CENWS-OD-ME-DMMO

MEMORANDUM FOR: RECORD **February 19, 2013**

SUBJECT: DETERMINATION REGARDING THE SUITABILITY OF PROPOSED DREDGED MATERIAL FROM BAY HEAD MARINA, ORCAS ISLAND, SAN JUAN COUNTY, EVALUATED UNDER SECTION 404 OF THE CLEAN WATER ACT FOR BENEFICIAL USE OR UNCONFINED OPEN-WATER DISPOSAL AT THE ROSARIO STRAIT DISPERSIVE 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 Department of Ecology, Washington State Department of Natural Resources, and the Environmental Protection Agency) regarding the suitability of up to 20,000 cubic yards (cy) of dredged material from Bay Head Marina for beneficial use or open-water disposal at the Rosario Strait dispersive site.

2. **Background**. The Bay Head Marina is located on the south side of Orcas Island, approximately 1500 feet east of the Orcas Island Ferry dock. The marina, which supports the moorage of about 70 boats, was first dredged approximately 30 years ago. Since its creation, sediment has built up in the marina from creek input and tidal action. Dredging is needed to restore full access to all the slips and improve access for boats entering and exiting the marina during low tide.

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

Table 1. Project Summary

Project ranking	Moderate
Proposed dredging volume	20,000 cy
Proposed dredging depth	-8 ft MLLW (plus 1 ft overdredge)
Round 1: Sediment sampling dates	 February 24, 2012
Sediment characterization report (SCR) received	June 27, 2012
Comments provided on 1st draft SCR	July 13, 2012
2nd draft SCR received	August 28, 2012
Round 2: 1st Draft Dioxin SAP received	 August 30, 2012
Comments provided on 1st Dioxin SAP	September 11, 2012
2nd Draft Dioxin SAP received	September 15, 2012
Dioxin SAP approved	September 21, 2012
Dioxin sampling	September 25, 2012
Draft final SCR received	January 31, 2013
Comments provided on draft dioxin SCR	February 1, 2013
Final sediment characterization report received	February 12, 2013

DAIS Tracking number	BAYHE-1-A-F-328
USACE Permit Application Number	
Recency Determination (moderate rank = 5 years)	February 2017

4. **Project Ranking and Sampling Requirements**. This project was ranked "moderate" by the DMMP agencies according to the guidelines set out in the User's Manual for marinas. In a moderate-ranked area the number of samples and analyses are calculated using the following guidelines (DMMP, 2008a):
    - Maximum volume of sediment represented by each field sample = 4,000 cubic yards
    - Maximum volume of sediment represented by each analysis in the upper 4-feet of the dredging prism (surface sediment) = 16,000 cubic yards
    - Maximum volume of sediment represented by each analysis in the subsurface portion of the dredging prism = 24,000 cubic yards

    Based on these guidelines, the 20,000 cy of heterogeneous sediments were divided into two DMMUs. The surface DMMU included the top four feet of sediment throughout the marina. The subsurface DMMU included all material below the top four feet.

5. **Sampling**. All Round 1 sampling and analysis was done without coordination with DMMP agencies and without an approved SAP. Round 1 sampling took place February 24th, 2012 using a combination hand collected samples and a split-spoon hollow stem drill rig. Three boring locations (Figure 2) were collected from land during low tide, divided and composited into three samples and submitted for physical and chemical analysis. The surface DMMU was represented by a composite of three hand collected surface samples and the subsurface DMMU was represented by a composite of three samples from two boring locations. Compositing information for Round 1 sampling is presented in Table 2. A z-sample was also collected from each of the three sampling locations and composited for a single analysis. Not all of the material composited into the z-sample was actually representative of material that will be exposed by dredging, but the DMMP agencies determined based on the results of the chemical analysis, that the variability in the sampling depths was not sufficient to impact the usability of the data.

