

CENWS-OD-TS-NR

MEMORANDUM FOR: RECORD

February 2, 2017

SUBJECT: DETERMINATION REGARDING THE SUITABILITY OF PROPOSED DREDGED MATERIAL FROM BARBEE MILL BOATHOUSE 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 2,700 cubic yards (CY) of dredged material adjacent to the Barbee Mill Boathouse in Renton, Washington for open-water disposal. Proposed disposal is in the Elliott Bay open-water disposal site.
2. **Background.** The estimated volume of material proposed for dredging at the Barbee Mill Boathouse on Lake Washington is 2,700 CY. The dredge area covers approximately 24,000 square feet with an average sediment thickness of approximately 2-4 ft. The project area was dredged in 1994, 1997, 2001/2002, and 2011. The DMMP agencies last issued a suitability determination for 1000 CY at the site in 2008 (DMMP, 2008a).

Dredging for this project will likely be performed using a long-reach excavator with an environmental bucket. The material will be transported to the Elliott Bay open-water disposal site in a dump barge under tow from Lake Washington through the Ballard Locks.

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

Table 1. Project Summary

Project ranking	Moderate
Proposed dredging volume	2,700 CY
Proposed dredging depth (ft below mudline)	Varies up to ~3 ft
SAP received	June 13, 2016
DMMP comments on 1 st draft	June 24, 2016
2 nd draft SAP received	June 30, 2016
DMMP comments on 2 nd draft	July 7, 2016
SAP approved ¹	Comments not addressed; SAP was neither finalized nor approved
Sampling date ¹	July 4, 2016
Draft Sediment Characterization Report (SCR) received	October 7, 2016
DMMP comments on 1 st draft SCR	October 19, 2016
Second draft SCR received	November 23, 2016
DMMP comments on 2 nd draft SCR	December 8, 2016

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

Third draft SCR received	December 13, 2016
DMMP comments on 3 rd draft SCR	December 22, 2016
Fourth draft SCR received	January 3, 2017
SCR approved	January 12, 2017
DMMO tracking number	BARBB-1-A-F-376
EIM study ID	BARBB16
Recency Determination (moderate rank = 5 years)	July 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

Three samples were collected from DMMU1 for this project. The number of planned field samples (3) was estimated based on 2015 survey data; the sampling frequency meets the DMMP requirements.

5. **Sampling.** Sampling occurred July 4, 2016 at the three locations shown in Figure 3 and detailed in Table 2. Sediment cores were collected at locations SED-1 and SED-2 using a gravity core. Sediment from SED-3 was collected using a Van Veen grab sampler.

The samples were composited prior to delivery to the laboratory for analysis. One composite sample (07042016BARBEE-C) was generated using the two cores and one grab sample. Percent recoveries for the two cores were 37.5 and 80%, with reduced recovery attributed to the loss of sand from the bottom of the cores during core retrieval.

6. **Sediment Conventional, Grain Size and Chemical Analysis.**

Samples were analyzed by Analytical Resources, Inc. in Tukwila, Washington. Data was not validated by an independent data validator. Some quality control issues were reported by the laboratory in their laboratory report, but data quality is considered sufficient for regulatory decision-making, as qualified, under the DMMP program.

Sediment conventional and chemical analytical results (Table 3) show that the proposed dredged material is predominantly gravel (21%) and sand (76%) with less than 5% fines (silt and clay). No chemicals were detected in excess of the DMMP freshwater screening level (SL) or marine screening level 1 (SL1) guidelines. 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 both freshwater and marine screening levels.

Organometallics. Bulk organotin analysis was not required for this project per DMMP comments on the draft Sampling and Analysis Plan.

Dioxins/furans. Dioxins/furans were detected at low levels in the DMMU1 composite sample. The dioxin/furan toxicity equivalent (TEQ, with U = ½ estimated reporting limit) for DMU1 was 0.66 ppb,

which is less than the 4 ppt Disposal Site Management Objective for dredging projects in Puget Sound. The DMMP agencies concur that the material from DMMU1 passes the DMMP dioxin/furan guidelines for open-water disposal in Puget Sound.

7. **Biological Testing.** There were no marine SL or freshwater SL1 exceedances for the standard COCs. No marine bioaccumulation triggers were exceeded. Bioaccumulation triggers have not been set for freshwater sediments. 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). Z-samples were not collected from DMMU1; however, there were no chemical concentrations above the freshwater SL1 in the dredge prism sample. Therefore, this project is in compliance with the State of Washington anti-degradation standard.
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). Email communications with the project consultant provided the following information to evaluate current debris concerns and debris management practices.

