

Subject: Suitability Determination Memorandum for the Sandy Hook Yacht Club Estates project on Whidbey Island, Washington (NWS-2018-181).

Introduction

This suitability determination memorandum (SDM) documents the consensus regarding the suitability of the proposed dredged material for unconfined aquatic disposal as determined by the Dredged Material Management Program (DMMP) agencies (U.S. Army Corps of Engineers, Washington Departments of Ecology and Natural Resources, and the U.S. Environmental Protection Agency).

Project Description

The project is located at the southernmost end of Whidbey Island on a peninsular landform in the eastern half of Cultus Bay, see Figure 1. The project includes an entrance channel on the western and northern sides of the peninsula and an inner channel through the marina on the eastern side of the peninsula. The marina channel is approximately 750 meters long, running north to south, and contains 70 boat slips that can accommodate vessels ranging from 10 to 28 feet in length.

Because of its location, the channel and marina receive significant sediment inputs from storm surges, net-shore drift processes, and intertidal and freshwater transport. Sandy Hook is surrounded by tidally inundated mudflats and a shallow intertidal zone on three sides. In the past, the Sandy Hook community has relied heavily on maintenance dredging to maintain the navigational channel, although it has been approximately 17 years since the last dredging event.

Project Summary

Waterbody	Whidbey Island, Puget Sound
Water classification	Marine
Initial Project rank	Moderate
Final Project Rank	Very low (DMMUs 3 and 4) Low (DMMUs 1 and 2) Moderate (DMMU 5)
Total proposed dredging volume (cy)	32,600 cubic yards (CY)
Target proposed dredging depth	-3 ft MLLW in entrance channel (DMMUs 3 and 4) -4 ft MLLW in marina (DMMUs 1, 2, 5)
Max. proposed dredging depth (includes 1 foot overdepth allowance)	-4 ft MLLW in entrance channel (DMMUs 3 and 4) -5 ft MLLW in marina (DMMUs 1, 2, 5)
Proposed disposal location(s)	Port Gardner non-dispersive disposal site or Port Townsend dispersive disposal site or beneficial use
Dredged Material Management Units (DMMUs): No. of stations	DMMUs 1-2: composite of 2 to 3 grabs per DMMU DMMU 5 and z-sample: composite of 2 vibracores
DMMO tracking number	SANDY-1-A-F-450
EIM Study ID	SANDY23
USACE Regulatory Reference Number	NWS-2018-181
Draft Sampling and Analysis Plan (SAP) Submittal Date	September 29, 2022
Sampling and Analysis Plan (SAP) Approval Date	January 18, 2023
Sampling Date(s)	February 15 and 28 th , 2023

Testing Parameters	DMMP standard marine COCs
Biological Testing	Not required
Suitability Outcome	All material found suitable for in-water disposal at a dispersive or non-dispersive disposal site
Recency Expiration Dates	DMMUs 3 and 4 – July 2026 DMMUs 1 and 2 – February 2029 DMMU 5 – February 2028

Sampling Design Considerations

The previous characterization (DMMP, 2017) reached its recency expiration in July 2021. In April 2021 the Sandy Hook entrance channel (DMMUs 3 and 4) was down-ranked to very low, with a recency period of 10 years (DMMP, 2021a). No dredging in DMMU 4 is proposed. Since there was no change in land use and no recorded spills in the area, and no dredging since the last characterization, the DMMP required confirmatory grab sampling in DMMUs 1 and 2. A previously uncharacterized dredging area in the inner harbor (DMMU 5) was added to the project and core sampling was required in this area, see Figure 2.

Updated volumes for each DMMU are shown in Table 1.

Sampling and Analysis Description

Sediment samples were collected by vibracore on February 15, 2023 and by Vanveen grab sampler on February 28th, 2023 aboard sampling vessel R/V Tieton provided by Gravity Consulting. Figure 2 shows the proposed and actual sediment sampling locations and Table 2 lists the sampling station details. There were no significant deviations from the Sampling and Analysis Plan (Canyon Environmental and Gravity, 2023).

Samples were submitted to Analytical Resources in Tukwila, Washington for analysis. Analyses were performed by Analytical Resources and AmTest Laboratories in Kirkland, Washington.

Data Validation

An EPA Stage 2b data validation was performed by Laboratory Data Consultants of Carlsbad, CA. Two Antimony results were rejected due to low percent recovery in the MS/MSD. Other than that, only minor issues were documented; and all data were considered usable, as qualified, by the data validator.