    A second round of sampling was required by the DMMP agencies to address the reason-to-believe concerns with respect to dioxin and disposal at a dispersive DMMP disposal site (DMMP, 2010). Dioxin and furans were not analyzed in the first round of sampling, and no archived sediment was available for analysis. Due to the very low levels of COCs seen in Round 1 testing, the DMMP agencies agreed that a single composite of both DMMUs would be sufficient for dioxin analysis. Round 2 sampling took place September 25th, 2012 using a split-spoon hollow stem drill rig according to the approved Dioxin SAP (Geo-Test Services, 2012a). Three samples were collected from three boring locations and composited into a single sample, the locations of these borings are shown in Figure 3 and the compositing information is shown in Table 3. Z-samples from each boring were archived separately.

6. **Chemical Analysis**. There was no SAP for Round 1 sampling; however, based on the location of the samples relative to potential sources and the low concentrations of chemical of concern found in the marina (Geo-Test Services, 2012b), the DMMP agencies determined the results were sufficient for decision-making. The sediment conventional and chemistry results can be found in Table 4 and

dioxin results can be found in Table 5.

The sediment conventional results show that the proposed dredged material is predominantly sand, with 82.4 and 72.4% sand in the surface and subsurface DMMUs, respectively. Total organic carbon was also low, ranging from 0.27% in the surface DMMU to 0.40% in the subsurface DMMU.

The chemical results indicate that there were no detected exceedances of screening levels for the standard DMMP chemicals of concern (DMMP, 2011). However, there were undetected exceedances of screening level values for antimony, selenium, and 2,4-dimethylphenol in both the surface and subsurface DMMUs at the method reporting limit. None of these compounds were detected in any of the samples at the lower method detection limit, which were all well below the screening level values. Therefore, the DMMP agencies determined that these chemicals were not likely to be present above the screening levels in these samples, and agreed there was no need to conduct bioassays.

During Round 2 sampling, the SAP was followed and DMMP quality control guidelines were generally met. Results of the dioxin analysis revealed very low levels of dioxin and furan congeners in Bay Head Marina sediments. The majority of dioxin and furan congeners were undetected in the sediment sample. The dioxin concentration in the sediment sample was 0.09 ppt TEQ, with U=1/2 EDL. Dioxin testing of the z-samples was not required.

7. **Sediment Exposed by Dredging**. The sediment to be exposed by dredging must either meet the State of Washington Sediment Quality Standards (SQS) (Ecology, 1995) or the State's antidegradation standard (DMMP, 2008b).

   Although not required by the DMMP agencies, the z-sample from Round 1 sampling was analyzed for the full suite of physical and chemical parameters. A comparison of the analytical results from the z-samples to SQS is presented in Table 6.

   There were no detected exceedances of any of the SMS sediment quality standards in the z-sample. There was one undetected exceedance for hexachlorobenzene (SQS = 0.38 mg/kg OC and z-sample = 0.399 (U) mg/kg OC) when reported at the method detection limit. The DMMP agencies considered the available information regarding the apparent hexachlorobenzene exceedance and the location of the project site. Bay Head Marina is located on Orcas Island in an unindustrialized area. Hexachlorobenzene was undetected at values well below the DMMP SL in both the dredge prism and the z-sample, and the undetected SMS exceedance was not substantially above the SQS value. The DMMP agencies concluded, based on the above considerations, that hexachlorobenzene is not likely to be present in the surface to be exposed by dredging at a concentration of concern.

   Thus, the sediment to be exposed by dredging is not considered to be degraded relative to the currently exposed sediment surface. On this basis the DMMP agencies conclude that this project is in compliance with the State of Washington anti-degradation policy.

8. **Suitability Determination**. This memorandum documents the evaluation of the suitability of sediment proposed for dredging from Bay Head Marina for beneficial use or open-water disposal at the Rosario Strait dispersive disposal site. The approved sampling and analysis plan, where

applicable, was generally followed. The data gathered were deemed sufficient and acceptable for regulatory decision-making under the DMMP program.

In summary, based on the results of the previously described testing, the DMMP agencies conclude that **all 20,000 cubic yards from Bay Head Marina are suitable** for open-water disposal at the Rosario Strait dispersive site. The material is also suitable for in-water beneficial use; however, a determination regarding upland beneficial use should be coordinated with the local health jurisdiction.

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.

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 the Regulatory Branch of the Seattle District Corps of Engineers at least 7 days prior to the pre-dredge meeting. A DNR site use authorization must also be acquired.