Geographically, the project area is located adjacent to the mouth of May Creek and receives significant sediment input from the creek. Industrial use of the project area stopped in the late 1990s. Since then, the boathouse area has been used exclusively for recreational use and was dredged in 1994, 1997, 2001/2002, and 2011 to maintain navigational access. Wood waste debris was encountered during the 2001/2002 MTCA cleanup dredging of the adjacent aquatic lands (to the north) and boathouse; however, information is unclear as to what specific materials (if any) may have been removed from the boathouse area. During the most recent dredging event (2011) of the boathouse area, old piling and at least one log (may also have been a piling) were reportedly encountered and removed along with tree branches and leaf litter. Furthermore, no debris was encountered during sediment sampling in July 2016.

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 the **2,700 cubic yards of dredged material in DMMU 1 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, 2008a. *Determination on the Suitability of Proposed Maintenance Dredged Material from Barbee Mill Boathouse Renovation Project (NWS-2007-1019-NO) Evaluated under Section 404 of the Clean Water Act for Potential Beneficial Uses (Habitat Enhancement) in Lake Washington or Upland Beneficial Uses.* Prepared by the USACE for the DMMP agencies. February 14, 2008.

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.

Lloyd & Associates, 2016. *Draft Sampling and Analysis Plan, Barbee Maintenance Dredging,* Barbee Company, P.O. Box 359, Renton, Washington. Draft dated June 28, 2016.

Lloyd & Associates, 2016. *Sediment Sampling and Analytical Results,* Barbee Maintenance Dredging, Barbee Company, Renton, Washington. Final version with DMMP edits dated January 3, 2017.

11. Agency Signatures.

signed copy on file in DMMO - Seattle District office

Concur:

Date Heather 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 Celia Barton - Washington Department of Natural Resources

Copies furnished:
DMMP signatories
USACE, Seattle District Regulatory
Michael Lloyd – Lloyd and Associates, Inc.
Robert Cugini – Barbee Forest Products

Table 2. Sample locations, depths, and sample descriptions

DMMU	Composite Sample ID	Station	NAD83 WA State Plane South (ft)		Collection Date	Sample Method	Lake Elev (ft)	Depth to Mudline (ft)	Mudline Elevation (ft Lake Washington USACE datum)	Core Penetration (ft)	% Core Recovery	Proposed Dredge Depth (ft)	DMMU Volume (CY)
			Easting	Northing									
1	07042016BARBEE-C	SED-1	1301394	195430.7	7/4/2016	Gravity Corer	20.6	2.1	18.5	4	37.5	3	2700
		SED-2	1301509	195448	7/4/2016	Gravity Corer	20.6	1.5	19.1	3.1	80	2.5	
		SED-3	1301612.5	195476.9	7/4/2016	Van Veen Grab	20.6	7.6	13	0.4	100	0.5	

