

CENWS-OD-TS-NR

MEMORANDUM FOR: RECORD

February 20, 2015

SUBJECT: DETERMINATION REGARDING THE SUITABILITY OF PROPOSED DREDGED MATERIAL FROM THE PORT OF GRAYS HARBOR TERMINALS 1, 2, 3 AND 4, ABERDEEN, GRAYS HARBOR COUNTY, FOR OPEN-WATER DISPOSAL AT THE SOUTH JETTY OR POINT CHEHALIS DISPERSIVE SITES OR FOR IN-WATER BENEFICIAL USE.

- 1. Introduction.** This memorandum reflects the consensus determination of the Dredged Material Management Program (DMMP) agencies (U.S. Army Corps of Engineers, Environmental Protection Agency, and Washington Departments of Ecology and Natural Resources) regarding the suitability of up to a total 159,000 cubic yards (cy) of dredged material annually from the Port of Grays Harbor Terminals 1, 2, 3 and 4 for disposal at one of the Grays Harbor dispersive open-water sites or for appropriate in-water beneficial use. Total annual permitted volumes for each terminal are included in Table 2.

The Port of Grays Harbor has also requested that Terminals 2, 3 and 4 be considered for down-ranking, from low-moderate to low. The DMMP User Manual allows consideration for re-ranking after at least two rounds of full characterization. Terminal 1 is currently ranked low, and no changes are proposed.

- 2. Project Summary.** The Port of Grays Harbor owns four terminals in the vicinity of Aberdeen, Washington, all of which were sampled as part of this characterization. Terminals 1 and 2 operate as liquid bulk commodity import and export terminals. Terminal 3 is used for shipping wood and wood products. Terminal 4 operates as a cargo shipping facility for automobiles, break bulk cargo, and logs. Figure 1 (Vicinity Map) shows the relative locations of the terminals.

The Port of Grays Harbor terminals are located at the mouth of the Chehalis and Hoquiam Rivers, in an area where sediment accumulates rapidly. In areas subject to rapid shoaling, not all proposed dredged sediment is in place at the time of any given sampling. Thus the volume estimated for each terminal is based on historical dredging records and best professional judgment (DMMP 2014).

Table 1. Project Tracking

Draft SAP received	December 1, 2014
Revised SAP received	December 8, 2014
Revised SAP approved	December 9, 2014
Sampling dates	December 11-12, 2014
Data report received	January 22, 2015
DMMP Tracking number	PGHTE-1-A-F-363
EIM Project number	PGHTE14

Table 1. Project Tracking

USACE Permit Numbers	T-1: NWS-2009-601 T-2: NWS-2007-1789-SO T-3: NWS-2008-997 T-4: NWS-2007-1789-SO
Recency Expiration Date (all Terminals ranked Low subsequent to this characterization)	7 yrs (December 2021)

3. **Project Ranking and Sampling Requirements.** For this characterization, Terminal 1 was ranked “low” and Terminals 2, 3 and 4 ranked “low-moderate.” For projects that are dredged frequently due to rapid or routine shoaling, the sediments are expected to be relatively homogeneous. Grab samples are considered adequate to characterize homogeneous sediments (DMMP 2014). Sampling and analysis requirements for the four terminals are shown in Table 2.

Table 2. Sampling requirements and DMMUs.

DMMU ID	DMMU SUBUNIT ID	RANK	DMMP SAMPLING REQUIREMENTS	PERMITTED VOLUME (CY)	NUMBER OF SAMPLES	NUMBER OF ANALYSES
T1D1	T1-1	Low	<ul style="list-style-type: none"> one sample per 8,000 cy one analysis per 60,000 cy 	30,000	4	1
	T1-2					
	T1-3					
	T1-4					
T2D1*	S-1	Low moderate	<ul style="list-style-type: none"> one sample per 8,000 cy one analysis per 40,000 cy 	60,000	3	1
	S-2					
	S-3					
T2D2	T2-1				5	1
	T2-2					
	T2-3					
	T2-4					
T2-5						
T3D1	T3-1	Low moderate	<ul style="list-style-type: none"> one sample per 8,000 cy one analysis per 40,000 cy 	45,000	3	1
	T3-2					
	T3-3					
T3D2	T3-4				3	1
	T3-5					
	T3-6					
T4D1	T4-1	Low moderate	<ul style="list-style-type: none"> one sample per 8,000 cy one analysis per 40,000 cy 	24,000	3	1
	T4-2					
	T4-3					

*T2D1 was sampled in September, 2014, with results documented in a recency decision dated 4 November 2014 (DMMP 2014b).

4. **Sampling.** Sampling for the majority of the project took place on December 11-12, 2014, using a power grab sampler. Eighteen grab samples were obtained, per the approved SAP. Sample

locations for 10 samples were modified in the field due to insufficient dredged material at the original proposed locations. Field changes were approved by the DMMO project manager. No other deviations from the approved SAP occurred. Three grab samples were taken at T2 on September 17, 2014. These samples were in support of an interim recency characterization so that urgent dredging at T2 could proceed prior to the full characterization event (DMMP 2014b). Those results are considered in this suitability determination for all of T2.

5. **Chemical Analysis.** The approved sampling and analysis plan was followed and quality control guidelines specified by the PSEP and DMMP programs were met, with only minor quality control deviations (BergerABAM 2015). The data were considered sufficient and acceptable for regulatory decision-making under the DMMP program.

Sediment conventional results (Table 3) show that the proposed dredged material in Terminals 1, 2 and 4 is predominantly silt. Material from Terminal 3 was coarser, with slightly more sand than silt. Total organic carbon ranged from 1.46 to 2.1 percent. Chemical results indicated that there were no exceedances of DMMP screening levels (Table 5).

Table 3. PoGH Sediment Conventionals

	DMMU	T1D1	T2D1*	T2D2	T3D1	T3D2	T4D1
Characterized Volume (cy)	30,000	30,000	30,000	30,000	22,500	22,500	24,000
Grain Size	% Gravel	1%	0%	0.7%	0.7%	0.8%	1.0%
	% Sand	8%	22%	18%	46%	22%	9%
	% Silt	70%	57%	61%	38%	56%	63%
	% Clay	22%	21%	21%	16%	22%	27%
	% Fines (clay+silt)	92%	78%	82%	54%	78%	90%
Total Solids, %	36.1	45.2	38.4	47.1	35.1	35.02	
Total Volatile Solids, %	8.49	8.8	8.03	5.73	8.05	9.44	
Total Organic Carbon, %	1.59	2.1	1.59	1.46	1.67	1.92	
Total Sulfides, mg/kg	32.3	8.0	60.5	35.6	15	62.3	
Total Ammonia, mg/kg	19.7	82.5	<2.88	21.1	3.4	33.6	

*T2D1 data from BergerABAM 2014

In addition to routine DMMP chemicals of concern, analyses of both TBT and dioxins/furans were required for this project. Porewater from all composites (except for T2D1) was analyzed for TBT, with all results undetected below the DMMP SL. Dioxins/furans are widespread in Grays Harbor due to the historical presence of bleach process pulp mills. Results (Table 6) showed detected levels of dioxins/furans in all samples. Toxicity equivalents (TEQ, with U = ½ estimated detection limit) ranged from 3.99 – 10.49 ng/kg dry wt., below the 15 ng/kg TEQ suitability level set for Grays Harbor. Levels of 2,3,7,8 TCDD were also below the 5 ng/kg suitability level set for this dioxin congener, with levels ranging from non-detect to 3.46 ng/kg (Table 6). The approved sampling and analysis plan was followed and quality control guidelines specified by the PSEP and DMMP programs were met, with only minor quality control deviations (BergerABAM 2015). The data were considered sufficient and acceptable for regulatory decision-making under the DMMP program.

6. **Biological Testing.** No bioassays or bioaccumulation tests were required for this project.