Analytical Testing Results

Table 3 summarizes the analytical results for the single core composite (DMMU 5) and the two grab composites (DMMUs 1 and 2) alongside the DMMP marine guidelines (Canyon Environmental and Gravity, 2024). DMMP marine guidelines are used to evaluate suitability of proposed dredged material for open-water disposal at a DMMP disposal site. Table 4 summarizes the analytical results for DMMUs 1, 2, and 5 alongside the State of Washington Sediment Management Standards for evaluation of antidegradation and to assist in evaluation of the material for beneficial use. Likewise, Table 5 summarizes the analytical results for DMMU 5-Z compared to SMS dry-weight AETs due to low TOC in this sample.

The dredged material soil type ranged from sandy loam in DMMUs 1 and 2, to silt loam in DMMU 5. The DMMU 5 z-sample returned to sandy loam. Correspondingly, grain size results ranged from 53.7 - 69.7% sand in DMMUs 1 and 2, with the amount of sand dropping to 17.6% in DMMU 5 and increasing back up

to 66.3% in DMMU 5-Z. Total organic carbon (TOC) varied similarly, with a range of 0.32% to 0.89% in DMMUs 1, 2 and 5-Z, and an increase to 1.3% in DMMU 5. Total sulfides were elevated in DMMU 2 at 870 mg/kg, but there is no SL for sulfides.

No detected or non-detected exceedances of the DMMP marine screening levels occurred.

Although antimony results were rejected in two of the four sediment samples the remaining two samples with acceptable results show that antimony was low in the sediment samples with non-detected concentrations nearly four orders of magnitude below the DMMP SL. Therefore, it is unlikely that antimony would be present in the project sediment in concentrations above the DMMP SL. Antimony is not on a COC on the SMS list.

TBT. Tributyltin analysis was not required by the DMMP for this project based on the site history and location of the project.

Dioxins/furans. Dioxin analysis was not required by the DMMP for this project based on the site history and location of the project.

Biological Results

No biological testing was required for this project.

DMMP Determinations

Suitability Determination

Chemical concentrations in the dredge prism composite samples were below the DMMP marine SLs as discussed above. The DMMP agencies have concluded that all 32,600 CY of dredged material from the Sandy Hook Yacht Club DMMUs 1, 2, 3 and 5 are suitable for open-water disposal at any dispersive or non-dispersive disposal site. The Port Gardner disposal site is the proposed disposal location due to its proximity to the project. Port Townsend is the closest dispersive disposal site.

Antidegradation Determination

The sediment to be exposed by dredging must either meet the State of Washington Sediment Management Standards (SMS) or the State's Antidegradation Standard (Ecology, 2013) as outlined by DMMP guidance (DMMP, 2008). Concentrations of all DMMP chemicals of concern were below DMMP SLs, and there is no reason to believe that the new exposed surface would be contaminated relative to the overlying materials, so analysis of the Z-sample was not required.

Although not required, the z-sample from DMMU 5 was accidentally analyzed by the analytical laboratory, see Table 5. There were no SL or SQS exceedances of the z-sample results, confirming the expectation that the sediment exposed by dredging is in compliance with the State of Washington Antidegradation Standard.

Rank Revision

DMMP guidelines allow down-ranking of a project after two testing cycles, based on the results from that testing and the use of best professional judgment (DMMP 2021b,).

The navigation channel (DMMUs 3 and 4) and the inner harbor (DMMUs 1 and 2) were characterized under a moderate rank in 2017 (with sampling in July 2016) and the navigation channel was down-ranked to very-low in 2021.

The inner channel DMMUs 1 and 2 were characterized once in 2017 and again this round with analysis of the full suite of standard marine COCs. Both characterizations demonstrated that the material is suitable for open-water disposal. Therefore, DMMUs 1 and 2 are down-ranked to low-moderate for future characterizations.

Inner channel DMMU 5 has only undergone one round of sampling. After the next sampling event, re-ranking will be evaluated.

Area	DMMUs	2023 rank	Recency length	Recency expiration
Navigation Channel	DMMUs 3 and 4	Very low	10 years	July 2026
Inner Harbor Area	DMMUs 1 and 2	Low-Moderate	6 years	February 2029
	DMMU 5	Moderate	5 years	February 2028

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).