9. References.

DMMP, 2011. *Marine Sediment Quality Screening Levels: Adopting RSET Marine SLs for Use in DMMP.* A Clarification Paper prepared by Laura Inouye (Ecology) and David Fox (USACE) for the Dredged Material Management Program, June 2011.

DMMP, 2010. *Dredged Material Management Program New Interim Guidelines for Dioxins*. December 6, 2010.

DMMP, 2008a. *Dredged Material Evaluation and Disposal Procedures (Users Manual)*. Prepared by the Seattle District Dredged Material Management Office for the Dredged Material Management Program, July 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.

Ecology, 1995. *Sediment Management Standards – Chapter 173-204 WAC*. Washington State Department of Ecology, December 1995.

Geo-Test Services Inc. 2012a. Updated Sampling and Analysis Plan (SAP) for Proposed Bay Head Marina Maintenance Dredging. September 21st, 2012.

Geo-Test Services Inc., 2012b. Sediment Characterization Report for Bay Head Marina. February 12, 2013.

10. Agency Signatures.

The signed document is on file at the Dredged Material Management Office

Concur:

_____ _____
Date Kelsey van der Elst - Seattle District Corps of Engineers

_____ _____
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:

Bret Thurman, Bay Head Marina
Dan Sorensen, Geo-Test Services
Susan Powell, Seattle District Regulatory
DMMP signatories

Table 2. Round 1 Sampling and Compositing.

		Surface DMMU	Subsurface DMMU	z-sample	Total
SAP volume (CY):		~ 11,000	~ 9,000	---	20,000
Station	B-1	4 to 1.5	0 to -2.5	-3.5 to -8	
	B-2	4 to 1.5	---	-6 to -9.5	
	B-3	2 to -0.5	-2 to -4.5 -5.5 to -8	-8 to -10.5	

Notes:

1) The design depth is -9 feet MLLW, including one foot of overdredge depth.

Table 3. Round 2 Sampling and Compositing.

		Dioxin Composite DMMU
SAP volume (CY):		20,000 cy
Station	B-4[1]	0.5 to -7 ft MLLW
	B-5	0.5 to -9 ft MLLW
	B-6	-6 to -9 ft MLLW

[1] sample location in side slope

Table 4. Chemical results compared to DMMP regulatory guidelines.

