

MEMORANDUM FOR RECORD

April 5, 2018

**SUBJECT:** DETERMINATION REGARDING THE SUITABILITY OF PROPOSED DREDGED MATERIAL FROM THE KILISUT HARBOR RESTORATION PROJECT FOR OPEN-WATER DISPOSAL AT A DISPERSIVE OR NON-DISPERSIVE DMMP DISPOSAL 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 8,650 CY of proposed beach berm dredged material at the Kilisut Harbor Restoration Project for open-water disposal (Figure 1). The data for the 8,650 CY of tested material are summarized in this memorandum and are also available for the assessment of beneficial use by the project proponent, the local health jurisdiction and/or the owner of a receiving property. The Project proposes to beneficially reuse approximately 2,500 CY of the 8,650 CY of beach berm dredged material for beach nourishment; using the DMMP process to obtain the information necessary to characterize and confirm the appropriateness of the beach berm material for beach placement. The remainder of the beach berm material, along with the remaining portion of the total 66,660 CY of material to be dredged/excavated from the project area will be disposed at an upland location. Upon completion of the full project excavation (all 66,660 CY), confirmation samples of the new surface will be required to ensure that state anti-degradation requirements have been met. The post-excavation confirmation samples are required because 58,010 CY of material proposed for upland disposal were not characterized.
- 2. Background.** Kilisut Harbor is a marine bay located in Puget Sound. The bay was historically connected to Oak Bay at its south end via a tidal channel. Embankment fill for State Route 116 (SR-116), constructed in the 1940s, filled in the tidal channel. Tidal exchange between Kilisut Harbor and Oak Bay has not occurred since before the 1970s.

The North Olympic Salmon Coalition (NOSC) is planning the Kilisut Harbor Restoration Project (the Project) to remove the impacts of prior development, restore a fish migration route, and re-establish habitat for salmonids. To reach this objective, the NOSC proposes to excavate approximately 66,660 cubic yards (CY) of sediment from the main channel to reconnect Kilisut Harbor and Oak Harbor (Figure 2).

Upon completion of the Project, the main channel bottom will be excavated to +2 and +1 ft NAVD88<sup>1</sup> on the north side of the SR-116 to tie into Kilisut Harbor. South of SR-116, the channel will be excavated to +2 ft NAVD88 near SR-116, sloping down to 0 ft NAVD88 to tie into Oak Bay on the southern end of the channel. A portion of the southern main channel will be over-excavated to +1 to -1 ft NAVD88 and then backfilled with native silty sand to +2 to 0 ft NAVD88.

The NOSC proposes to use approximately 2,500 CY of the excavated material for beach nourishment. This material will be taken from the current beach berm (shown in purple in Figure 3)

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<sup>1</sup> For this project location, 0 ft NAVD88 is equivalent in elevation to +1.35 ft MLLW.

along the proposed Oak Bay channel outlet and placed along the beach to the northwest as beach nourishment (Figure 2). The remainder of the excavated material (approximately 64,160 CY) will be disposed of at the Shold Excavating Pit (Figure 2).

During pre-sampling coordination with the DMMP in May-June 2017, the DMMP determined that sampling and testing per DMMP guidelines will only be required of the material proposed for beach nourishment use. Excavated material proposed for upland disposal would not require DMMP testing. However, post-excitation grab samples of the intertidal leave surface for the entire excavation area will be required after project completion, to ensure that state anti-degradation requirements are being fulfilled.

This memorandum documents the findings of the testing required of the material to be used for beach nourishment. Sampling and testing of the post-excitation leave surface for confirmation of anti-degradation compliance will occur after project completion; a DMMP anti-degradation determination will be presented in a separate memorandum.

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

**Table 1. Project Summary and Tracking Information**

Project ranking	Low-moderate
Characterized volume (CY)	8,650
Project design depth (ft NAVD88)	+2 to 0*
Draft SAP received	September 12, 2017
Draft SAP returned with DMMP comments	September 29, 2017
2 <sup>nd</sup> draft SAP received	October 30, 2017
2 <sup>nd</sup> draft SAP returned with DMMP comments	November 6, 2017
Final SAP received	November 14, 2017
Final SAP approved	November 16, 2017
Sampling dates	December 6, 2017
Draft data report received	February 26, 2018
Comments provided on draft report	March 13, 2018
Final data report received	March 26, 2018
DMMO tracking number	DMMP-KILIS-1-A-F-393
EIM Study ID	KILIS17
Recency Determination (6 years for low-moderate)	December 2023

\*Equivalent excavation elevation is 3.35 to 1.35 ft in MLLW datum.