All projects must use a screen to remove debris unless it can be demonstrated that debris is unlikely to be present or that the debris present is large woody debris that can be easily observed and removed by other means during dredging. For this project, a 12"x12" debris screen must be used for DMMUs 1, 2, and 5 unless information is provided to the DMMP that meet the "reason to believe" criteria laid out in DMMP 2015. A dredging and disposal quality control plan (QCP) must be developed and approved prior to dredging, and the QCP must include a debris management plan, including the use of a 12"x12" debris screen as required.

Notes and Clarifications

The decisions documented in this memorandum do **not** constitute final agency approval of the project. During the public comment period that follows a public notice, 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.

A pre-dredge meeting with DNR, Ecology and the Corps of Engineers is required at least 7 days prior to dredging. A dredging quality control plan must be developed and submitted to DNR, Ecology and the USACE Seattle District's Regulatory Branch and DMMO prior to the pre-dredge meeting. Refer to the USACE permit and Ecology 401 certification for project-specific submittal requirements and timelines.

The DMMP does not make specific beneficial use determinations. However, these data are available for the assessment of project-specific beneficial use by the project proponent, permitting agencies, local health jurisdictions and/or the owner of a receiving property.

References

Canyon Environmental and Gravity, 2023. *Sampling and Analysis Plan Sediment Quality Study, Sandy Hook Dredging Project, Whidbey Island, Washington*. Prepared for Sandy Hook Yacht Club Estates. Prepared by Gravity Consulting and Canyon Environmental Group, January 17, 2023.

- Canyon Environmental and Gravity, 2024. *Sediment Quality Study Data Report, Sandy Hook Dredging Project, Whidbey Island, Washington*. Prepared for Sandy Hook Yacht Club Estates. Prepared by Gravity Consulting and Canyon Environmental Group, January 5, 2024.
- DMMP, 2008. *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*. Final DMMP Clarification Paper. October 02, 2015.
- DMMP, 2021a. *Re-ranking of the Sandy Hook Marina on Whidbey Island, Washington (NWS-2018-181) in Accordance with Dredged Material Management Program Policy*. Prepared by the DMMP agencies. April 28, 2021.
- DMMP, 2021b. *Dredged Material Evaluation and Disposal Procedures (User Manual)*. Dredged Material Management Program, updated July 2021.
- DMMP, 2017. *Determination Regarding the Suitability of Proposed Dredged material from the Sandy Hook Marina, Whidbey Island, Washington, Evaluated Under Section 404 of the Clean Water Act for Unconfined Open-Water Disposal at the Port Gardner Non-Dispersive Disposal Site*. Prepared by the DMMP agencies. January 5, 2017.
- DMMP, 2002. *Determination on the Suitability of Proposed Dredged Material from the Sandy Hook Yacht Club Navigation Channel and Gravel Bar, for Beneficial Uses Disposal on an Adjacent Beach*. Prepared by the DMMP agencies. August 13, 2002.
- Ecology, 2013. *Sediment Management Standards – Chapter 173-204 WAC*. Washington State Department of Ecology, February 2013.

Agency Signatures

The signed copy is on file in the Dredged Material Management Office, U.S. Army Corps of Engineers, Seattle District

Date Kelsey van der Elst – U.S. Army Corps of Engineers, Seattle District

Date Erika Hoffman – U.S. Environmental Protection Agency, Region 10

Date Laura Inouye, PhD. – Washington State Department of Ecology

Date Shannon Soto – Washington State Department of Natural Resources

Copies Furnished:

- DMMP agencies
- Jamie Liljegren, USACE Regulatory PM
- Jeff Ninneman, Canyon Environmental Group
- Shawn Hinz, Gravity Environmental
- DMMO File

Table 1. DMMU Volumes

DMMU	DMMU volumes w/ 12% contingency (cubic yards)
1	11,210
2	5,700
3	13,160
4	
5	2,530
Total	32,600

Table 2. Sampling Information

Sample Location Name	Latitude (WGS84)	Longitude (WGS84)	Type	Mudline Elevation (ft MLLW)	Penetration Depth (ft)	Recovery Depth (ft)	Compositing Information	
							DMMU Name	Compositing Depths
C-1	47.91303702 N	122.39448254 W	Core	-2.3	8.2	7.5	DMMU 5	0-4 ft
C-2	47.91404942 N	122.3933568 W	Core	-3.4	6.5	6.0		0-4 ft
G-3	47.91503278 N	122.3928083 W	Grab	-0.98	---	---	DMMU 2	0-20 cm
G-4	47.91651554 N	122.39221588 W	Grab	-1.73	---	---		0-20 cm
G-1	47.91720294 N	122.39203888 W	Grab	-1.71	---	---	DMMU 1	0-20 cm
G-2	47.91835859 N	122.39147144 W	Grab	-0.2	---	---		0-20 cm