CHEMICAL	SL	BT	ML	Surface DMMU		Subsurface DMMU		z-sample	
CONVENTIONALS				conc	LQ	conc	LQ	conc	LQ
Gravel, %				7.5		9.5		12	
Sand, %				82.4		72.4		57.5	
Silt, %				7.6		15		6.6	
Clay, %				2.5		3.1		23.9	
Fines (Silt + Clay), %				10.1		18.1		30.5	
Total Solids, %				82.4		82.2		79.6	
Volatile Soilids, %				1.1		1.41		1.89	
Total Organic Carbon, %				0.274		0.397		0.828	
Total Sulfides, mg/kg				2.1		0.9	J	0.5	J
Total Ammonia, mg N/kg				0.91		6.92		11.1	
METALS (mg/kg)									
Antimony	150	---	200	11.1	U	11.4	U	11.6	U
Arsenic	57	507	700	2.6		1.3	J	2.8	
Cadmium	5.1	11.3	14	0.13		0.2		0.23	
Chromium	260	260	---	10.7		11		16.1	
Copper	390	1,027	1,300	9.4		7.3		8.8	
Lead	450	975	1,200	2.3	J	1.9	J	2	J
Mercury	0.41	1.5	2.3	0.012		0.012		0.011	
Selenium	---	3	---	*0.8*	*U*	*0.8*	*U*	*0.8*	*U*
Silver	6.1	6.1	8.4	0.6	U	0.6	U	0.6	U
Zinc	410	2,783	3,800	20.7		19.3		22.5	
ORGANOMETALLIC COMPOUNDS (µg/L)									
Tributyltin	0.15	---	---	0.05	U	0.05	U	0.052	U
PAHs (ug/kg dry)									
Total LPAH	5,200	---	29,000	6.1	U	6.1	U	6.3	U
Naphthalene	2,100	---	2,400	6.1	U	6.1	U	6.3	U
Acenaphthylene	560	---	1,300	6.1	U	6.1	U	6.3	U
Acenaphthene	500	---	2,000	6.1	U	6.1	U	6.3	U
Fluorene	540	---	3,600	6.1	U	6.1	U	6.3	U
Phenanthrene	1,500	---	21,000	6.1	U	6.1	U	6.3	U
Anthracene	960	---	13,000	6.1	U	6.1	U	6.3	U
2-Methylnaphthalene	670	---	1,900	6.1	U	6.1	U	6.3	U
Total HPAH	12,000	---	69,000	32.3		8.8		6.3	U
Fluoranthene	1,700	4,600	30,000	8.5		4.5	J	6.3	U
Pyrene	2,600	11,980	16,000	7.2		4.3	J	6.3	U
Benzo(a)anthracene	1,300	---	5,100	6.1	U	6.1	U	6.3	U
Chrysene	1,400	---	21,000	8.1		6.1	U	6.3	U
Total benzofluoranthenes	3,200	---	9,900	4.5	J	6.1	U	6.3	U
Benzo[a]pyrene	1,600	---	3,600	6.1	U	6.1	U	6.3	U
Indeno(1,2,3-c,d)pyrene	600	---	4,400	6.1	U	6.1	U	6.3	U
Dibenzo(a,h)anthracene	230	---	1,900	6.1	U	6.1	U	6.3	U
Benzo(g,h,i)perylene	670	---	3,200	4	J	6.1	U	6.3	U
CHLORINATED BENZENES (ug/kg)									
1,2-Dichlorobenzene	35	---	110	6.1	U	6.1	U	6.3	U
1,4-Dichlorobenzene	110	---	120	6.1	U	6.1	U	6.3	U
1,2,4-Trichlorobenzene	31	---	64	6.1	U	6.1	U	6.3	U
Hexachlorobenzene	22	168	230	6.1	U	6.1	U	6.3	U
PHTHALATE ESTERS (ug/kg)									
Dimethyl phthalate	71	---	1,400	6.1	U	6.1	U	6.3	U
Diethyl phthalate	200	---	1,200	6.1	U	6.1	U	6.3	U
Di-n-butyl phthalate	1,400	---	5,100	13	U	13	U	13	U
Butyl benzyl phthalate	63	---	970	6.1	U	6.1	U	6.3	U
Bis(2-ethylhexyl)phthalate	1,300	---	8,300	6.1	U	15	J	63	U
Di-n-octyl phthalate	6,200	---	6,200	6.1	U	6.1	U	6.3	U

CHEMICAL	SL	BT	ML	Surface DMMU		Subsurface DMMU		z-sample	
PHENOLS (ug/kg)									
Phenol	420	---	1,200	3.9	J	3.6	J	19	U
2 Methylphenol	63	---	77	6.1	U	6.1	U	6.3	U
4 Methylphenol	670	---	3,600	6.1	U	6.1	U	6.3	U
2,4-Dimethylphenol	29	---	210	*6.3*	*U*	*6.3*	*U*	*6.3*	*U*
Pentachlorophenol	400	504	690	61	U	61	U	63	U
MISCELLANEOUS EXTRACTABLES (ug/kg)									
Benzoic acid	650	---	760	130	U	130	U	130	U
Benzyl alcohol	57	---	870	13	U	13	U	13	U
Dibenzofuran	540	---	1,700	6.1	U	6.1	U	6.3	U
Hexachlorobutadiene	11	---	270	6.1	U	6.1	U	6.3	U
Hexachloroethane	---	---	---	6.1	U	6.1	U	6.3	U
N-Nitrosodiphenylamine	28	---	130	6.1	U	6.1	U	6.3	U
PESTICIDES (ug/kg)									
Aldrin	9.5	---	---	0.61	U	0.61	U	0.63	U
Total Chlordane	2.8	37	---	0.61	U	0.61	U	0.63	U
Dieldrin	1.9	---	---	0.61	U	0.61	U	0.63	U
Heptachlor	1.5	---	---	0.61	U	0.61	U	0.63	U
p,p'-DDE	9	---	---	0.61	U	0.61	U	0.63	U
p,p'-DDD	16	---	---	0.61	U	0.61	U	0.63	U
p,p'-DDT	5	---	---	0.61	U	0.61	U	0.63	U
Total DDT		50	69	0.61	U	0.61	U	0.63	U
PCBs (ug/kg)									
Total PCBs	130	---	3,100	13	U	13	U	13	U
Total PCBs (mg/kg OC)	---	38	---	4.7	U	3.3	U	1.6	U
DMMP DETERMINATION									
DMMU volume				9,000 CY		11,000 CY		---	
Rank				Moderate		Moderate		---	
Mean sample depth				+2 ft MLLW		-3.75 ft MLLW		-7.75 ft MLLW	
Maximum sampling depth				-0.5 ft MLLW		-8 ft MLLW		-10.5 ft MLLW	
Determination				pass		pass		---	
	SL	**BT**	**ML**	**Surface DMMU**		**Subsurface DMMU**		**z-sample**	