4. **Project Ranking and Sampling Requirements.**

Based on known site history and existing data, the DMMP assigned the Project a rank of low-moderate. This ranking indicates that available information indicates a “low” rank, but there are insufficient data to confirm the ranking. For a low-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 = 8,000 CY
- Maximum volume of sediment represented by each composite sample = 32,000 CY

The material proposed for beneficial use will be obtained from the current beach berm near the Oak Bay channel outlet (area shown in purple on Figure 3). Approximately 2,500 CY of material will be used for beach nourishment from a total of 8,650 CY that will be excavated from the beach berm. Based on this latter volume, two surface grab samples composited to represent one DMMU were approved to characterize the beach berm material. Given the maximum depth of the dredge prism (<4 feet), no subsurface DMMUs were required. The sampling design and frequency meets the DMMP requirements.

5. **Sampling.** Sampling occurred on December 6, 2017 in accordance with the approved Sampling and Analysis Plan at the two locations shown in Figure 3. Grab samples were collected by hand with a stainless steel trowel between the surface and approximately 6 inches below the surface. Thick underground plant material and other plant matter were encountered at both sample sites; sample material was collected starting immediately below the dense vegetative material that formed the apparent surface. Water was encountered at 4 inches below ground surface (bgs) at location 1a; no free water was encountered at location 1b. Material from locations 1a and 1b was composited into a single DMMU sample (DMMU 1). Sample collection data are provided in Table 2.

The DMMU composite was submitted to ALS Environmental in Kelso, Washington, for chemical analyses.

6. **Analytical Results.** The DMMU composite was analyzed for sediment conventionals and the standard DMMP chemicals of concern for marine projects. The conventional and chemical data results are summarized in Tables 3 and 4.

**Sediment Conventionals.** The composite sample was analyzed for total organic carbon (TOC), total solids, total volatile solids, and grain size, ammonia, and sulfides. TOC was 0.366%, ammonia was 0.09 mg/kg, and sulfides were non-detect. The DMMU composite was primarily sand (85.79%) and gravel (9.02%) with a much smaller percentage of fines (1.22%).

**Standard Chemicals of Concern.** The DMMU sample was analyzed for standard DMMP marine COCs, including metals, pesticides, semivolatile organic compounds, polycyclic aromatic hydrocarbons, and polychlorinated biphenyls (PCBs). All chemistry results (detects and non-detects) are below the standard DMMP marine screening levels (SLs) (Table 4).

**Tributyltin.** Tributyltin (TBT) testing was not required for this project.

**Dioxins/furans.** Dioxins/furan testing was not required for this project.

**Comparison to Sediment Management Standards Benthic Criteria.** Ecology does not recommend carbon-normalization when TOC is below 0.5 percent. The measured TOC in the DMMU 1 composite was 0.366%; therefore, comparison to Ecology's benthic criteria is not indicated

for OC-normalized values. No detects or non-detected concentrations exceed the Sediment Quality Standards (SQS) for non-OC normalized target analytes (Table 4).

**Data Validation.** Chemistry data did not undergo third-party, independent data validation. Assigned laboratory qualifiers were used.

7. **Biological Testing.** No biological testing was required for this project.
8. **Debris Management.** The DMMP agencies implemented a debris screening requirement following the 2015 SMARM in order to prevent the disposal of solid waste and debris at open-water disposal sites in Puget Sound (DMMP, 2015). A debris screen is not required for this project because no material will be going to an open-water disposal site.
9. **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). Upon completion of the full project excavation (all 66,660 CY), confirmation samples of the new surface will be required to ensure that state anti-degradation requirements have been met.
10. **Suitability Determination.**

In summary, based on the results of the previously described testing, the DMMP agencies have concluded that up to 8,650 cubic yards of dredged material in DMMU 1 are suitable for open-water disposal at either a dispersive or non-dispersive DMMP disposal site.

The remaining untested portion (58,010 CY) proposed for excavation does not require testing since that material will be disposed at an upland location. However, upon completion of the full project excavation (all 66,660 CY), confirmation samples of the new surface will be required in accordance with the approved Sampling and Analysis Plan to ensure that state anti-degradation requirements have been met (Cardno, 2017).

The DMMP agencies do not make beneficial re-use determinations, but the data for the 8,650 CY of tested material are available for the assessment of beneficial use by the project proponent, local health jurisdiction and/or the owner of a receiving property.