7. **Beneficial-Use Analysis.** The proposed dredged material had no exceedances of the State of Washington numerical Sediment Quality Standards (Table 7). However, based on agency best professional judgment regarding acceptable dioxin concentrations in beneficial use material, sediment from this project may be used for beneficial use only after comparison of dioxin concentrations in the source and receiving areas. Specifically, if the TEQ of sediment proposed for beneficial use is equal to or less than that in a representative sampling of the sediments from the receiving area(s), the dredged material will be acceptable for beneficial use at that approved location.
8. **Re-ranking Analysis.** The 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, 2014a; PSDDA, 1988). For any project to be ranked low there must be few or no sources of chemicals of concern (COCs), with data available to verify low chemical concentrations. All COCs chemicals of concern (COCs) must be below DMMP screening levels.

Maintenance dredged material from Terminals 1, 2 and 4 were last characterized in November 2007 (DMMP 2007). Chemical results of all COCs, including dioxins, showed no SL exceedances, and all material was found suitable for open-water disposal. Terminal 3 was last characterized in August 2008 (DMMP 2008), and chemical results also showed no exceedances of DMMP screening levels. With the current characterization, Terminals 2, 3 and 4 now have two cycles of data to support a low ranking. The DMMP concurs that maintenance material from these terminals now may be considered low rank for future characterizations. Should conditions or guidelines change, ranks will be reconsidered and may be adjusted.

It should be noted that this ranking pertains only to rapidly accumulated maintenance dredge material, in the current terminal footprints. Should dredging of bedded sediments be proposed as part of terminal reconfiguration or deepening, the DMMP will use a Tier 1 evaluation to determine whether a low rank is appropriate for new dredged material.

9. **Suitability Determination.** This memorandum documents the evaluation of the suitability of sediment proposed for dredging from the Port of Grays Harbor Terminals 1, 2, 3 and 4 for open-water disposal or appropriate beneficial use. The approved sampling and analysis plan was followed and the data gathered were deemed sufficient and acceptable for regulatory decision-making under the DMMP program.

Based on the results of the previously described testing, the DMMP agencies conclude that all tested material is suitable for open-water disposal at either the South Jetty or Point Chehalis dispersive sites, on an annual basis in the following volumes:

Table 4. PoGH Suitable material by Terminal

TERMINAL	ANNUAL SUITABLE VOLUME (cubic yards)
1	30,000
2	60,000
3	45,000
4	24,000
Total	159,000

If in-water beneficial use is to be considered, dioxin testing will be required of the receiving area. For upland disposal, further coordination with local authorities may be required.

This suitability determination does *not* constitute final agency approval of the expanded 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 conference call with DNR, Ecology and the Corps of Engineers will be required. A dredging quality control plan must be developed and submitted to the DMMP prior to the pre-dredge conference call. A DNR site use authorization must also be acquired.

9. References.

BergerABAM 2014. Interim Recency Dredged Material Characterization Report, Port of Grays Harbor, Terminal 2, Hoquiam, Washington. Draft Report prepared for the Port of Grays Harbor, Aberdeen, WA. 21 October 2014

BergerABAM 2015. Port of Grays Harbor – Terminals 1, 2, 3 and 4, Dredged Material Characterization. Draft Report prepared for the Port of Grays Harbor, Aberdeen, WA. January 2015

DMMP 2007. *Determination Regarding the Suitability of Proposed Dredged Material from the Port of Grays Harbor Terminals 1, 2 and 4, Aberdeen, Grays Harbor County, for Open-Water Disposal at the South Jetty or Point Chehalis Dispersive Sites, or for Beneficial Use.* Dredged Material Management Program, November 14, 2007.

DMMP 2008. *Determination Regarding the Suitability of Proposed Dredged Material from the Port of Grays Harbor Terminal 3, Hoquiam, Grays Harbor County, for Open-Water Disposal at the South Jetty or Point Chehalis Dispersive Sites, or for Beneficial Use.* Dredged Material Management Program, August 13, 2008.

DMMP 2014a. *Dredged Material Evaluation and Disposal Procedures (User Manual).* Dredged Material Management Program, updated December 2014.

DMMP 2014b. Memorandum for Record. Subject: Supplemental Testing and DMMP Recency Extension for the Port Of Grays Harbor Terminal 2. 4 November 2014

PSDDA, 1988. *Evaluation Procedures Technical Appendix – Phase I – Central Puget Sound.* U.S. Army Corps of Engineers Seattle District, U.S. Environmental Protection Agency Region 10, Washington State Department of Ecology, Washington State of Natural Resources. June 1988.

signed page on file in the DMMO office

10. Agency Signatures.

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Concur:

Date Lauran Cole Warner - Seattle District Corps of Engineers

Date Justine Barton - Environmental Protection Agency

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

Date Celia Barton - Washington Department of Natural Resources

Copies furnished:

- DMMP signatories
- Ron Wilcox, Seattle District Regulatory
- Amber Roesler, Berger-ABAM
- Mike Johnson, Port of Grays Harbor
- Marc Horton, Washington Project Consultants
- Joe Schumacker, Quinault Tribe

Table 5. Results of Chemical Analysis compared to DMMP Guidelines

CHEMICAL	Sample ID	T1D1		T2D1*		T2D2		T3D1		T3D2		T4D1		DMMP Criteria		
	Sample date	12/11/14	LQ	9/17/14	LQ	12/11/14	LQ	12/12/14	LQ	12/12/14	LQ	12/11/14	LQ	SL	BT	ML
METALS (mg/kg dry wt)																
Antimony		10	U	10	U	10	U	10	U	10	U	10	U	150	---	200
Arsenic		20		10	U	10		20		20		10	U	57	507.1	700
Cadmium		0.6		0.5		0.6		0.5		0.7		0.5	U	5.1	11.3	14
Chromium		45		42		41		39		41		32		260	260	---
Copper		62.8		54.8		56.4		42.2		51.7		45.1		390	1,027	1,300
Lead		7		7		7		5		6		5	U	450	975	1,200
Mercury		0.05	U	0.04	J	0.05	U	0.05	U	0.07	U	0.06	U	0.41	1.5	2.3
Nickel		29		28		26		27		26		20		---	---	---
Selenium		1	U	0.53	J	1	U	1	U	2	U	1	U	---	3	---
Silver		0.8	U	0.7	U	0.8	U	0.7	U	0.9	U	0.8	U	6.1	6.1	8.4
Zinc		87		87		79		75		77		62		410	2,783	3800
PAHs (µg/kg dry wt)																
Naphthalene		10		28		25		32		25.0		7.5		2,100	---	---
Acenaphthylene		4.9	U	4.9		4.8	U	4.4	J	4.9	U	4.8	U	560	---	---
Acenaphthene		11		3.2	J	4.8	U	8		4.9	U	4.8	U	500	---	---
Fluorene		9.2		5		4.8	U	7.4		4.9	U	4.8	U	540	---	---
Phenanthrene		60		39		10.0	J	43		8.2		8.2		1,500	---	---
Anthracene		13		3.4	J	4.8	U	7.7	J	4.9	U	4.8	U	960	---	---
2-Methylnaphthalene		6.0		11		4.9		9.3		15	J	14	J	670	---	---
Total LPAH		103.2		76.9		35.0		102.5		33		16		5,200	---	---
Fluoranthene		59		35		11		54		8.9		21		1,700	4,600	---
Pyrene		48		31		8.4		40		7.7		12		2,600	11,980	---
Benzo(a)anthracene		11		5		2.9	J	6.1		2.8	J	5.2		1,300	---	---
Chrysene		17		8		4.2	J	5.4		3.9	J	6.8		1,400	---	---
Benzo(a)fluoranthene (b, j, k)		13		9.8		5.4		6.1		5.8		8.8		3,200	---	---
Benzo(a)pyrene		4.8	J	4.7	J	2.8	J	3.0	J	2.6	J	3.4	J	1,600	---	---
Indeno(1,2,3-c,d)pyrene		4.9	U	4.8	U	4.8	U	4.9	U	4.9	U	4.8	U	600	---	---
Dibenz(a,h)anthracene		4.9	U	4.8	U	4.8	U	4.9	U	4.9	U	4.8	U	230	---	---
Benzo(g,h,i)perylene		24	J	5.1		4.8	U	4.9	U	4.9	U	4.8	U	670	---	3,200
Total HPAH		177		94		35		115		32		57		12,000	---	69,000
CHLORINATED HYDROCARBONS (µg/kg dry wt)																
1,4-Dichlorobenzene		4.9	U	3.1	J	4.8	U	4.8	U	5.0	U	4.8	U	110	---	120
1,2-Dichlorobenzene		4.9	U	2.9	J	4.8	U	4.8	U	5.0	U	4.8	U	35	---	110
1,2,4-Trichlorobenzene		4.9	U	4.8	U	4.8	U	4.8	U	5.0	U	4.8	U	31	---	64
Hexachlorobenzene (HCB)		0.99	U	0.98	U	0.97	U	0.97	U	0.98	U	0.99	U	22	168	230
PHthalATES (µg/kg dry wt)																
Dimethyl phthalate		4.9	U	14		4.8	U	4.8	U	5.0	U	4.8	U	71	---	1,400
Diethyl phthalate		20	U	19	U	19	U	19	U	20	U	22	U	200	---	1,200
Di-n-butyl phthalate		20	U	19	U	19	U	19	U	20	U	19	U	1,400	---	5,100
Butyl benzyl phthalate		4.9	U	4.8	U	4.8	U	4.8	U	5.0	U	4.8	U	63	---	970
Bis(2-ethylhexyl) phthalate		49	U	48	U	48	U	48	U	50	U	48	U	1,300	---	8,300
Di-n-octyl phthalate		20	U	19	U	19	U	19	U	20	U	19	U	6,200	---	6,200