U = undetected at the MRL unless otherwise noted
J = estimated concentration
OC = organic carbon
SL = screening level
BT = bioaccumulation trigger
ML = maximum level
undetected at the MDL

Table 5. Results of Dioxin/Furans analysis

ANALYTE	WHO (05) TEF	Composite DMMU		
		ng/kg-dw	VQ	TEQ
1,2,3,4,6,7,8-HpCDD	0.01	3.04	B	0.0152
1,2,3,4,6,7,8-HpCDF	0.01	0.357	U	0.0018
1,2,3,4,7,8,9-HpCDF	0.01	0.142	U	0.0007
1,2,3,4,7,8-HxCDD	0.1	0.0668	J	0.0067
1,2,3,4,7,8-HxCDF	0.1	0.0715	U	0.0036
1,2,3,6,7,8-HxCDD	0.1	0.0678	U	0.0034
1,2,3,6,7,8-HxCDF	0.1	0.0393	U	0.0020
1,2,3,7,8,9-HxCDD	0.1	0.0661	UJ	0.0033
1,2,3,7,8,9-HxCDF	0.1	0.0422	UJ	0.0021
1,2,3,7,8-PeCDD	1	0.0299	U	0.0150
1,2,3,7,8-PeCDF	0.03	0.0286	U	0.0004
2,3,4,6,7,8-HxCDF	0.1	0.0339	U	0.0017
2,3,4,7,8-PeCDF	0.3	0.0337	UJ	0.0051
2,3,7,8-TCDD	1	0.0547	U	0.0274
2,3,7,8-TCDF	0.1	0.0518	U	0.0026
OCDD	0.0003	16.7	U	0.0025
OCDF	0.0003	0.836	J	0.0003
Total TEQ (U= 1/2 EDL)				0.094
Total TEQ (U= 0)				0.007

VQ= validation qualifiers
U = undetected at the EDL
B = blank contamination
J = estimated concentration

Table 6. Chemical results compared to SMS regulatory guidelines.

CHEMICAL	SMS Guidelines		Z-sample	
	SQS	CSL	conc	LQ
Total Organic Carbon, %			0.828	
METALS (mg/kg dry)				
Arsenic	57	93	2.8	
Cadmium	5.1	6.7	0.23	
Chromium	260	270	16.1	
Copper	390	390	8.8	
Lead	450	530	2	J
Mercury	0.41	0.59	0.011	
Silver	6.1	6.1	0.6	U
Zinc	410	960	22.5	
PAHs (mg/kg OC)				
Total LPAH	370	780	0.761	U
Naphthalene	99	170	0.761	U
Acenaphthylene	66	66	0.761	U
Acenaphthene	16	57	0.761	U
Fluorene	23	79	0.761	U
Phenanthrene	100	480	0.761	U
Anthracene	220	1200	0.761	U
2-Methylnaphthalene	38	64	0.761	U
Total HPAH	960	5300	0.761	U
Fluoranthene	160	1200	0.761	U
Pyrene	1000	1400	0.761	U
Benzo(a)anthracene	110	270	0.761	U
Chrysene	110	460	0.761	U
Benzofluoranthenes	230	450	0.761	U
Benzo(a)pyrene	99	210	0.761	U
Indeno(1,2,3-c,d)pyrene	34	88	0.761	U
Dibenzo(a,h)anthracene	12	33	0.761	U
Benzo(g,h,i)perylene	34	88	0.761	U
CHLORINATED BENZENES (mg/kg OC)				
1,2-Dichlorobenzene	2.3	2.3	0.761	U
1,4-Dichlorobenzene	3.1	9	0.761	U
1,2,4-Trichlorobenzene	0.81	1.8	0.761	U
Hexachlorobenzene	0.38	2.3	*0.399*	*U*
PHTHALATE ESTERS (mg/kg OC)				
Dimethyl phthalate	53	53	0.761	U
Diethyl phthalate	61	110	0.761	U
Di-n-butyl phthalate	220	1700	1.570	U
Butyl benzyl phthalate	4.9	64	0.761	U
Bis(2-ethylhexyl)phthalate	47	78	7.609	U
Di-n-octyl phthalate	58	4500	0.761	U