## 11. **References.**

Cardno, 2017. *Final Kilisut Harbor Restoration Sediment Sampling and Analysis Plan*. Prepared by Cardno for the North Olympic Salmon Coalition, November 6, 2017.

Cardno, 2018. *Kilisut Harbor Restoration Project Sediment Characterization Report*. Prepared by Cardno for the North Olympic Salmon Coalition, March 26, 2018.

DMMP, 2016. *Dredged Material Evaluation and Disposal Procedures (User Manual)*, prepared by the Dredged Material Management Office, U.S. Army Corps of Engineers – Seattle District for the Dredged Material Management Program agencies, November 2016.

12. Agency Signatures.

Concur:

signed copy on file in DMMO - Seattle District office

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Date

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Heather Whitney Fourie - Seattle District Corps of Engineers

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Date

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Justine Barton - Environmental Protection Agency

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Date

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

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Date

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Celia Barton - Washington Department of Natural Resources

Copies furnished:

DMMP signatories  
USACE Regulatory

Table 2. Sampling Collection Data

Unit	Sampling Location	Target Latitude	Target Longitude	Actual Latitude	Actual Longitude
DMMU 1	1a	48.018377	-122.70406	48.01837	- 122.70407
	1b	48.018112	-122.703602	48.0181	- 122.70361

Horizontal Datum: NAD83

Table 3. Grain Size Results

Wentworth class	Size Range	Percentage
Gravel, Fine or larger	>4 mm	2.94
Gravel, Very Fine	2-4 mm	6.08
Sand, Very Coarse	1-2 mm	25.8
Sand, Coarse	500-1000 µm	47.82
Sand, Medium	250-500 µm	11.67
Sand, Fine	125-250 µm	0.43
Sand, Very Fine	62.5-125 µm	0.07
Silt	31.3-62.5 µm	0.11
Silt	15.6-31.3 µm	0.19
Silt	7.8-15.6 µm	0.13
Silt	3.9-7.8 µm	0.12
Clay	2-3.9 µm	0
Clay	1-2 µm	0.14
Colloid	<1 µm	0.53
<b>General classification</b>		
Gravel		9.02
Sand		85.79
Silt		0.55
Clay		0.67
Fines		1.22

Table 4. Summary Analytical Results

Chemical of Concern	Analytical Method	Result	Flag	MDL	MRL	Marine Screening Level	Non-OC-normalized Sediment Quality Standards <sup>c</sup>
<b>Conventionals</b>							
Ammonia (mg/kg)	Plumb 1981	0.09	J	0.05	0.58	--	--
TOC (%)	PSEP 1986 - 9060M	0.366		0.02	0.05	--	--
Total solids (%)	PSEP 1986	84.5		NA	NA	--	--
Total sulfides (mg/kg)	PSEP 1986	ND	U	0.6	1.7	--	--
Total volatile solids (%)	EPA 160.4 modified	1.5		NA	0.1	--	--
<b>Metals (mg/kg dry weight)</b>							
Antimony	EPA 6020A	0.043	J	0.021	0.053	150	--
Arsenic	EPA 6020A	1.25		0.04	0.53	57	57
Cadmium	EPA 6020A	0.052		0.007	0.021	5.1	5.1
Chromium	EPA 6020A	18.7		0.06	0.21	260	260
Copper	EPA 6020A	8.9		0.04	0.21	390	390
Lead	EPA 6020A	2.45		0.021	0.053	450	450
Mercury	EPA 7471B	0.008	J	0.002	0.021	0.41	0.41
Selenium	EPA 6020A	ND	U	0.07	1.1	--	--
Silver	EPA 6020A	0.015	J	0.004	0.021	6.1	6.1
Zinc	EPA 6020A	28.2		0.21	0.53	410	410
<b>PAHs (µg/kg dry weight)</b>							
Naphthalene	EPA 8270D	ND	U	2.9	6	2,100	NA
Acenaphthylene	EPA 8270D	ND	U	2.6	6	560	NA
Acenaphthene	EPA 8270D	ND	U	3.2	6	500	NA
Fluorene	EPA 8270D	ND	U	3.3	6	540	NA
Phenanthrene	EPA 8270D	ND	U	3.6	6	1,500	NA
Anthracene	EPA 8270D	ND	U	3.2	6	960	NA
2-Methylnaphthalene	EPA 8270D	ND	U	2.8	6	670	NA
Total LPAH	EPA 8270D	ND	U	--	--	5,200	NA
Fluoranthene	EPA 8270D	ND	U	3.7	6	1,700	NA
Pyrene	EPA 8270D	ND	U	3.7	6	2,600	NA
Benzo(a)anthracene	EPA 8270D	ND	U	3.6	6	1,300	NA
Chrysene	EPA 8270D	ND	U	4.1	6	1,400	NA
Benzo(b)fluoranthene	EPA 8270D	ND	U	3.4	6	3,200	NA
Benzo(k)fluoranthene	EPA 8270D	ND	U	4	6	3,200	NA
Benzo(a)pyrene	EPA 8270D	4.1	J	3.6	6	1,600	NA
Indeno(1,2,3-c,d)pyrene	EPA 8270D	ND	U	3.2	6	600	NA
Dibenz(a,h)anthracene	EPA 8270D	ND	U	3	6	230	NA
Benzo(g,h,i)perylene	EPA 8270D	ND	U	3.7	6	670	NA
Total HPAH	EPA 8270D	4.1		--	--	12,000	NA
Total PAHs	EPA 8270D	4.1		--	--	--	--
<b>Chlorinated Hydrocarbons (µg/kg dry weight)</b>							
1,4-dichlorobenzene	EPA 8270D	ND	U	2.5	6	110	NA
1,2-dichlorobenzene	EPA 8270D	ND	U	2.4	6	35	NA
1,2,4-trichlorobenzene	EPA 8270D	ND	U	2.6	6	31	NA
Hexachlorobenzene (HCB)	EPA 8270D	ND	U	3.3	6	22	NA
<b>Phthalates (µg/kg dry weight)</b>							
Dimethyl phthalate	EPA 8270D	ND	U	4	6	71	NA
Diethyl phthalate	EPA 8270D	ND	U	3.7	6	200	NA