CHEMICAL	Sample ID	T1D1		T2D1*		T2D2		T3D1		T3D2		T4D1		DMMP Criteria		
	Sample date	12/11/14	LQ	9/17/14	LQ	12/11/14	LQ	12/12/14	LQ	12/12/14	LQ	12/11/14	LQ	SL	BT	ML
PHENOLS (µg/kg dry wt)																
Phenol		87	B	34	M	61	B	53	B	59	B	58	B	420	---	1,200
2-Methylphenol		4.2	J	3.8	J	2.7	J	4.8	U	2.7	J	4.8	U	63	---	77
4-Methylphenol		51		42		32		29		28		26		670	---	3,600
2,4-Dimethylphenol		25	U	24	U	24	U	24	U	25	U	24	U	29	---	210
Pentachlorophenol		17	QJ	97	U	19	U	19	U	20	U	19	U	400	504	690
MISCELLANEOUS EXTRACTABLES (µg/kg dry wt)																
Benzyl alcohol		37		19	U	28		19	J	32		37		57	---	870
Benzoic acid		380		88	J	180	J	150	J	190	J	190	J	650	---	760
Dibenzofuran		5.3		19	U	4.8	U	10	J	4.9	U	4.8	U	540	---	1,700
Hexachlorobutadiene		0.99	U	0.98	U	0.97	U	0.97	U	0.98	U	0.99	U	11	---	270
N-Nitrosodiphenylamine		4.9	U	4.8	U	4.8	U	4.8	U	5.0	U	4.8	U	28	---	130
PESTICIDES & PCBs (µg/kg dry wt)																
4,4'-DDD		0.99	U	0.98	U	0.97	U	0.97	U	0.98	U	0.99	U	16	---	---
4,4'-DDE		0.99	U	0.98	U	0.97	U	0.97	U	0.98	U	0.99	U	9	---	---
4,4'-DDT		0.99	U	0.98	U	0.97	U	0.97	U	0.98	U	0.99	U	12	---	---
sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT		0.99	U	0.98	U	0.97	U	0.97	U	0.98	U	0.99	U	---	50	69
Aldrin		0.50	U	0.49	U	0.48	U	0.48	U	0.49	U	0.50	U	9.5	---	---
Total Chlordane		2.5	Y	1.1	U	1.7	Y	0.97	U	0.98	U	0.99	U	2.8	37	---
cis-chlordane		0.50	U	0.49	U	0.48	U	0.48	U	0.49	U	0.50	U			
trans-chlordane		2.5	Y	1.1	Y	1.7	Y	0.48	U	0.69	U	0.50	U			
cis-nonachlor		0.99	U	0.98	U	0.97	U	0.97	U	---		0.99	U			
trans-nonachlor		1.8	Y	0.98	U	0.97	U	0.97	U	0.98	U	0.99	U			
oxychlordane		0.99	U	0.98	U	0.97	U	0.97	U	0.98	U	0.99	U			
Dieldrin		0.99	U	0.98	U	0.97	U	0.97	U	0.98	U	0.99	U	1.9	---	1,700
Heptachlor		0.50	U	0.53	LY	0.48	U	0.48	U	0.49	U	0.50	U	1.5	---	270
Total PCBs Aroclors		9.5	U	14	Y	9.2	U	9.1	U	9.9	U	9.3	U	130	---	3,100
Total PCBs (mg/kg OC)		0.6	U	0.67	Y	0.6	U	0.6	U	0.6	U	0.5	U	---	38 ⁽¹⁾	---
ORGANOMETALLIC COMPOUNDS																
Tributyltin ion (interstitial water; ug/L)		0.005	U	--		0.005	U	0.005	U	0.005	U	0.005	U	0.15	0.15	---

Notes:

- *T2D1 data from BergerABAM 2014
- LPAH = low molecular weight polynuclear aromatic hydrocarbon compounds. Total LPAH = Sum of acenaphthylene, acenaphthene, anthracene, fluorene, naphthalene and phenanthrene. Methylnaphthalene is not included in the summation for total LPAH.
- HPAH = high molecular weight polynuclear aromatic hydrocarbon compounds. Total HPAH = The sum of benzo(a)anthracene, benzo(a)pyrene, total benzofluoranthenes, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-c,d)pyrene and pyrene.
- Total benzofluoranthenes = the sum of the "b," "j" and "k" isomers. The "j" isomer co-elutes with the "k" isomer, thus the concentration of the "j" isomer is included in the "k" isomer concentration
- This value is normalized to total organic carbon, and is expressed in mg/kg organic carbon.
- Lab Qualifiers (LQ):
 - U= Target analyte was not detected at the reported concentration.
 - J = Estimated concentration when the value is less than ARI's established reporting limits.
 - B = Analyte detected in an associated Method Blank at a concentration greater than 1/2 of ARI's reporting limit, 5% of the regulatory limit or 5% of the analyte concentration in the sample.
 - Y = Analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.