	SMS Guidelines		Z-sample	
PHENOLS (ug/kg dry)				
Phenol	420	1200	19	U
2 Methylphenol	63	63	6.3	U
4 Methylphenol	670	670	6.3	U
2,4-Dimethylphenol	29	29	*6.3*	*U*
Pentachlorophenol	360	690	63	U
MISCELLANEOUS EXTRACTABLES (mg/kg OC)				
Dibenzofuran	15	58	0.761	U
Hexachlorobutadiene	3.9	6.2	0.761	U
N-Nitrosodiphenylamine	11	11	0.761	U
PCBs (mg/kg OC)				
Total PCBs (mg/kg carbon)	12	65	1.57	U
MISCELLANEOUS EXTRACTABLES (ug/kg dry)				
Benzyl alcohol	57	73	130	U
Benzoic acid	650	650	13	U

U = undetected at the MRL unless otherwise noted
QL = laboratory qualifier
OC = organic carbon
SMS = Sediment Management Standards
SQS = sediment quality standard
CSL = cleanup screening level
undetected at the MDL
above SQS

Reference Map Acme Mapper 2.0

Project Location

NORTH

GEOTEST SERVICES, INC.
741 Marine Drive
Bellingham, WA 98225
phone: (360) 733-7318
fax: (360) 733-7418