Chemical of Concern	Analytical Method	Result	Flag	MDL	MRL	Marine Screening Level	Non-OC-normalized Sediment Quality Standards <sup>c</sup>
Di-n-butyl phthalate	EPA 8270D	10	J	4.8	12	1,400	NA
Butyl benzyl phthalate	EPA 8270D	6.2		3.7	6	63	NA
Bis(2-ethylhexyl) phthalate	EPA 8270D	25	J	8.9	59	1,300	NA
Di-n-octyl phthalate	EPA 8270D	ND	U	3.2	6	6,200	NA
<b>Phenols (µg/kg dry weight)</b>							
Phenol	EPA 8270D	3.4	J	3.1	18	420	420
2-Methylphenol	EPA 8270D	ND	U	4.1	6	63	63
4-Methylphenol	EPA 8270D	ND	U	4.5	6	670	670
2,4-Dimethylphenol	EPA 8270D	ND	U	6.3	30	29	29
Pentachlorophenol	EPA 8270D	ND	U	5.3	59	400	360
<b>Miscellaneous Extractables (µg/kg dry weight)</b>							
Benzyl alcohol	EPA 8270D	ND	U	4.9	12	57	57
Benzoic acid	EPA 8270D	ND	U	96	240	650	650
Dibenzofuran	EPA 8270D	ND	U	3.4	6	540	NA
Hexachlorobutadiene	EPA 8270D	ND	U	3	6	11	NA
N-Nitrosodiphenylamine	EPA 8270D	ND	U	3.2	6	28	NA
<b>Pesticides &amp; PCBs (µg/kg dry weight)</b>							
4,4'-DDD	EPA 8081B	ND	U	0.74	1.3	16	--
4,4'-DDE	EPA 8081B	ND	U	0.5	1.3	9	--
4,4'-DDT	EPA 8081B	ND	U	0.76	1.3	12	--
sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT	EPA 8081B	ND	U	--	--	--	--
Aldrin	EPA 8081B	ND	U	0.73	1.3	9.5	--
gamma-Chlordane <sup>a</sup>	EPA 8081B	ND	U	0.47	1.3	2.8 <sup>b</sup>	--
alpha-Chlordane	EPA 8081B	ND	U	0.51	1.3	2.8 <sup>b</sup>	
Total Chlordane		ND	U				
Dieldrin	EPA 8081B	ND	U	0.28	1.3	1.9	--
Heptachlor	EPA 8081B	ND	U	0.49	1.3	1.5	--
Total PCBs (Aroclors)	EPA 8082A	ND	U	2.9	20-Oct	130	NA

Notes:

<sup>a</sup> For this analyte (CAS Registry No. 5103-74-2), the U.S. Environmental Protection Agency (USEPA) has corrected the name to be beta-Chlordane, also known as trans-Chlordane.