Table 3. Analytical results from Sandy Hook Marina compared to DMMP guidelines

Chemical	DMMP MARINE GUIDELINES			DMMU 1	DMMU 2	DMMU 5	DMMU 5-Z
	SL	BT	ML				
CONVENTIONALS							
Gravel (%)				0.3	0.1	0.4	17.3
Sand (%)				69.7	53.7	17.6	66.3
Silt (%)				21.6	32.1	61.8	10
Clay (%)				8.6	14.2	20.2	6.3
Ammonia as Nitrogen (mg/kg)				10.5	33.4	65.2	6.08
Carbon, Total Organic (TOC)(%)				0.53	0.89	1.3	0.32
Solids, Total (%)				67.08	58.45	51.18	79.26
Solids, Total Volatile (%)				2.12	3.06	4.9	1.95
						C-1	C-2
Sulfide, Total mg/Kg				49.4	870	352	421
Preserved Total Solids %				61.51	38.29	42.40	40.43
METALS (mg/kg dry weight)							
Antimony	150		200	REJ	0.32 u	0.36 u	REJ
Arsenic	57	507.1	700	2.85	3.62	5.59	3.32
Cadmium	5.1		14	0.17	0.25	1.08	0.18
Chromium	260			26.6	32.8	48.9	30.1
Copper	390		1,300	10.9	17.4	42.4	11.2
Lead	450	975	1,200	2.95	4.37	8.77	1.86 j+
Mercury	0.41	1.5	2.3	0.0117 j	0.0243 j	0.0702	0.0279 u
Selenium		3		1.1	1.05	1.68	1.16
Silver	6.1		8.4	0.06 j	0.1 j	0.18 j	0.04 j
Zinc	410		3,800	33.9	46.4	80.7	29.7
PAHs (µg/kg dry weight)							
Naphthalene	2,100		2,400	20 u	20 u	15.4 j	20 u
Acenaphthylene	560		1,300	20 u	20 u	7.4 j	20 u
Acenaphthene	500		2,000	20 u	20 u	6.1 j	20 u
Fluorene	540		3,600	20 u	20 u	19.7 u	20 u
Phenanthrene	1,500		21,000	9.8 j	11.1 j	34.8	20 u
Anthracene	960		13,000	20 u	20 u	22	20 u
2-Methylnaphthalene	670		1,900	20 u	4.6 j	11.6 j	20 u
Total LPAH	5,200		29,000	9.8	15.7	97.3	20 u

Chemical	DMMP MARINE GUIDELINES			DMMU 1	DMMU 2	DMMU 5	DMMU 5-Z
	SL	BT	ML				
Fluoranthene	1,700	4,600	30,000	21.4	39	106	20 u
Pyrene	2,600	11,980	16,000	20.6	30.4	165	20 u
Benz(a)anthracene	1,300		5,100	8 j	8 j	48.6	20 u
Chrysene	1,400		21,000	12.1 j	18.9 j	88	20 u
Benzofluoranthenes (b, j ,k)	3,200		9,900	21.6 j	22.3 j	146	40 u
Benzo(a)pyrene	1,600		3,600	7.9 j	6.6 j	38.8	20 u
Indeno(1,2,3-c,d)pyrene	600		4,400	20 u	20 u	25.2	20 u
Dibenz(a,h)anthracene	230		1,900	20 u	20 u	19.7 u	20 u
Benzo(g,h,i)perylene	670		3,200	20 uj	20 uj	29	20 u
Total HPAH	12,000			91.6	125.2	646.6	40 u
Total PAHs⁽⁶⁾				101.4	140.9	743.9	40 u
CHLORINATED HYDROCARBONS (µg/kg dry weight)							
1,4-Dichlorobenzene	110			0.9 j*	0.8 u	1.5 u	20 u
1,2-Dichlorobenzene	35			1.1 j*	5 u	0.8 u	20 u
1,2,4-Trichlorobenzene	31			5 u*	5 u	4.9 u	20 u
Hexachlorobenzene (HCB)	22	168		1.2 j*	5 u	0.8 u	20 u
PHTHALATES (µg/kg dry weight)							
Dimethyl phthalate	71			20 u	20 u	19.7 u	20 u
Diethyl phthalate	200			49.9 u	50 u	49.3 u	50 u
Di-n-butyl phthalate	1,400			20 u	20 u	19.7 u	20 u
Butyl benzyl phthalate	63			20 u	20 u	19.7 u	20 u
Bis(2-ethylhexyl) phthalate	1,300			49.9 uj	50 uj	12.3 J	8.3 j
Di-n-octyl phthalate	6,200			20 uj	20 uj	19.7 u	20 u
PHENOLS (µg/kg dry weight)							
Phenol	420			9.7 u	24.6	65.7	15.4 u
2-Methylphenol	63		77	1.4 j*	1.1 j*	2.6 j*	5u*
4-Methylphenol	670		3,600	4.8 j*	32.4	38.8 *	1.8 j*
2,4-Dimethylphenol	29			20 uj*	20 uj*	5.1 j*	20 uj*
Pentachlorophenol	400	504		99.9 uj	100 uj	98.6 u	100 u
MISCELLANEOUS EXTRACTABLES (µg/kg dry weight)							
Benzyl alcohol	57		870	20 u	20 u	11.9 u	20 u
Benzoic acid	650		760	30.6 uj	18.8 uj	219 j-	159 j-
Dibenzofuran	540		1,700	20 u	20 u	19.7 u	20 u
Hexachlorobutadiene	11		270	5 u*	5 u*	4.9 u*	1.3 u*
N-Nitrosodiphenylamine	28		130	20 u	20 u	19.7 u	20 u