Table 6. Dioxin results and TEQ calculations

	TEF (WHO 2005)	ng/kg		ng/kg		ng/kg		ng/kg		ng/kg		ng/kg		ND=1/2 RL TEQ					
		T1D1		T2D1*		T2D2		T3D1		T3D2		T4D1		T1D1	T2D1	T2D2	T3D1	T3D2	T4D1
2,3,7,8-TCDD	1	3.46		1.89		2.82		1.64		1.69	EMPC	2.25	EMPC	3.46	1.89	2.82	1.64	0.85	1.13
1,2,3,7,8-PeCDD	1	4.57		2.43		3.65		2.23		1.88		2.88		4.57	2.43	3.65	2.23	1.88	2.88
1,2,3,4,7,8-HxCDD	0.1	1.15	EMPC	0.761	UJ	1.02		0.644	J	0.585	J	0.817	J	0.06	0.04	0.10	0.06	0.06	0.08
1,2,3,6,7,8-HxCDD	0.1	3.55		2.42		3.34		2.7		1.71	B	2.67		0.36	0.24	0.33	0.27	0.17	0.27
1,2,3,7,8,9-HxCDD	0.1	10.6		6.18		8.8		5.17		4.08		6.85		1.06	0.62	0.88	0.52	0.41	0.69
1,2,3,4,6,7,8-HpCDD	0.01	41.2		34.1		44.9		36.6		28		34.2		0.41	0.34	0.45	0.37	0.28	0.34
OCDD	0.0003	237		247		269		240		208		226		0.07	0.07	0.08	0.07	0.06	0.07
2,3,7,8-TCDF	0.1	0.604	JEMPC	0.747	UJ	0.749	J	0.595	JEMPC	0.498	J	0.743	J	0.03	0.04	0.07	0.03	0.05	0.07
1,2,3,7,8-PeCDF	0.03	0.366	BJ	0.221	UJ	0.24	BJ	0.279	BJ	0.24	BJ	0.198	BJEMPC	0.01	0.00	0.01	0.01	0.01	0.00
2,3,4,7,8-PeCDF	0.3	0.394	BJ	0.281	J	0.338	BJEMPC	0.272	BJ	0.196	BJ	0.222	BJEMPC	0.12	0.08	0.05	0.08	0.06	0.03
1,2,3,4,7,8-HxCDF	0.1	0.704	J	0.543	J	0.691	J	0.549	J	0.528	J	0.571	J	0.07	0.05	0.07	0.05	0.05	0.06
1,2,3,6,7,8-HxCDF	0.1	0.63	BJEMPC	0.451	UJ	0.507	BJEMPC	0.535	BJ	0.389	BJ	0.482	BJ	0.03	0.02	0.03	0.05	0.04	0.05
1,2,3,7,8,9-HxCDF	0.1	0.344	BJ	0.178	J	0.222	BJEMPC	0.387	BJ	0.306	BJEMPC	0.258	BJEMPC	0.03	0.02	0.01	0.04	0.02	0.01
2,3,4,6,7,8-HxCDF	0.1	0.766	BJ	0.623	UJ	0.695	BJ	0.803	BJEMPC	0.45	BJEMPC	0.326	BJEMPC	0.08	0.03	0.07	0.04	0.02	0.02
1,2,3,4,6,7,8-HpCDF	0.01	12.5		11.9		15.2		11.2		7.32	EMPC	12.5	EMPC	0.13	0.12	0.15	0.11	0.04	0.06
1,2,3,4,7,8,9-HpCDF	0.01	0.716	BJEMPC	0.496	J	0.731	BJ	0.626	BJEMPC	0.442	BJEMPC	0.635	BJEMPC	0.00	0.00	0.01	0.00	0.00	0.00
OCDF	0.0003	19.4		17.5		26.1		14.5		15.5		19.9		0.01	0.01	0.01	0.00	0.00	0.01
Totals														10.49	6.01	8.79	5.59	3.99	5.77

Notes:

- *T2D1 data from BergerABAM 2014
- Lab Qualifiers (LQ):

U= Target analyte was not detected at the reported concentration.

J = Estimated concentration when the value is less than ARI's established reporting limits.

B = Analyte detected in an associated Method Blank at a concentration greater than 1/2 of ARI's reporting limit, 5% of the regulatory limit or 5% of the analyte concentration in the sample.

EMPC = estimated maximum possible concentration - defined in EPA statement of work DLM02.2 as a value "calculated for 2,3,7,8-substituted isomers for which the quantitation and/or confirmation ion(s) has signal to noise in excess of 2.5 but does not meet identification criteria". Equivalent to non-detection and 1/2 the value is used for the Total TQ calculations. (dioxins/furans analysis only)

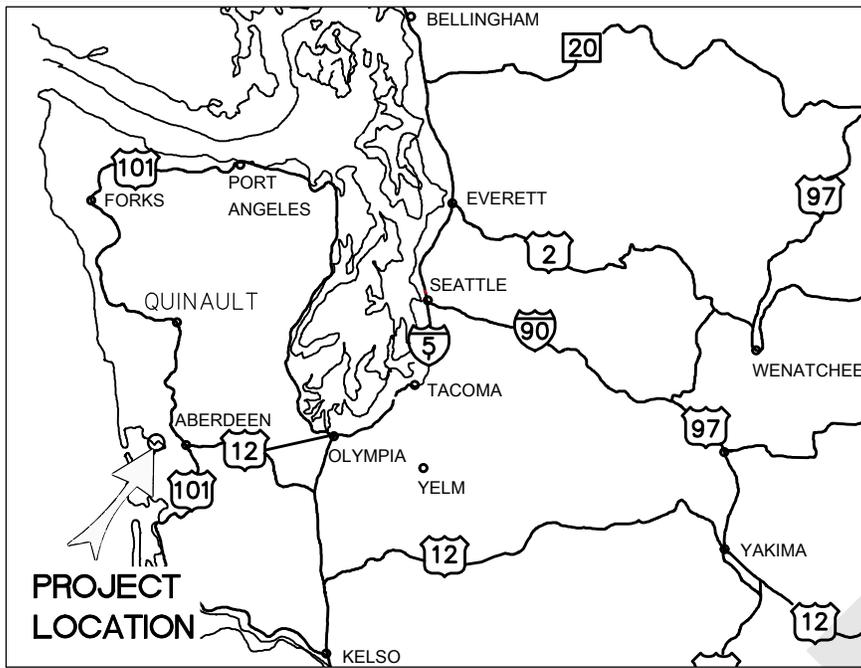
Table 7. Summary of Chemical Data Compared to SMS Criteria

CHEMICAL	CAS ⁽¹⁾ NUMBER	SMS Guidelines		T1D1		T2D1		T2D2		T3D1		T3D2		T4D1	
		SQS	CSL	12/11/14	LQ	9/17/14	LQ	12/11/14	LQ	12/12/14	LQ	12/12/14	LQ	12/11/14	LQ
Total Organic Carbon, %				1.59		2.1		1.59		1.46		1.67		1.92	
METALS (mg/kg dry weight)															
Arsenic	7440-38-2	57	93	20		10	U	10		20		20		10	U
Cadmium	7440-43-9	5.1	6.7	0.6		0.5		0.6		0.5		0.7		0.5	U
Chromium	7440-47-3	260	270	45		42		41		39		41		32	
Copper	7440-50-8	390	390	62.8		54.8		56.4		42.2		51.7		45.1	
Lead	7439-92-1	450	530	7		7		7		5		6		5	U
Mercury	7439-97-6	0.41	0.59	0.05	U	0.04	J	0.05	U	0.05	U	0.07	U	0.06	U
Silver	7440-22-4	6.1	6.1	0.8	U	0.7	U	0.8	U	0.7	U	0.9	U	0.8	U
Zinc	7440-66-6	410	960	87		87		79		75		77		62	
PAHs (µg/kg OC)															
Naphthalene	91-20-3	99	170	0.6		1.3		1.6		2.2		1.5		0.4	
Acenaphthylene	208-96-8	66	66	0.3	U	0.2		0.3	U	0.3	J	0.3	U	0.3	U
Acenaphthene	83-32-9	16	57	0.7		0.2	J	0.3	U	0.5		0.3	U	0.3	U
Fluorene	86-73-7	23	79	0.6		0.2		0.3	U	0.5		0.3	U	0.3	U
Phenanthrene	85-01-8	100	480	3.8		1.9		0.6		2.9		0.5		0.4	
Anthracene	120-12-7	220	1,200	0.8		0.2	J	0.3	U	0.5	J	0.3	U	0.3	U
2-Methylnaphthalene ⁽¹⁾	91-57-6	38	64	0.4		0.5		0.3		0.6		0.9	J	0.7	J
Total LPAH	---	370	780	6.5		3.7		2.2		7.0		2.0		0.8	
Fluoranthene	206-44-0	160	1,200	3.7		1.7		0.7		3.7		0.5		1.1	
Pyrene	129-00-0	1,000	1,400	3.0		1.5		0.5		2.7		0.5		0.6	
Benz(a)anthracene	56-55-3	110	270	0.7		0.2		0.2	J	0.4		0.2	J	0.3	
Chrysene	218-01-9	110	460	1.1		0.4		0.3	J	0.4		0.2	J	0.4	
Benzo(a)fluoranthene (b, j, k)	205-99-2	230	450	0.8		0.5		0.3		0.4		0.3		0.5	
Benzo(a)pyrene	50-32-8	99	210	0.3	J	0.2	J	0.2	J	0.2	J	0.2	J	0.2	J
Indeno(1,2,3-c,d)pyrene	193-39-5	34	88	0.3	U	0.2	U	0.3	U	0.3	U	0.3	U	0.3	U
Dibenz(a,h)anthracene	53-70-3	12	33	0.3	U	0.2	U	0.3	U	0.3	U	0.3	U	0.3	U
Benzo(g,h,i)perylene	191-24-2	34	88	1.5		0.2		0.3	U	0.3	U	0.3	U	0.3	U
Total HPAH	---	960	5,300	11.1		4.5		2.2		7.8		1.9		3.0	
CHLORINATED HYDROCARBONS (µg/kg OC)															
1,4-Dichlorobenzene	106-46-7	3.1	9	0.3	U	0.1	J	0.3	U	0.3	U	0.3	U	0.3	U
1,2-Dichlorobenzene	95-50-1	2.3	2.3	0.3	U	0.1	J	0.3	U	0.3	U	0.3	U	0.3	U
1,2,4-Trichlorobenzene	120-82-1	0.81	1.8	0.3	U	0.2	U	0.3	U	0.3	U	0.3	U	0.3	U
Hexachlorobenzene (HCB)	118-74-1	0.38	2.3	0.1	U	0.0	U	0.1	U	0.1	U	0.1	U	0.1	U
PHTHALATES (µg/kg OC)															
Dimethyl phthalate	131-11-3	53	53	0.3	U	0.7		0.3	U	0.3	U	0.3	U	0.3	U
Diethyl phthalate	84-66-2	61	110	1.3	U	0.9	U	1.2	U	1.3	U	1.2	U	1.1	
Di-n-butyl phthalate	84-74-2	220	1,700	1.3	U	0.9	U	1.2	U	1.3	U	1.2	U	1.0	U