<sup>b</sup> Marine SL is for Total Chlordane

<sup>c</sup> For Sediment Quality Standards, only non-OC-normalized values are shown. "NA" (not applicable) is used where an OC-normalized value exists.

% rec – percent recovery

DOD-QSM 4.2 definition: Analyte was not detected and is reported as less than the level of detection (LOD) or as defined by the project.

The detection limit is adjusted for dilution.

MDL – Method Detection Limit

MRL – Method Reporting Limit

HPAH – high molecular weight PAHs

J – The result is an estimated value.

LPAH – low molecular weight PAHs

ND – Non-detect

PAH – polycyclic aromatic hydrocarbons

OC – organic carbon

TOC – total organic carbon

U – The analyte was analyzed for, but was not detected ("Non-detect," or ND) at or above the MRL/MDL.

Figure 1. Site Location Map (Cardno, 2018)

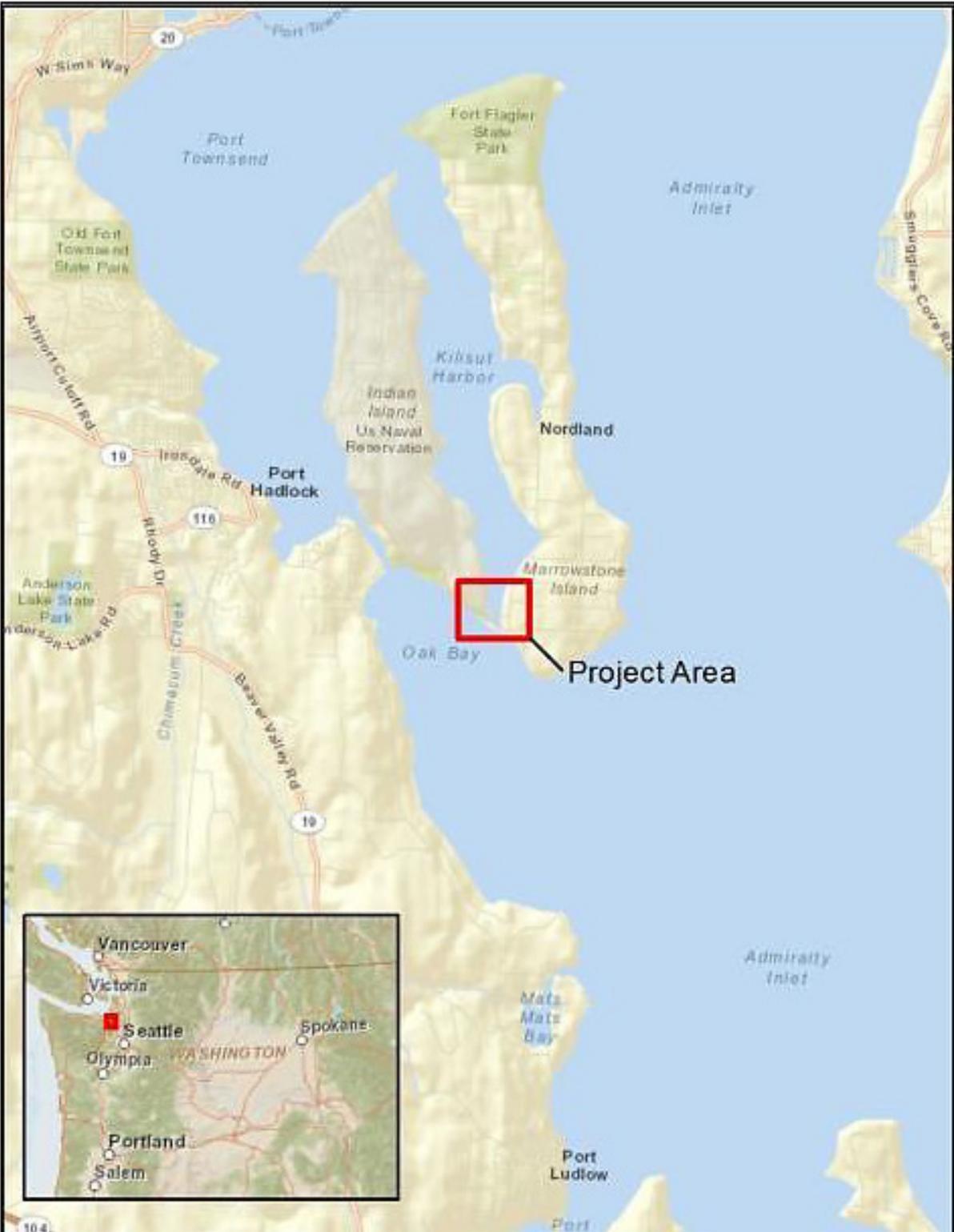


Figure 2. Project Excavation Area, Beach Nourishment Area, and Upland Disposal Site (Cardno, 2017)