Table 3. Chemical analysis results

CHEMICAL	Units	DMMU1		Marine Guidelines			Freshwater Guidelines		SMS Freshwater Sediment	
		Result	Flag	SL1	BT	ML	SL1	SL2	SCO	CSL
CONVENTIONALS										
Gravel, %	percent	21.0		--	--	--	--	--	--	--
Sand, %	percent	76.0		--	--	--	--	--	--	--
Silt, %	percent	2.1		--	--	--	--	--	--	--
Clay, %	percent	0.9		--	--	--	--	--	--	--
Fines (Silt + Clay), %	percent	3.0		--	--	--	--	--	--	--
Total Solids, %	percent	80.75		--	--	--	--	--	--	--
Total organic carbon, %	percent	0.182		--	--	--	--	--	--	--
Total Ammonia, mg N/kg	mg/kg	19.6		--	--	--	--	--	230	300
Total Sulfides, mg/kg	mg/kg	1.8		--	--	--	--	--	39	61
Preserved total solids	percent	80.75		--	--	--	--	--	--	--
Total volatile solids	percent	1.12		--	--	--	--	--	--	--
METALS (mg/kg dry)										
Antimony	mg/kg	0.25	U	150	--	200	--	--	--	--
Arsenic	mg/kg	2.1		57	507.1	700	14	120	14	120
Cadmium	mg/kg	0.081	J	5.1	--	14	2.1	5.4	2.1	5.4
Chromium	mg/kg	22.1		260	--	--	72	88	72	88
Copper	mg/kg	13.9		390	--	1,300	400	1200	400	1200
Lead	mg/kg	4		450	975	1,200	360	1300	360	1300
Mercury	mg/kg	0.03	U	0.41	1.5	2.3	0.66	0.8	0.66	0.8
Nickel	mg/kg	28.2		--	--	--	38	110	26	110
Selenium	mg/kg	0.577	J	--	3	--	11	20	11	20
Silver	mg/kg	0.023	J	6.1	--	8.4	0.57	1.7	0.57	1.7
Zinc	mg/kg	48		410	--	3,800	3200	4200	3200	4200
ORGANOMETALLIC COMPOUNDS (ug/kg dry)										
Butyltin ion	ug/kg	Not required for analysis on this project		--	--	--	540	4800	540	4800
Dibutyltin ion	ug/kg	Not required for analysis on this project		--	--	--	910	130000	910	130000
Tetrabutyltin	ug/kg	Not required for analysis on this project		--	--	--	97	97	97	97
Tributyltin ion	ug/kg	Not required for analysis on this project		--	73	--	47	320	47	320
PAHs (ug/kg dry)										
1-Methylnaphthalene	ug/kg	19	U	--	--	--	--	--	--	--
2-Methylnaphthalene	ug/kg	19	U	670	--	1,900	--	--	--	--
Acenaphthene	ug/kg	8.7	J	500	--	2,000	--	--	--	--
Acenaphthylene	ug/kg	19	U	560	--	1,300	--	--	--	--
Anthracene	ug/kg	9.6	J	960	--	13,000	--	--	--	--
Benzo(a)anthracene	ug/kg	27		1,300	--	5,100	--	--	--	--
Benzo(a)pyrene	ug/kg	24		1,600	--	3,600	--	--	--	--
Benzo(b)fluoranthene	ug/kg	not reported		--	--	--	--	--	--	--
Benzo(g,h,i)perylene	ug/kg	19		670	--	3,200	--	--	--	--
Benzo(k)fluoranthene	ug/kg	not reported		--	--	--	--	--	--	--
Benzofluoranthenes	ug/kg	55		3,200	--	9,900	--	--	--	--
Chrysene	ug/kg	30		1,400	--	21,000	--	--	--	--
Dibenzo(a,h)anthracene	ug/kg	19	U	230	--	1,900	--	--	--	--
Fluoranthene	ug/kg	88		1,700	4,600	30,000	--	--	--	--
Fluorene	ug/kg	8.7	J	540	--	3,600	--	--	--	--
Indeno(1,2,3-cd)pyrene	ug/kg	19		600	--	--	--	--	--	--
Naphthalene	ug/kg	19	U	2,100	--	2,400	--	--	--	--
Phenanthrene	ug/kg	40		1,500	--	21,000	--	--	--	--
Pyrene	ug/kg	66		2.6	11,980	16,000	--	--	--	--
Total LPAH	ug/kg	67		5,200	--	29,000	--	--	--	--
Total HPAH	ug/kg	328		12,000	--	69,000	--	--	--	--
Total PAHs	ug/kg	395		--	--	--	17000	30000	17000	30000
CHLORINATED BENZENES (ug/kg dry)										
1,4-Dichlorobenzene	ug/kg	9.6	U	110	--	120	--	--	--	--