CHEMICAL	CAS ⁽¹⁾ NUMBER	SMS Guidelines		T1D1		T2D1		T2D2		T3D1		T3D2		T4D1	
		SQS	CSL	12/11/14	LQ	9/17/14	LQ	12/11/14	LQ	12/12/14	LQ	12/12/14	LQ	12/11/14	LQ
Total Organic Carbon, %				1.59		2.1		1.59		1.46		1.67		1.92	
Butyl benzyl phthalate	85-68-7	4.9	64	0.3	U	0.2	U	0.3	U	0.3	U	0.3	U	0.3	U
Bis(2-ethylhexyl) phthalate	117-81-7	47	78	3.1	U	2.3	U	3.0	U	3.3	U	3.0	U	2.5	U
Di-n-octyl phthalate	117-84-0	58	4,500	1.3	U	0.9	U	1.2	U	1.3	U	1.2	U	1.0	U
PHENOLS (µg/kg dry weight)															
Phenol	108-95-2	420	1,200	87	B	34	M	61	B	53	B	59	B	58	B
2-Methylphenol	95-48-7	63	63	4.2	J	3.8	J	2.7	J	4.8	U	2.7	J	4.8	U
4-Methylphenol	106-44-5	670	670	51		42		32		29		28		26	
2,4-Dimethylphenol	105-67-9	29	29	25	U	24	U	24	U	24	U	25	U	24	U
Pentachlorophenol	87-86-5	360	690	17	QJ	97	U	19	U	19	U	20	U	19	U
MISCELLANEOUS EXTRACTABLES															
Benzyl alcohol (µg/kg dry weight)	100-51-6	57	73	37		19	U	28		19	J	32		37	
Benzoic acid (µg/kg dry weight)	65-85-0	650	650	380		88	J	180	J	150	J	190	J	190	J
Dibenzofuran (µg/kg OC)	132-64-9	15	58	0.3		0.9	U	0.3	U	0.7	J	0.3	U	0.3	U
Hexachlorobutadiene (µg/kg OC)	87-68-3	3.9	6.2	0.1	U	0.05	U	0.1	U	0.1	U	0.1	U	0.1	U
N-Nitrosodiphenylamine (µg/kg OC)	86-30-6	11	11	0.3	U	0.2	U	0.3	U	0.3	U	0.3	U	0.3	U
PESTICIDES & PCBs (µg/kg dry weight)															
Total PCBs Aroclors (Sum of: 1016, 1221, 1242, 1248, 1254, 1260, 1268)	60-57-1	12	65	0.6	U	0.7	Y	0.6	U	0.6	U	0.6	U	0.5	U

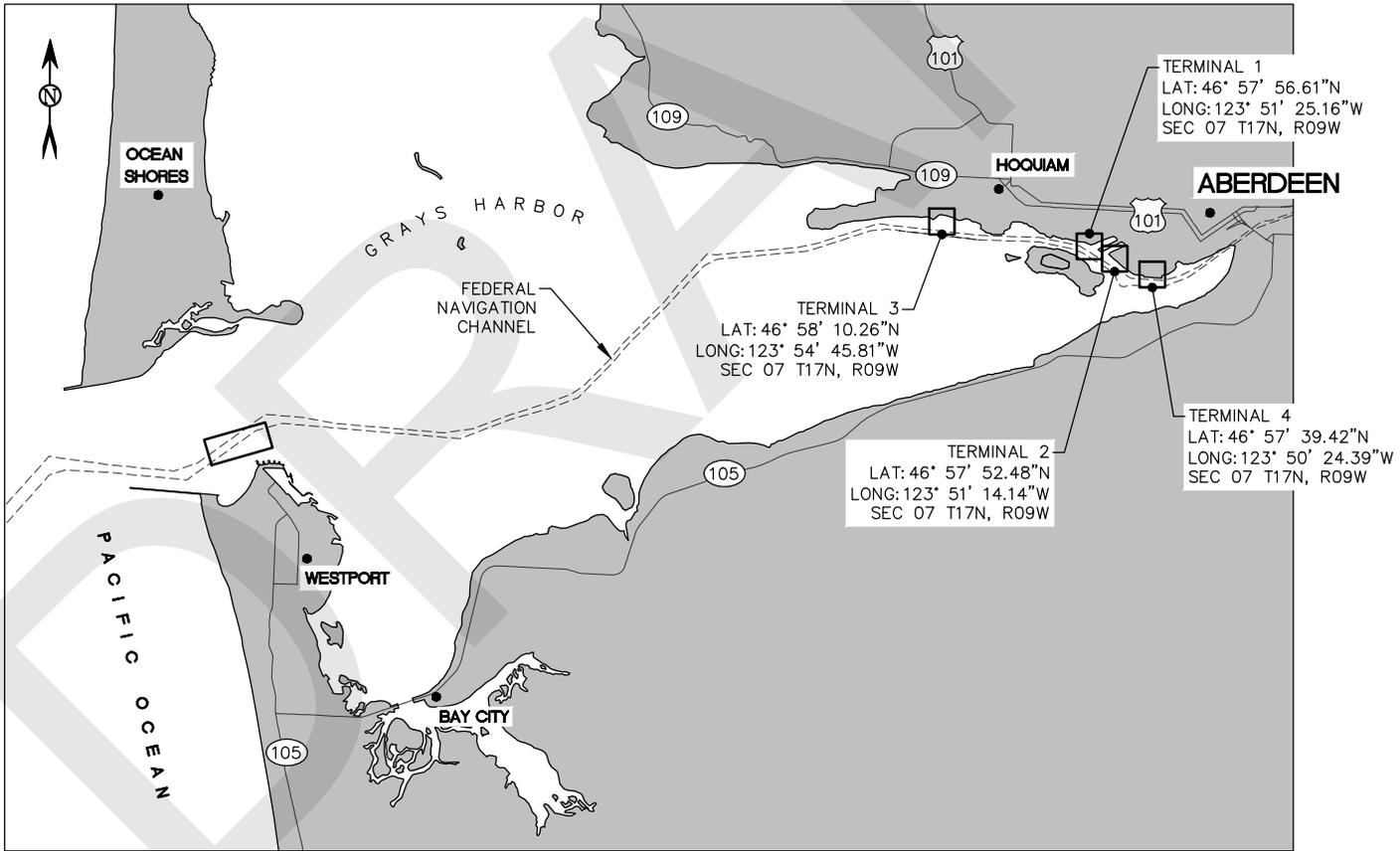
Notes:

- *T2D1 data from BergerABAM 2014
- SMS = Sediment Management Standards (February 2013)
- SQS = Sediment Quality Standard
- CSL = Cleanup Screening Level
- LPAH = low molecular weight polynuclear aromatic hydrocarbon compounds. Total LPAH = Sum of acenaphthylene, acenaphthene, anthracene, fluorene, naphthalene and phenanthrene. Methyl naphthalene is not included in the summation for total LPAH.
- HPAH = high molecular weight polynuclear aromatic hydrocarbon compounds. Total HPAH = The sum of benzo(a)anthracene, benzo(a)pyrene, total benzofluoranthenes, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3,-c,d)pyrene and pyrene.
- Total benzofluoranthenes = the sum of the "b," "j" and "k" isomers. The "j" isomer co-elutes with the "k" isomer, thus the concentration of the "j" isomer is included in the "k" isomer concentration
- Lab Qualifiers (LQ):
 - U= Target analyte was not detected at the reported concentration.
 - J = Estimated concentration when the value is less than ARI's established reporting limits.
 - B = Analyte detected in an associated Method Blank at a concentration greater than 1/2 of ARI's reporting limit, 5% of the regulatory limit or 5% of the analyte concentration in the sample.
 - Y = Analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.



WASHINGTON KEY MAP

DRAWING INDEX	
1.	VICINITY MAP
2.	TERMINAL 1 – SAMPLE LOCATIONS
3.	TERMINAL 2 – SAMPLE LOCATIONS
4.	TERMINAL 3 – SAMPLE LOCATIONS
5.	TERMINAL 4 – SAMPLE LOCATIONS



LOCATION MAP
N.T.S.

DRAFT

PURPOSE: MAINTENANCE DREDGING

VERTICAL DATUM: MLLW = 0.0 FT

APPLICATION BY: PORT OF GRAYS HARBOR

**PORT OF GRAYS HARBOR
TERMINALS 1, 2, 3, AND 4
RECENCY RENEWAL SAMPLING**

VICINITY MAP

PROPOSED: RECENCY RENEWAL

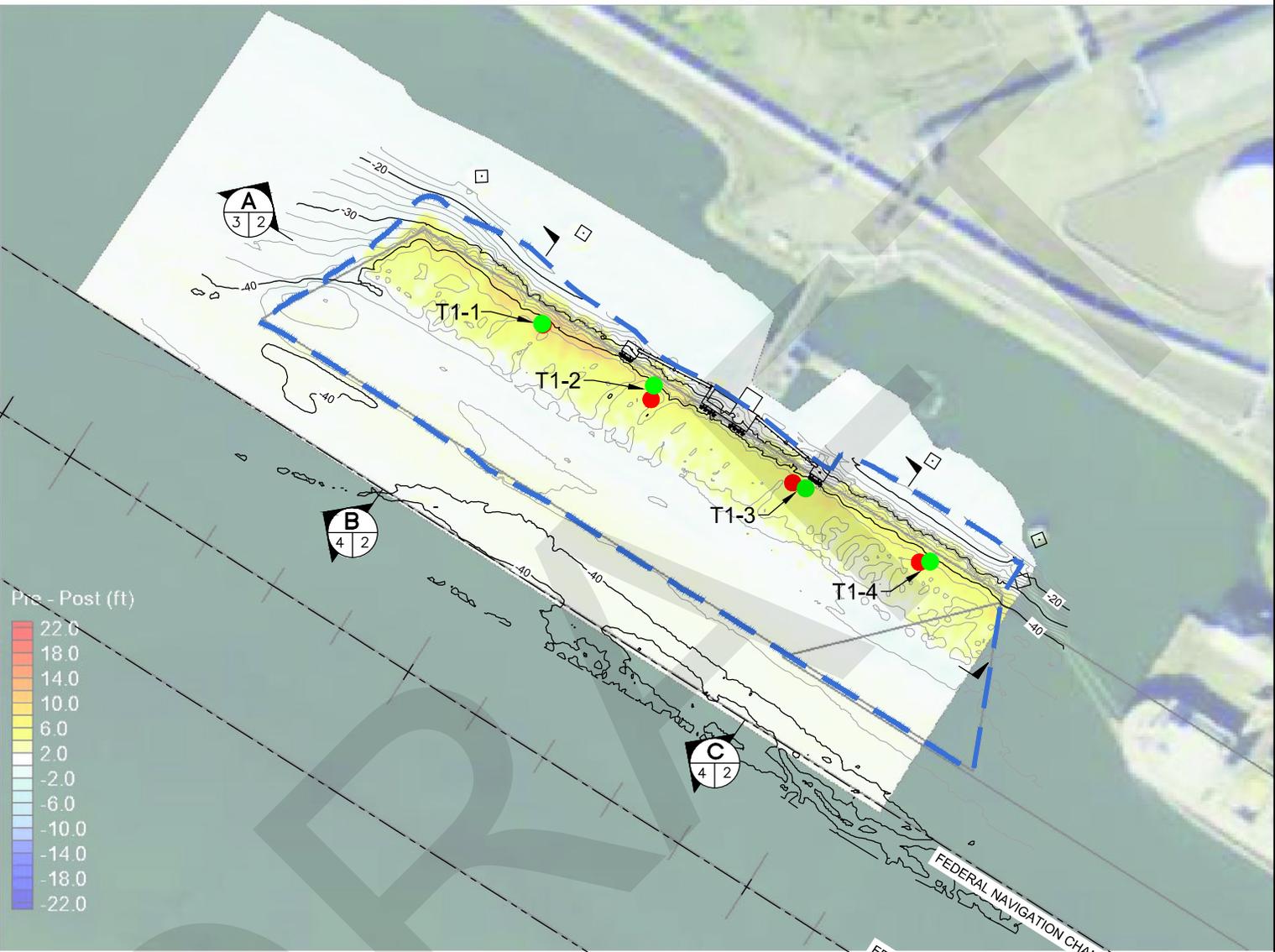
IN: GRAYS HARBOR

AT: TERMINALS 1, 2, 3, AND 4

COUNTY: GRAYS HARBOR **STATE:** WASHINGTON

SHEET 1 **DATE:** 1/15/2015

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LEGEND

- FEDERAL NAVIGATION CHANNEL TOE
- FEDERAL NAVIGATION CHANNEL CENTERLINE
- GRAB SAMPLE ID AND LOCATION (SAMPLED ON DECEMBER 11, 2014)
- PROPOSED GRAB SAMPLE LOCATION
- DMMU BOUNDARY

NOTES

1. HORIZONTAL DATUM: STATE PLANE, WA SOUTH, U.S. SURVEY FT, NAD83
2. AERIAL: 2013 NAIP
3. SURVEY CONDUCTED BY NORTHWEST HYDRO ON FEBRUARY 9, 2014.