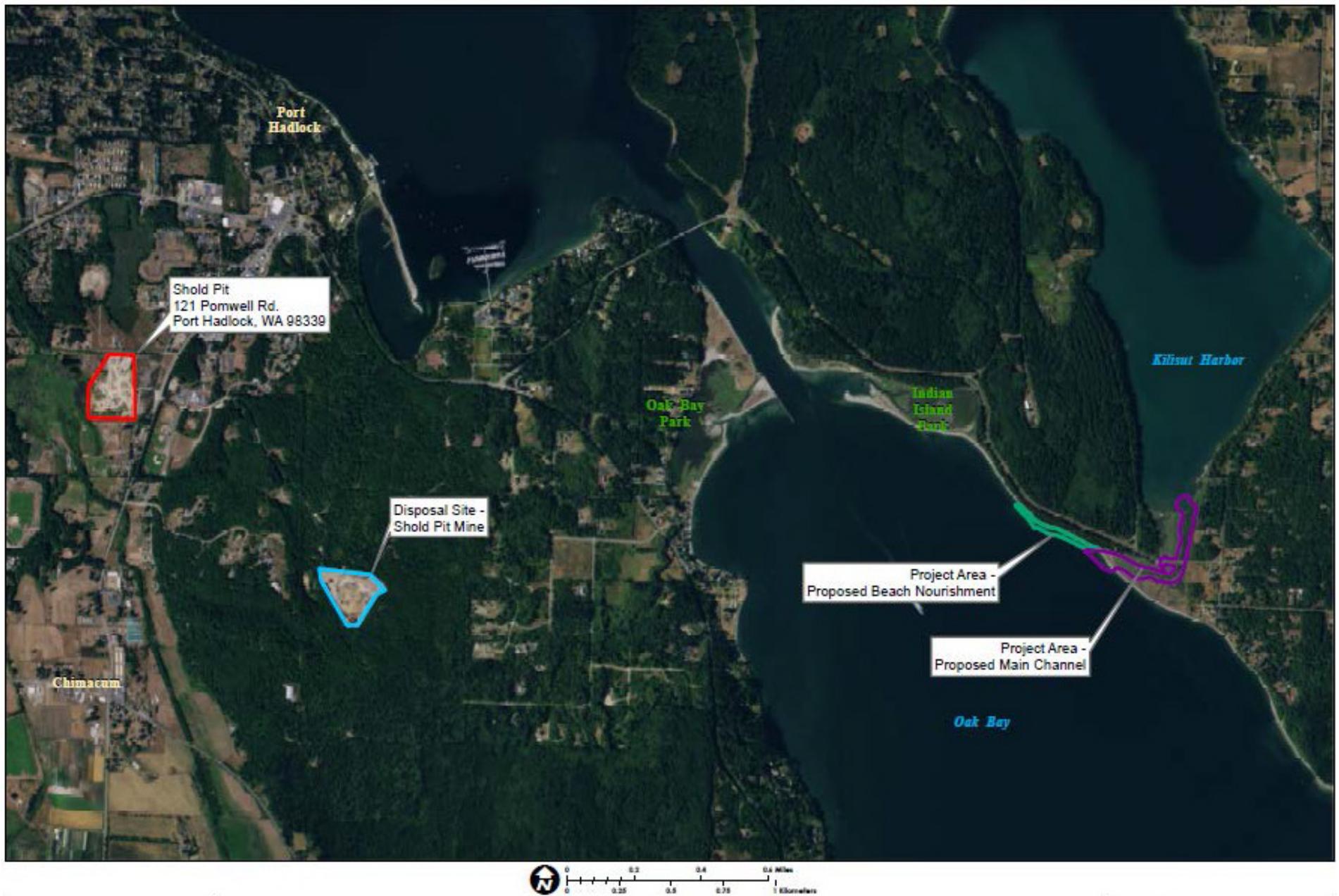


Figure 3. Target and Actual Sampling Locations