Chemical	DMMP MARINE GUIDELINES			DMMU 1	DMMU 2	DMMU 5	DMMU 5-Z
	SL	BT	ML				
PESTICIDES & PCBs (µg/kg dry weight)							
4,4'-DDD	16			1 u	1 u	0.99 uj	1 u
4,4'-DDE	9			1 u	0.25 j	0.99 uj	1 u
4,4'-DDT	12			1 u	0.7 j	0.99 uj	1 u
Sum of 4,4'-DDD, 4,4'-DDE, 4,4'- DDT		50	69	1 u	0.95 j	0.99 uj	1 u
Aldrin	9.5			0.5 u	0.5 u	0.49 uj	0.5 u
Total Chlordane (sum of cis-chlordane, trans-chlordane, cis-nonachlor, trans-nonachlor, oxychlordane)	2.8	37		1 u	1 u	1 uj	1 u
Dieldrin	1.9		1,700	1 u	1 u	0.99 uj	1 u
Heptachlor	1.5		270	0.5 u	0.5 u	0.49 uj	0.5 u
Aroclor 1016				4 u	4 u	4 u	4 u
Aroclor 1221				4 u	4 u	4 u	4 u
Aroclor 1232				4 u	4 u	4 u	4 u
Aroclor 1242				4 u	4 u	4 u	4 u
Aroclor 1248				4 u	4 u	4 u	4 u
Aroclor 1254				4 u	4 u	6.6	4 u
Aroclor 1260				4 u	4 u	9.5	4 u
Total PCBs (Aroclors)	130	38(8)	3,100	4 u	4 u	16.1	4 u

* Results derived from Method EPA 8270E-SIM

The following are definitions of the data qualifiers utilized during data validation:

J+ (Estimated, High Bias): The analyte was analyzed for and positively identified by the laboratory; however, the reported concentration is estimated, displaying high bias, due to non-conformances discovered during data validation.

J- (Estimated, Low Bias): The analyte was analyzed for and positively identified by the laboratory; however, the reported concentration is estimated, displaying low bias, due to non-conformances discovered during data validation.

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however, the reported concentration is estimated due to nonconformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however, the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however, the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the