DRAFT

PURPOSE: MAINTENANCE DREDGING

VERTICAL DATUM: MLLW = 0.0 FT

APPLICATION BY: PORT OF GRAYS HARBOR

**PORT OF GRAYS HARBOR
TERMINALS 1, 2, 3, AND 4
RECENCY RENEWAL SAMPLING**

TERMINAL 1 - SAMPLE LOCATIONS

PROPOSED: RECENCY RENEWAL

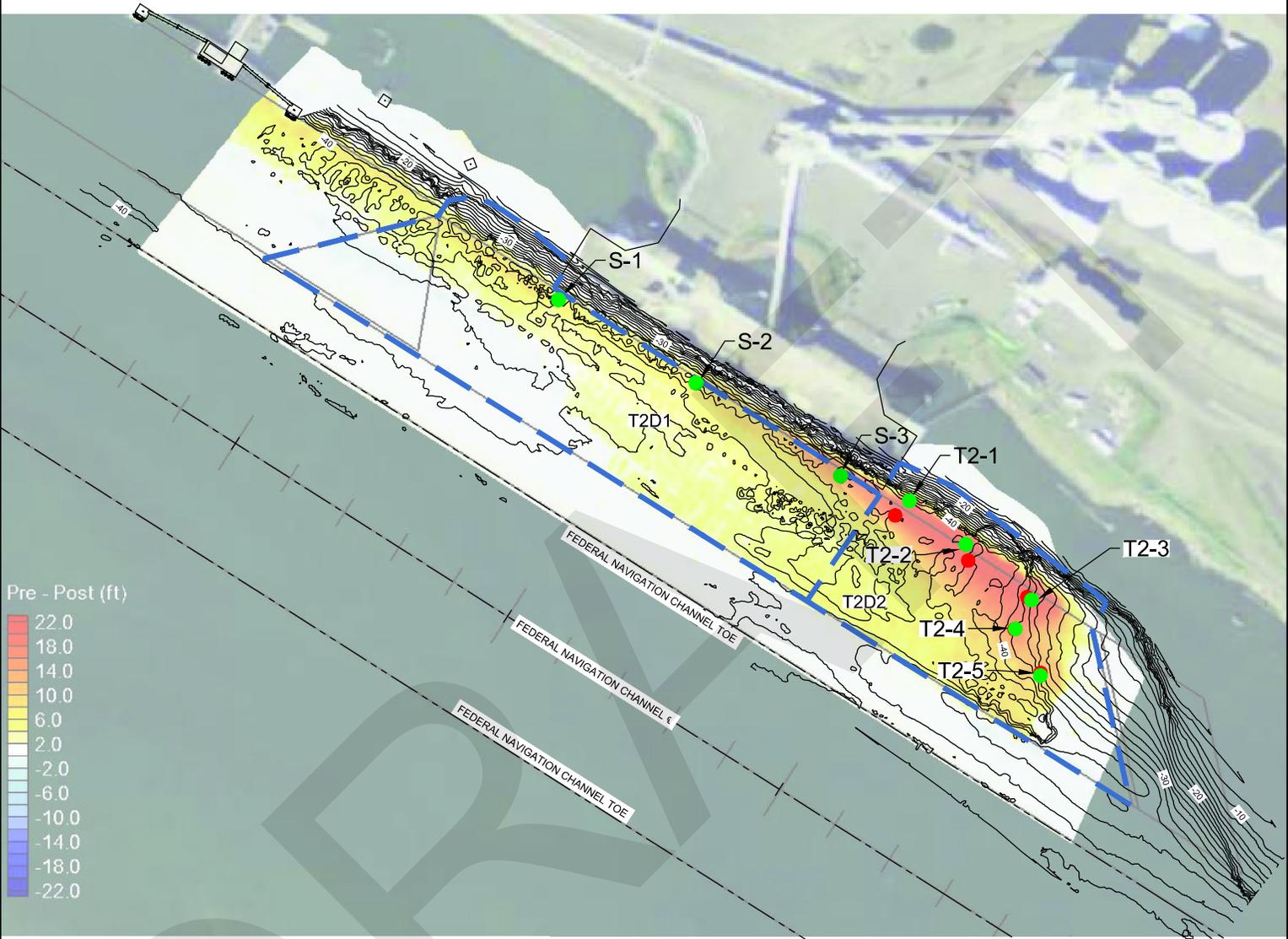
IN: GRAYS HARBOR

AT: TERMINALS 1, 2, 3, AND 4

COUNTY: GRAYS HARBOR **STATE:** WASHINGTON

SHEET 2 **DATE:** 1/15/2015

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LEGEND

- FEDERAL NAVIGATION CHANNEL TOE
- FEDERAL NAVIGATION CHANNEL CENTERLINE
- T2-1 GRAB SAMPLE ID AND LOCATION (SAMPLED ON DECEMBER 11, 2014)
- PROPOSED GRAB SAMPLE LOCATION
- DMMU BOUNDARY
- T2D1 DMMU ID

NOTES

1. HORIZONTAL DATUM: STATE PLANE, WA SOUTH, U.S. SURVEY FT, NAD83
2. AERIAL: 2013 NAIP
3. SURVEY CONDUCTED BY NORTHWEST HYDRO ON FEBRUARY 9, 2014.
4. S-1, S-2, AND S-3, REPRESENTING DMMU-1, WERE SAMPLED IN SEPTEMBER 2014.



DRAFT

PURPOSE: MAINTENANCE DREDGING

VERTICAL DATUM: MLLW = 0.0 FT

APPLICATION BY: PORT OF GRAYS HARBOR

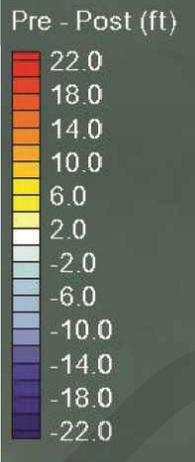
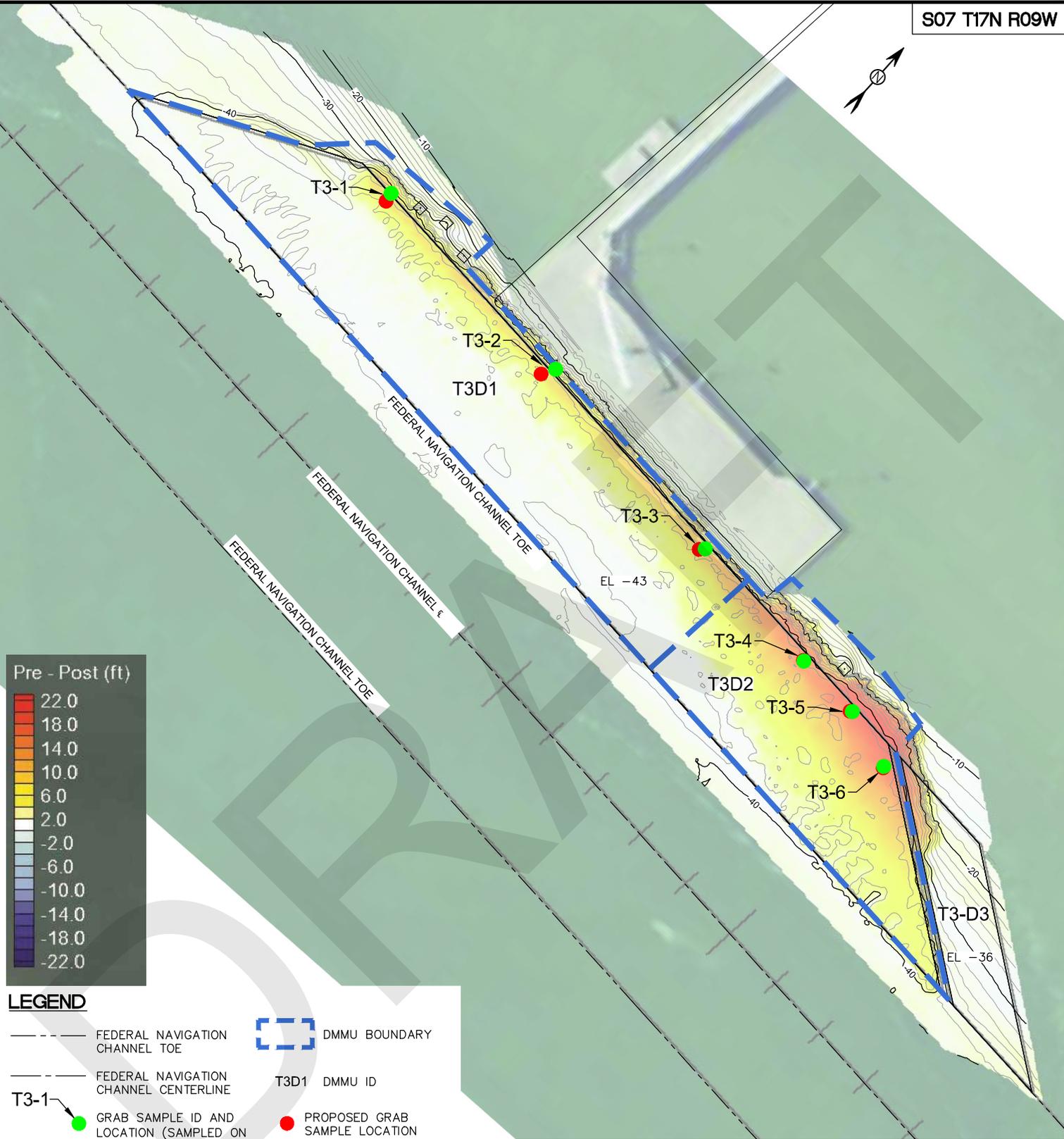
**PORT OF GRAYS HARBOR
TERMINALS 1, 2, 3, AND 4
RECENCY RENEWAL SAMPLING**