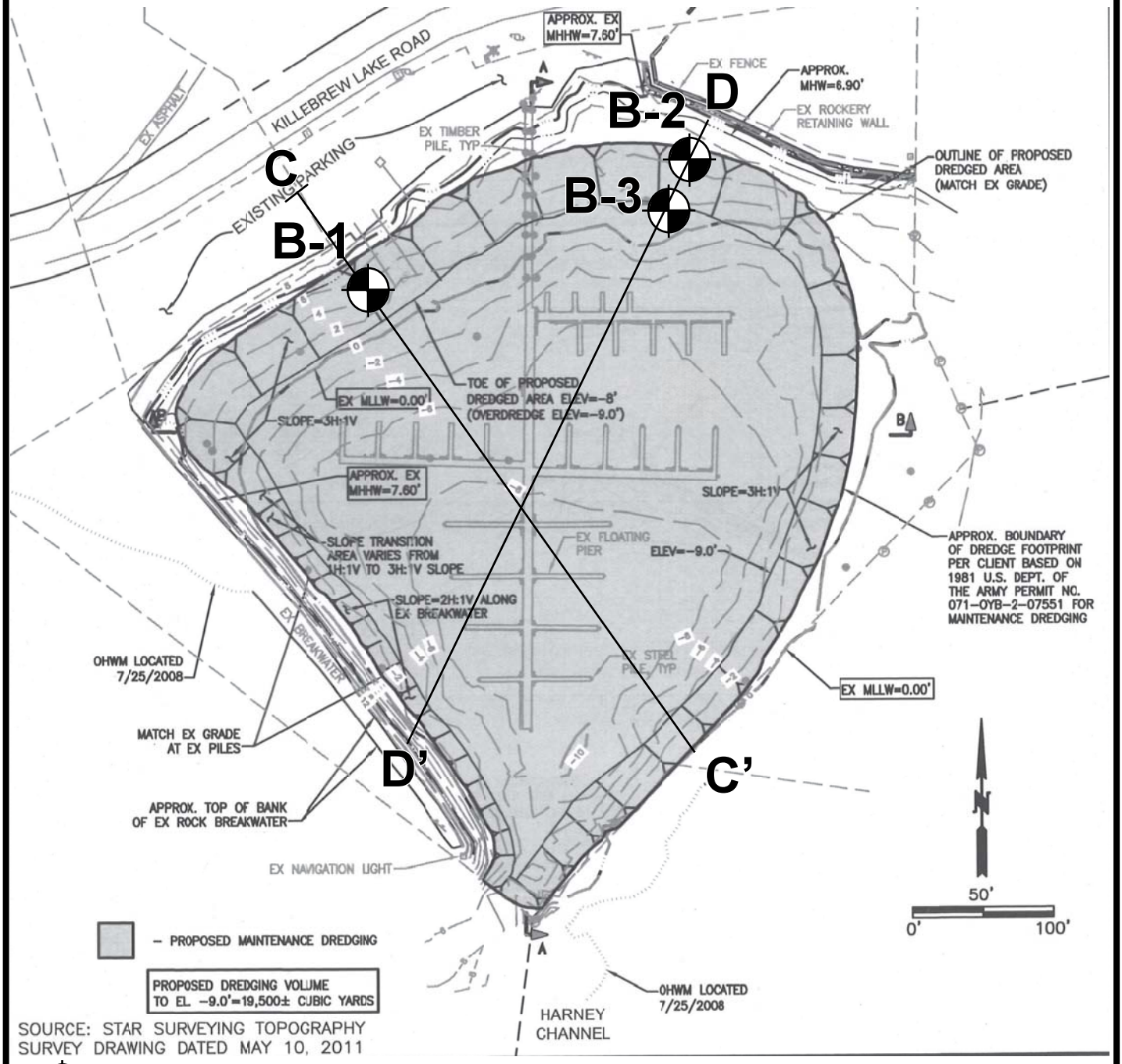
Date: 1-30-13	By: DS	Scale: None	Project 12-0027

SITE VICINITY MAP
BAY HEAD MARINA
MAINTENANCE DREDGING
ORCAS ISLAND, WASHINGTON

Figure 1

Exploration Latitude and Longitude (NAD83)

B-1 - 48° 35' 54.62" N / 122° 56' 15.15" W
B-2 - 48° 35' 55.64" N / 122° 56' 11.51" W
B-3 - 48° 35' 55.40" N / 122° 56' 11.63" W



SOURCE: STAR SURVEYING TOPOGRAPHY SURVEY DRAWING DATED MAY 10, 2011

B-# = Approximate Boring Exploration Location

Base Map Provided By Layton & Sell, Inc.

GEOTEST SERVICES, INC.
741 Marine Drive
Bellingham, WA 98225
phone: (360) 733-7318
fax: (360) 733-7418