CHEMICAL	Units	DMMU1		Marine Guidelines			Freshwater Guidelines		SMS Freshwater Sediment	
		Result	Flag	SL1	BT	ML	SL1	SL2	SCO	CSL
1,2-Dichlorobenzene	ug/kg	9.6	U	35	--	110	--	--	--	--
1,2,4-Trichlorobenzene	ug/kg	9.6	U	31	--	64	--	--	--	--
Hexachlorobenzene (HCB)	ug/kg	9.6	U	22	168	230	--	--	--	--
beta-Hexachlorocyclohexane	ug/kg	0.49	U	--	--	--	7.2	11	7.2	11
PHthalATES (ug/kg dry)										
Dimethyl phthalate	ug/kg	9.6	U	71	--	1,400	--	--	--	--
Diethyl phthalate	ug/kg	19	U	200	--	1,200	--	--	--	--
Di-n-butyl phthalate	ug/kg	8.7	J	1,400	--	5,100	380	1000	380	1000
Butylbenzyl phthalate	ug/kg	9.6	U	63	--	970	--	--	--	--
Bis(2-ethylhexyl) phthalate	ug/kg	50	Q	1,300	--	8,300	500	22000	500	22000
Di-n-octyl phthalate	ug/kg	19	U	6,200	--	6,200	39	1100	39	1100
PHENOLS										
2-Methylphenol	ug/kg	9.6	U	63	--	77	--	--	--	--
4-Methylphenol	ug/kg	19	U	670	--	3,600	260	2000	260	2000
2,4-Dimethylphenol (via 8270 SIM)	ug/kg	19.1	U	29	--	210	--	--	--	--
Pentachlorophenol	ug/kg	96	U	400	504	690	1200	1200	1200	1200
Phenol	ug/kg	19	U	420	--	1,200	120	210	120	210
MISCELLANEOUS EXTRACTABLES (ug/kg dry)										
Benzyl alcohol	ug/kg	19	U	57	--	870				
Benzoic acid	ug/kg	190	U	650	--	760	2900	3800	2900	3800
Carbazole	ug/kg	19	U	--	--	--	900	1100	900	1100
Dibenzofuran	ug/kg	19	U	540	--	1,700	200	680	200	680
Hexachlorobutadiene	ug/kg	9.6	U	11	--	270	--	--	--	--
N-Nitrosodiphenylamine	ug/kg	9.6	U	28	--	130	--	--	--	--
PESTICIDES & PCBs (ug/kg dry)										
2,4'-DDD	ug/kg	0.98	U	--	--	--	--	--	--	--
2,4'-DDE	ug/kg	0.98	U	--	--	--	--	--	--	--
2,4'-DDT	ug/kg	0.98	U	--	--	--	--	--	--	--
4,4'-DDD	ug/kg	0.98	U	16	--	--	--	--	--	--
4,4'-DDE	ug/kg	0.98	U	9	--	--	--	--	--	--
4,4'-DDT	ug/kg	0.98	U	12	--	--	--	--	--	--
Sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT	ug/kg	0.98	U	--	50	69	--	--	--	--
Total of 2,4' and 4,4'-DDD	ug/kg	0.98	U	--	--	--	310	860	310	860
Total of 2,4' and 4,4'-DDE	ug/kg	0.98	U	--	--	--	21	33	21	33
Total of 2,4' and 4,4'-DDT	ug/kg	0.98	U	--	--	--	100	8100	100	8100
Aldrin	ug/kg	0.49	U	9.5	--	--	--	--	--	--
Dieldrin	ug/kg	0.98	U	1.9	--	1,700	4.9	9.3	4.9	9.3
Endrin ketone	ug/kg	0.98	U	--	--	--	8.5	8.5	8.5	8.5
Heptachlor	ug/kg	0.49	U	1.5	--	570	--	--	--	--
Oxychlorane	ug/kg	0.98	U	--	--	--	--	--	--	--
cis-Chlordane	ug/kg	0.49	U	--	--	--	--	--	--	--
cis-Nonachlor	ug/kg	0.98	U	--	--	--	--	--	--	--
trans-Chlordane	ug/kg	0.49	U	--	--	--	--	--	--	--
trans-Nonachlor	ug/kg	0.98	U	--	--	--	--	--	--	--
Total Chlordane	ug/kg	0.98	U	2.8	37	--			--	--
Total Aroclors (PCBs)	ug/kg	3.9	U	130	38	3,100	110	2500	110	2500
BULK PETROLEUM HYDROCARBONS (mg/kg dry)										
Diesel Range Hydrocarbons	mg/kg	8.3		--	--	--	340	510	340	510
Residual Range Hydrocarbons	mg/kg	39		--	--	--	3600	4400	3600	4400