TERMINAL 2 - SAMPLE LOCATIONS

PROPOSED: RECENCY RENEWAL

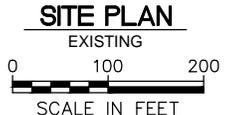
IN: GRAYS HARBOR
 AT: TERMINALS 1, 2, 3, AND 4
 COUNTY: GRAYS HARBOR STATE: WASHINGTON
 SHEET 3 DATE: 1/15/2015

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- LEGEND**
- FEDERAL NAVIGATION CHANNEL TOE
 - FEDERAL NAVIGATION CHANNEL CENTERLINE
 - T3-1 GRAB SAMPLE ID AND LOCATION (SAMPLED ON DECEMBER 12, 2014)
 - DMMU BOUNDARY
 - T3D1 DMMU ID
 - PROPOSED GRAB SAMPLE LOCATION

- NOTES**
1. HORIZONTAL DATUM: STATE PLANE, WA SOUTH, U.S. SURVEY FT, NAD83
 2. AERIAL: 2013 NAIP
 3. SURVEY CONDUCTED BY NORTHWEST HYDRO ON FEBRUARY 9, 2014.



DRAFT

PURPOSE: MAINTENANCE DREDGING

VERTICAL DATUM: MLLW = 0.0 FT

APPLICATION BY: PORT OF GRAYS HARBOR

**PORT OF GRAYS HARBOR
TERMINALS 1, 2, 3, AND 4
REGENCY RENEWAL SAMPLING**

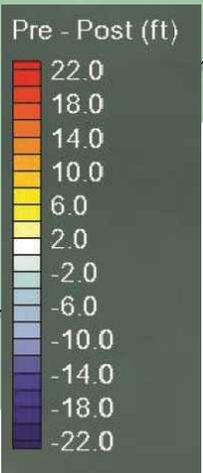
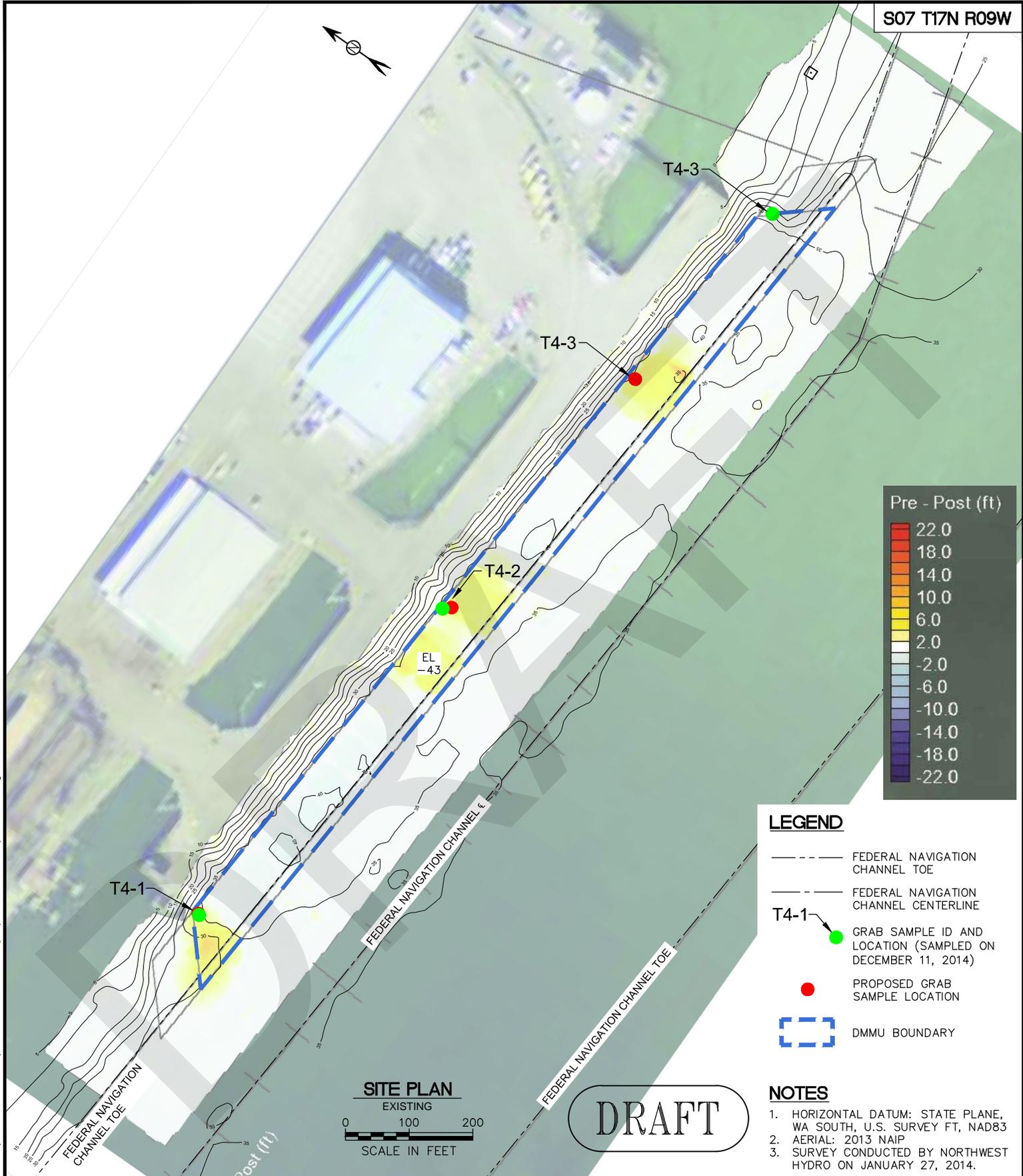
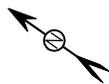
TERMINAL 3 - SAMPLE LOCATIONS

PROPOSED: REGENCY RENEWAL

IN: GRAYS HARBOR
AT: TERMINALS 1, 2, 3, AND 4
COUNTY: GRAYS HARBOR **STATE:** WASHINGTON

SHEET 4 **DATE:** 1/15/2015

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- LEGEND**
- FEDERAL NAVIGATION CHANNEL TOE
 - FEDERAL NAVIGATION CHANNEL CENTERLINE
 - T4-1 GRAB SAMPLE ID AND LOCATION (SAMPLED ON DECEMBER 11, 2014)
 - PROPOSED GRAB SAMPLE LOCATION
 - DMMU BOUNDARY

- NOTES**
1. HORIZONTAL DATUM: STATE PLANE, WA SOUTH, U.S. SURVEY FT, NAD83
 2. AERIAL: 2013 NAIP
 3. SURVEY CONDUCTED BY NORTHWEST HYDRO ON JANUARY 27, 2014.



DRAFT

PURPOSE: MAINTENANCE DREDGING

VERTICAL DATUM: MLLW = 0.0 FT

APPLICATION BY: PORT OF GRAYS HARBOR

**PORT OF GRAYS HARBOR
TERMINALS 1, 2, 3, AND 4
REGENCY RENEWAL SAMPLING**

TERMINAL 4 - SAMPLE LOCATIONS

PROPOSED: REGENCY RENEWAL

IN: GRAYS HARBOR

AT: TERMINALS 1, 2, 3, AND 4

COUNTY: GRAYS HARBOR **STATE:** WASHINGTON

SHEET 5 **DATE:** 1/15/2015

FILE: G:\Vancouver\2014\14.0266\NaturalResources\DMMP_SAP_Terminals\Graphics\POGH_T4.dwg USER: DaRosenio, Cesar