Table 4. Analytical results from Sandy Hook Marina compared to SMS Criteria

Chemical	Sediment Magament Standards		DMMU 1		DMMU 2		DMMU 5	
	SCO	CSL						
CONVENTIONALS								
Carbon, Total Organic (TOC)(%)			0.53		0.89		1.3	
Solids, Total (%)			67.08		58.45		51.18	
METALS (mg/kg dry weight)								
Arsenic	57	93	2.85		3.62		5.59	U
Cadmium	5.1	6.7	0.17		0.25		1.08	
Chromium	260	270	26.6		32.8		48.9	
Copper	390	390	10.9		17.4		42.4	
Lead	450	530	2.95		4.37		8.77	
Mercury	0.41	0.59	0.0117	J	0.0243	J	0.0702	
Silver	6.1	6.1	0.06	J	0.1	J	0.18	J
Zinc	410	960	33.9		46.4		80.7	
PAHs (mg/kg OC)								
Naphthalene	99	170	3.774	U	2.247	U	1.185	J
Acenaphthylene	66	66	3.774	U	2.247	U	0.569	J
Acenaphthene	16	57	3.774	U	2.247	U	0.469	J
Fluorene	23	79	3.774	U	2.247	U	1.515	U
Phenanthrene	100	480	1.849	J	1.247	J	2.677	
Anthracene	220	1,200	3.774	U	2.247	U	1.692	
2-Methylnaphthalene	38	64	3.774	U	0.517	J	0.892	J
Total LPAH	370	780	1.849		1.764		7.485	
Fluoranthene	160	1,200	4.038		4.382		8.154	
Pyrene	1,000	1,400	3.887		3.416		12.692	
Benz(a)anthracene	110	270	1.509	J	0.899	J	3.738	
Chrysene	110	460	2.283	J	2.124	J	6.769	
Benzofluoranthenes (b, j, k)			4.075		2.506	J	11.231	
	230	450		J				
Benzo(a)pyrene	99	210	1.491	J	0.742	J	2.985	
Indeno(1,2,3-c,d)pyrene	34	88	3.774	U	2.247	U	1.938	
Dibenz(a,h)anthracene	12	33	3.774	U	2.247	U	1.515	U
Benzo(g,h,i)perylene	31	78	3.774	UJ	2.247	UJ	2.231	
Total HPAH	960	5,300	17.283		14.067		49.738	
CHLORINATED HYDROCARBONS (mg/kg OC)								
1,2-Dichlorobenzene	2.3	2.3	0.170	J	0.562	U	0.062	U
1,4-Dichlorobenzene	3.1	9	0.208	J	0.090	U	0.115	U
1,2,4-Trichlorobenzene	0.81	1.8	0.943	U	0.562	U	0.377	U
Hexachlorobenzene (HCB)	0.38	2.3	0.226	J	0.562	U	0.062	U

Chemical	Sediment Magament Standards		DMMU 1		DMMU 2		DMMU 5	
	SCO	CSL						
PHthalates AND MISCELLANEOUS EXTRACTABLES (mg/kg OC)								
Dimethyl phthalate	53	53	3.774	U	2.247	U	1.515	U
Diethyl phthalate	61	110	9.415	U	5.618	U	3.792	U
Di-n-butyl phthalate	220	1,700	3.774	U	2.247	U	1.515	U
Butyl benzyl phthalate	4.9	64	3.774	U	2.247	U	1.515	U
Bis(2-ethylhexyl) phthalate	47	78	9.415	UJ	5.618	UJ	0.946	J
Di-n-octyl phthalate	58	4,500	3.774	UJ	2.247	UJ	1.515	U
Dibenzofuran	15	58	3.774	U	2.247	U	1.515	U
Hexachlorobutadiene	3.9	6	0.943	U	0.562	U	0.377	U
N-Nitrosodiphenylamine	11	11	3.774	U	2.247	U	1.515	U
PHENOLS AND MISCELLANEOUS EXTRACTABLES (µg/kg dry weight)								
Phenol	420	1,200	9.7	U	24.6		65.7	
2-Methylphenol	63	63	1.4	J	1.1	J	2.6	J
4-Methylphenol	670	670	4.8	J	32.4		38.8	
2,4-Dimethylphenol	29	29	20	UJ	20	UJ	5.1	J
Pentachlorophenol	360	690	99.9	UJ	100	UJ	98.6	U
Benzyl alcohol	57	73	20	U	20	U	11.9	U
Benzoic acid	650	650	30.6	UJ	18.8	UJ	219	J
PCBs (mg/kgOC)								
Aroclor 1016			0.755	U	0.449	U	0.308	U
Aroclor 1221			0.755	U	0.449	U	0.308	U
Aroclor 1232			0.755	U	0.449	U	0.308	U
Aroclor 1242			0.755	U	0.449	U	0.308	U
Aroclor 1248			0.755	U	0.449	U	0.308	U
Aroclor 1254			0.755	U	0.449	U	0.508	
Aroclor 1260			0.755	U	0.449	U	0.731	
Total PCBs (Aroclors)	12	65	0.755	U	0.449	U	1.238	

Non-detected exceedance of the Sediment Cleanup Objective (SCO)

The following are definitions of the data qualifiers utilized during data validation:

J+ (Estimated, High Bias): The analyte was analyzed for and positively identified by the laboratory; however, the reported concentration is estimated, displaying high bias, due to non-conformances discovered during data validation.

