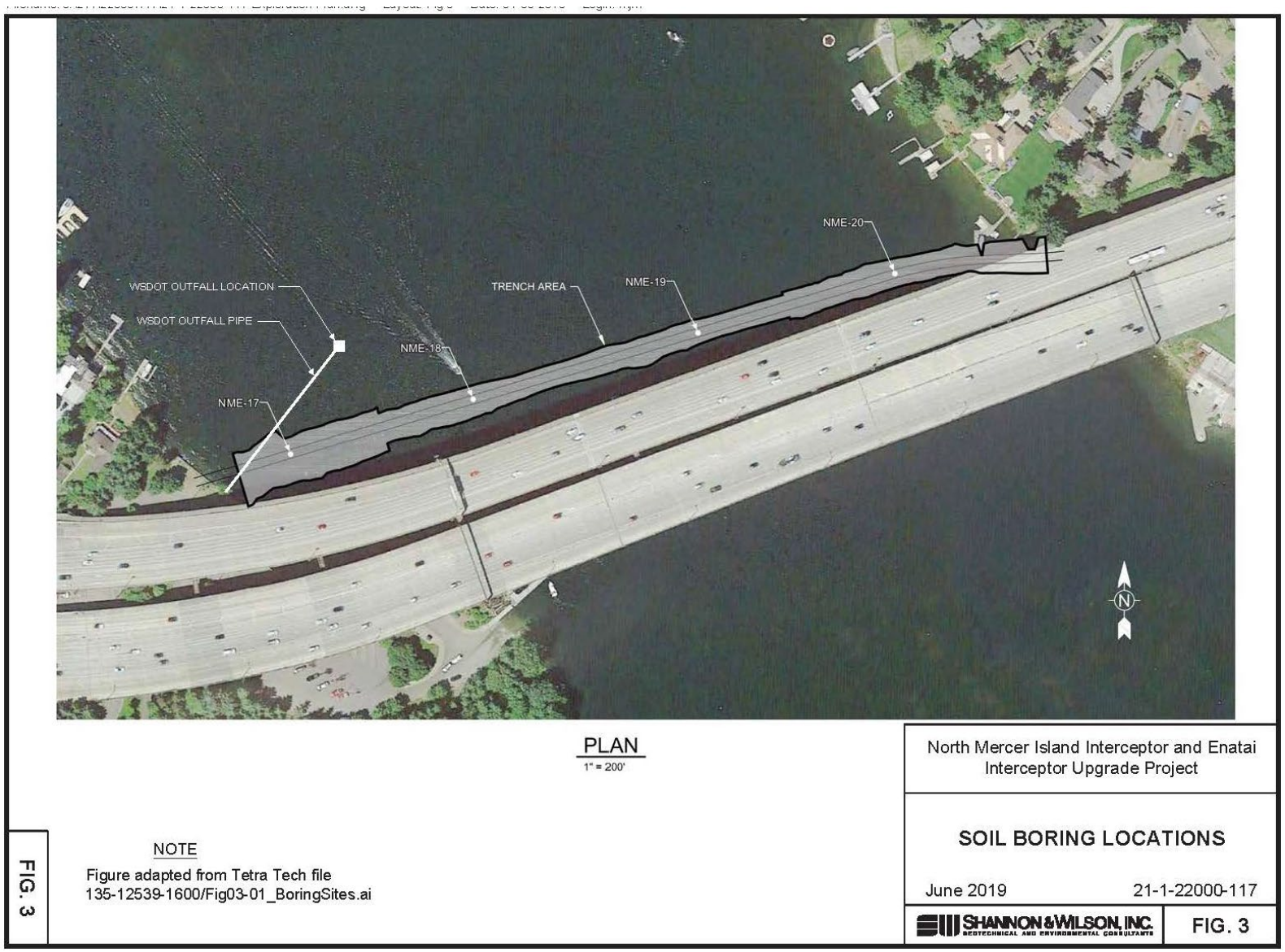
Figure 4. East Channel Field Sample Locations (from Shannon & Wilson, 2019)