J = estimated concentration

U = non-detect

SL = screening level

Bold = Value exceeds a screening level

Table 4. Dioxin analysis results

CHEMICAL	TEF (WHO 2005)	Units	DMMU1			
			Result	Flag	TEQ (U = 1/2 RL)	TEQ (U = 0)
2,3,7,8-TCDD	1	pg/g	0.145	JEMPC	0.145	0.145
1,2,3,7,8-PeCDD	1	pg/g	0.182	BJEMPC	0.182	0.182
1,2,3,4,7,8-HxCDD	0.1	pg/g	0.242	BJEMPC	0.0242	0.0242
1,2,3,6,7,8-HxCDD	0.1	pg/g	0.532	BJEMPC	0.0532	0.0532
1,2,3,7,8,9-HxCDD	0.1	pg/g	0.464	BJ	0.0464	0.0464
1,2,3,4,6,7,8-HpCDD	0.01	pg/g	9.93	B	0.0993	0.0993
OCDD	0.0003	pg/g	62.9	B	0.01887	0.01887
2,3,7,8-TCDF	0.1	pg/g	0.0776	BJEMPC	0.00776	0.00776
1,2,3,7,8-PeCDF	0.03	pg/g	0.0737	BJEMPC	0.002211	0.002211
2,3,4,7,8-PeCDF	0.3	pg/g	0.0563	U	0.01689	0
1,2,3,4,7,8-HxCDF	0.1	pg/g	0.114	BJ	0.0114	0.0114
1,2,3,6,7,8-HxCDF	0.1	pg/g	0.111	BJEMPC	0.0111	0.0111
1,2,3,7,8,9-HxCDF	0.1	pg/g	0.130	JEMPC	0.013	0.013
2,3,4,6,7,8-HxCDF	0.1	pg/g	0.136	JEMPC	0.0136	0.0136
1,2,3,4,6,7,8-HpCDF	0.01	pg/g	1.59		0.0159	0.0159
1,2,3,4,7,8,9-HpCDF	0.01	pg/g	0.101	U	0.000505	0
OCDF	0.0003	pg/g	2.62		0.000786	0.000786
TOTAL TEQ (pptr)					0.66	0.64

Figure 1. Site Location Map

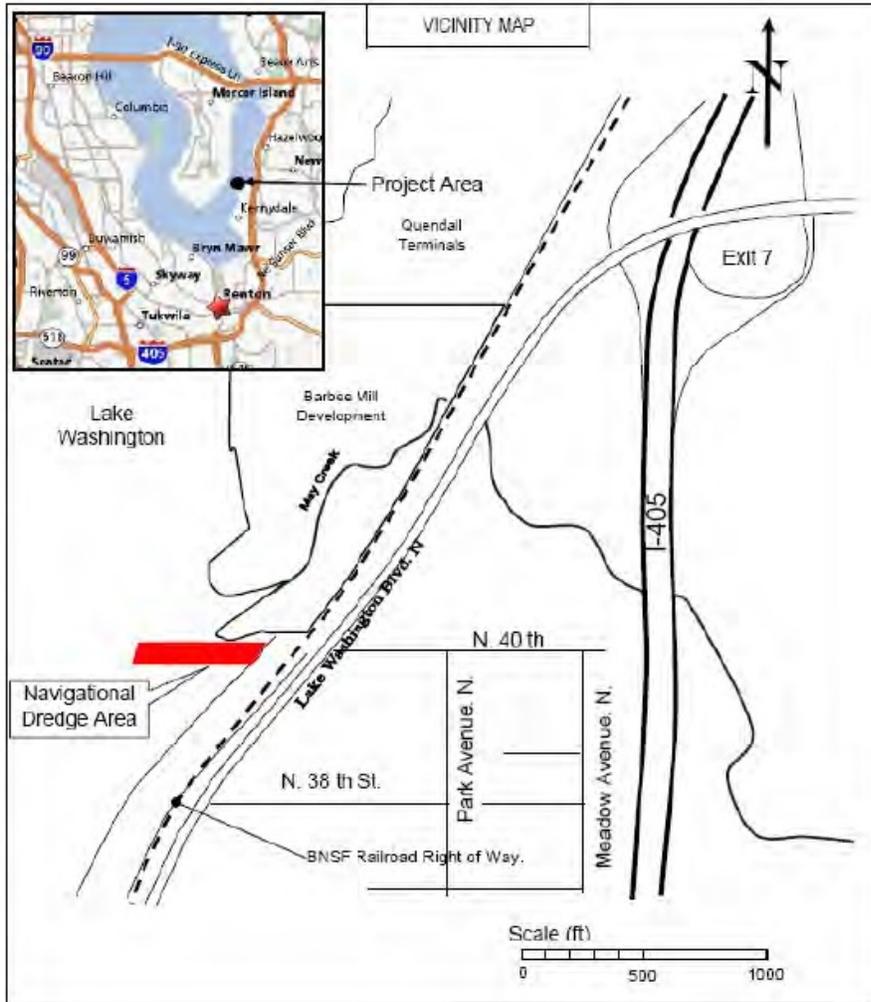


Figure 2. Sample Locations