Date: 1-30-13	By: DS	Scale: As Shown	Project
			12-0027

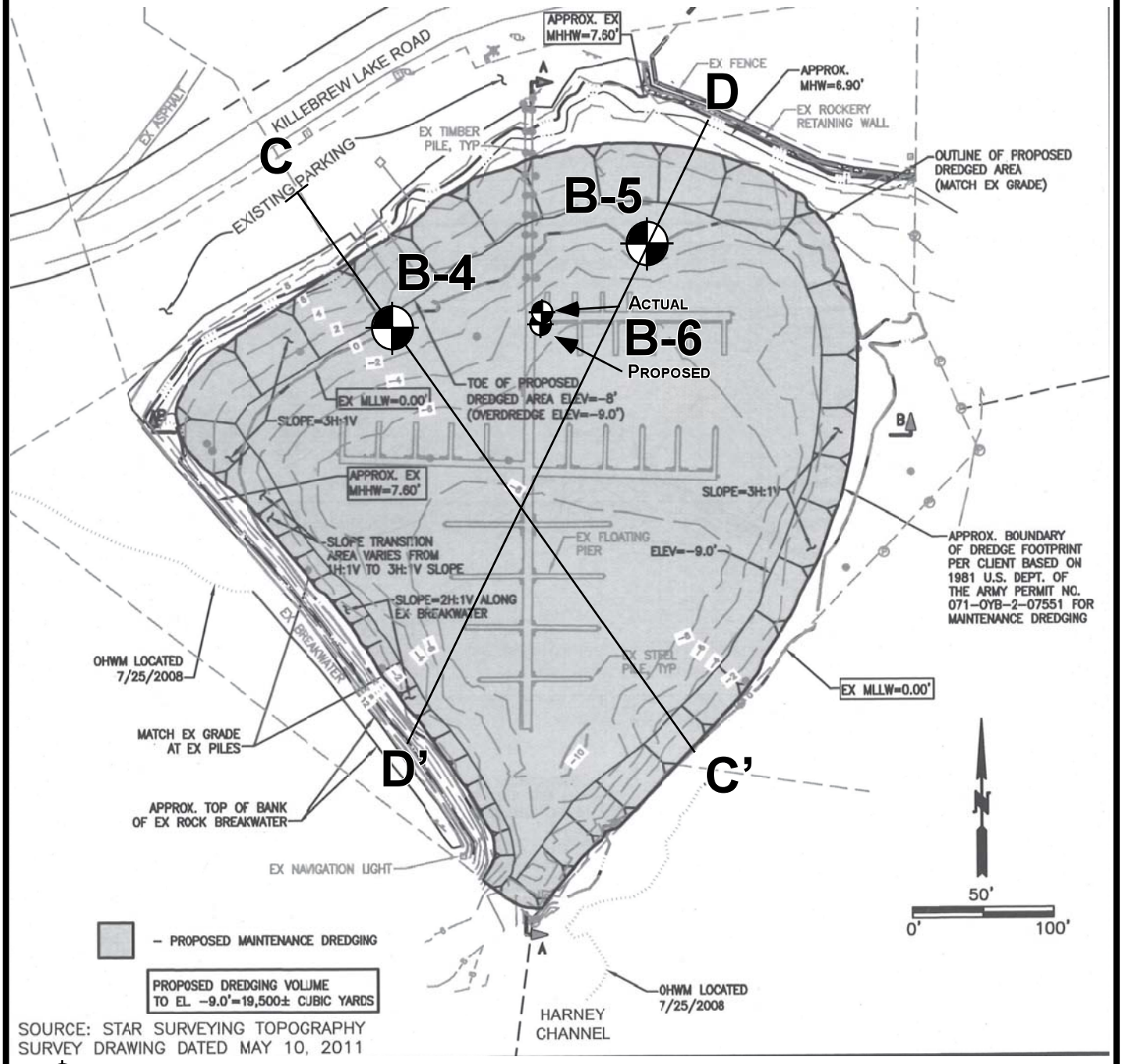
SITE AND EXPLORATION PLAN
BAY HEAD MARINA
MAINTENANCE DREDGING
ORCAS ISLAND, WASHINGTON

Figure
2

Exploration Latitude and Longitude (NAD83)

Proposed (based on Google Earth)	Actual (based on hand held GPS)
B-4 - 48° 35' 54.58" N / 122° 56' 14.91" W	B-4 - 48° 35' 54.24" N / 122° 56' 14.76" W
B-5 - 48° 35' 55.27" N / 122° 56' 11.73" W	B-5 - 48° 35' 55.50" N / 122° 56' 12.00" W
B-6 - 48° 35' 54.37" N / 122° 56' 13.02" W	B-6 - 48° 35' 54.54" N / 122° 56' 13.38" W

Note: The proposed locations based on Google Earth are approximate, the actual locations as measured in the field were based on ground measurements and were within 10 feet of the intended locations.



B-# = Approximate Boring Exploration Location

Base Map Provided By Layton & Sell, Inc.

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Date: 1-30-13	By: DS	Scale: As Shown	Project
			12-0027

SITE AND EXPLORATION PLAN
BAY HEAD MARINA
MAINTENANCE DREDGING
ORCAS ISLAND, WASHINGTON

Figure
3