J- (Estimated, Low Bias): The analyte was analyzed for and positively identified by the laboratory; however, the reported concentration is estimated, displaying low bias, due to non-

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however, the reported concentration is estimated due to nonconformances discovered during

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however, the analyte should be considered non-detected at the reported concentration due

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however, the reported quantitation/detection limit is estimated due to non-conformances

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not

Table 5. Analytical results from Sandy Hook Marina compared to dry weight AETs for low-TOC DMMUs.

Chemical	Sediment Magament Standards		DMMU 5-Z	
	SCO	CSL		
CONVENTIONALS				
Gravel (%)			17.3	
Sand (%)			66.3	
Silt (%)			10	
Clay (%)			6.3	
Ammonia as Nitrogen (mg/kg)			6.08	
Carbon, Total Organic (TOC)(%)			0.32	
Solids, Total (%)			79.26	
Solids, Total Volatile (%)			1.95	
METALS (mg/kg dry weight)				
Arsenic	57	93	3.32	
Cadmium	5.1	6.7	0.18	
Chromium	260	270	30.1	
Copper	390	390	11.2	
Lead	450	530	1.86	J+
Mercury	0.41	0.59	0.0279	U
Silver	6.1	6.1	0.04	J
Zinc	410	960	29.7	
PAHs (ug/kg dry weight)				
Naphthalene	2,100	2,100	20	U
Acenaphthylene	1,300	1,300	20	U
Acenaphthene	500	500	20	U
Fluorene	540	540	20	U
Phenanthrene	1,500	1,500	20	U
Anthracene	960	960	20	U
2-Methylnaphthalene	670	670	20	U
Total LPAH	5,200	5,200	20	U
Fluoranthene	1,700	2,500	20	U
Pyrene	2,600	3,300	20	U
Benz(a)anthracene	1,300	1,600	20	U
Chrysene	1,400	2,800	20	U
Benzo(a)fluoranthenes (b, j, k)	3,200	3,600	40	U
Benzo(a)pyrene	1,600	1,600	20	U
Indeno(1,2,3-c,d)pyrene	600	690	20	U
Dibenz(a,h)anthracene	230	230	20	U
Benzo(g,h,i)perylene	670	720	20	U
Total HPAH	12,000	17,000	40	U
CHLORINATEDHYDROCARBONS (ug/kg dry weight)				
1,2-Dichlorobenzene	35	51	20	U
1,4-Dichlorobenzene	110	110	20	U
1,2,4-Trichlorobenzene	31	51	20	U
Hexachlorobenzene (HCB)	22	70	20	U

Chemical	Sediment Magament Standards		DMMU 5-Z	
	SCO	CSL		
PHTHALATES AND MISCELLANEOUS EXTRACTABLES (ug/kg dry weight)				
Dimethyl phthalate	71	160	20	U
Diethyl phthalate	200	> 200	50	U
Di-n-butyl phthalate	1,400	5,100	20	U
Butyl benzyl phthalate	63	900	20	U
Bis(2-ethylhexyl) phthalate	1,300	3,100	8.3	J
Di-n-octyl phthalate	6,200	6,200	20	U
Dibenzofuran	540	540	20	U
Hexachlorobutadiene	11	120	1.3	U
N-Nitrosodiphenylamine	28	40	20	U
PHENOLS AND MISCELLANEOUS EXTRACTABLES (µg/kg dry weight)				
Phenol	420	1,200	15.4	U
2-Methylphenol	63	63	ND*	
4-Methylphenol	670	670	1.8	J
2,4-Dimethylphenol	29	29	20	UJ
Pentachlorophenol	360	690	100	UJ
Benzyl alcohol	57	73	20	UJ
Benzoic acid	650	650	159	J
PCBs (ug/kg dry weight)				
Aroclor 1016			4	U
Aroclor 1221			4	U
Aroclor 1232			4	U
Aroclor 1242			4	U
Aroclor 1248			4	U
Aroclor 1254			4	U
Aroclor 1260			4	U
Total PCBs (Aroclors)	130	1000	4	U

The following are definitions of the data qualifiers utilized during data validation:

J+ (Estimated, High Bias): The analyte was analyzed for and positively identified by the laboratory; however, the reported concentration is estimated, displaying high bias, due to

J- (Estimated, Low Bias): The analyte was analyzed for and positively identified by the laboratory; however, the reported concentration is estimated, displaying low bias, due to non-conformances discovered during data validation.

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however, the reported concentration is estimated due to nonconformances discovered during data validation.

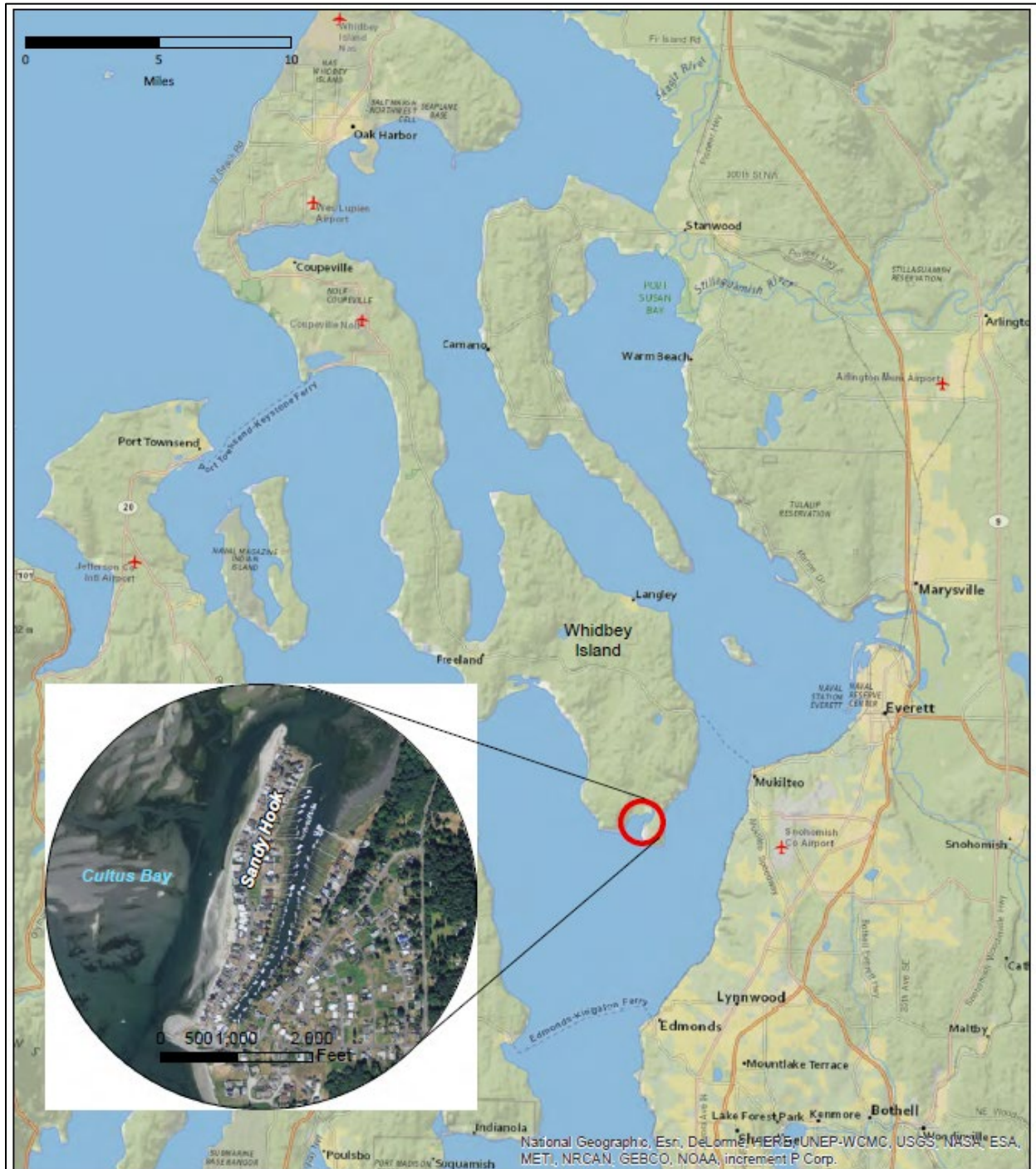
U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however, the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however, the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

Figure 1. Project Location



Source Information:
2011 NAIP Orthophoto



Canyon Environmental Group LLC
112 Ohio Street, Suite #115
Bellingham WA, 98225

FIGURE 1
Scaled Site Vicinity Map
Sandy Hook, Whidbey Island
Island County, WA

Date: 9/08/2022

Figure 2. Sediment Core Locations (from Canyon Environmental and Gravity, 2024)

