

MEMORANDUM FOR: RECORD

October 19, 2007

SUBJECT: DETERMINATION REGARDING THE SUITABILITY OF PROPOSED DREDGED MATERIAL FROM DELTA MARINE INDUSTRIES, DUWAMISH RIVER, SEATTLE, KING COUNTY, FOR BENEFICIAL USE OR UNCONFINED OPEN-WATER DISPOSAL AT THE ELLIOTT BAY NONDISPERSIVE SITE.

1. **Introduction.** This memorandum reflects the consensus determination of the Dredged Material Management Program (DMMP) agencies (U.S. Army Corps of Engineers, Washington Departments of Ecology and Natural Resources, and the Environmental Protection Agency) regarding the suitability of up to 11,905 cubic yards (cy) of dredged material from the Delta Marine Industries facility for beneficial use or for disposal at the Elliott Bay nondispersive open-water site.
2. **Background.** The Delta Marine facility, located on the Duwamish River, manufactures yachts and other vessels, as well as performing repairs and modifications on a variety of recreational and commercial watercraft (see Figure 1 for a vicinity map). Periodic maintenance dredging to -10 feet is permitted under Corps of Engineers permit 200200175. Sediment sampling and testing last occurred in July 2001, with dredging in 2004. The DMMP recency guidelines stipulate that sampling and testing results are only valid for a period of two years in a high-ranked area. Therefore, the maintenance material was required to be tested prior to the next cycle of dredging.

In addition to the maintenance dredging, Delta Marine Industries would like to accommodate larger vessels by dredging a portion of the area covered by permit 200200175 to a depth of -15 feet and, further, to dredge an area upstream of that covered by the current permit, also to a depth of -15 feet (AMEC, 2007a).

This suitability determination addresses both the maintenance and new-work dredging.

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

Table 1. Project Summary

Project ranking	High
Proposed dredging volume	11,905 cubic yards
Proposed dredging depth	-10 and -15 feet MLLW
Draft SAP received	March 29, 2007
Draft SAP returned for revisions	April 11, 2007
Revised SAP received	May 29, 2007
Revised SAP approved	June 19, 2007
Sampling dates	July 17-18, 2007
Data report received	September 26, 2007

DAIS Tracking number	DELTA-1-A-F-244
USACE Permit Application Number	200200175
Recency Determination (high rank = 2 years)	July 2009

4. **Project Ranking and Sampling Requirements.** This project was ranked "high" by the DMMP agencies based on its location on the Duwamish River (PSDDA, 1988). In a high-ranked area the number of samples and analyses are calculated using the following guidelines (PSDDA, 1988):
- 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) = 4,000 cubic yards
 - Maximum volume of sediment represented by each analysis in the subsurface portion of the dredging prism = 12,000 cubic yards

The total volume of material originally proposed for dredging was 12,760 cubic yards. The sampling and analysis plan (AMEC, 2007b) split this material into three options in order to accommodate uncertainties in the regulatory outcome and timing for the new-work dredging:

1. Option 1: 5,660 cubic yards (6,226 cy with a 10% bulking factor during dredging) of maintenance dredging (to -10 feet MLLW plus one foot of overdepth) already allowed under permit 200200175. The material to be dredged in this area was approximately 4 feet deep on average (to the design depth of -10 feet) and was all considered surface material in the SAP. See Figure 2A.
2. Option 2: 2,390 cubic yards of new-work dredging (2,629 cy with the bulking factor) to increase the depth of the outer portion of the maintenance dredging area to -15 feet MLLW, plus 2 feet of overdepth. This was all subsurface material. See Figure 2B.
3. Option 3: 3,550 cubic yards of new-work dredging (3,905 cy with the bulking factor) in an area immediately upstream of the dredging authorized under the existing permit. Dredging in this area is proposed to a depth of -15 feet MLLW, plus 2 feet of overdepth. This option included a mix of surface and subsurface material. See Figure 2C.

The DMMP agencies agreed to address the three options independently. Two dredged material management units (DMMUs 1 and 2) were required for option 1 and a single unit (DMMU 3) was required for option 2. While option 3 included both surface and subsurface material, the entire volume for this option was less than 4,000 cubic yards. After coordination with the EPA and Ecology cleanup programs, it was determined that there was no need to separate surface from subsurface material for this option. The surface and subsurface material could be composited together as a single management unit (DMMU 4).

While the nominal requirement for the number of field samples was one per DMMU, Delta Marine elected to take two samples per DMMU to get a better spatial representation of each management unit. The two field samples per DMMU would be composited for a single analysis per DMMU.

5. **Sampling.** Sampling took place July 17-18, 2007. Soundings taken during sampling indicated that field conditions had changed significantly since the original bathymetry had been done in March 2007. Sediment elevations were significantly lower, meaning that a portion of the proposed dredged material had eroded, possibly due to prop wash. Nearly all the material that would have

made up DMMU 2 was gone. Therefore this DMMU was eliminated. The small amount of material left in DMMU2 was included in DMMU 3 instead.

Another bathymetric survey will not be conducted until just prior to dredging. At that time, revised volumes for DMMUs 1, 3 and 4 will be calculated. In the meantime, and for the purposes of this suitability determination, the maximum volume of dredged material allowed per DMMU (4,000 cy) was assigned to DMMUs 1 and 3. The volume assigned to DMMU 4 remained unchanged. See Table 2 for proposed/revised DMMU volumes.

The sampling itself was accomplished with only minor problems. A vibracore was used and the full depth of sampling, including overdepth and Z-samples, was collected at each of the 6 sampling stations. However, due to the change in mudline elevations, the locations of the sampling stations needed to be adjusted from those proposed in the SAP in order to find adequate sediment depths for sampling. See Figure 3 for actual sampling locations and Table 2 for detailed sampling and compositing information.

6. **Chemical Analysis.** The approved sampling and analysis plan was followed and quality control guidelines specified by the PSEP and DMMP programs were met. 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 is predominantly silt. Total organic carbon ranged from 1.75 to 2.44 percent. The chemical results indicated that there were no exceedances of DMMP screening levels (Table 4). Consequently, bioassay testing was not required for this material. All three DMMUs met suitability guidelines, based on chemistry alone, for open-water disposal at the Elliott Bay site.

7. **Sediment Exposed by Dredging.** Sediment exposed by dredging must either meet the State of Washington Sediment Quality Standards (SQS) (Ecology, 1995) or the State's antidegradation standard (DMMP, 2001). Comparison of the proposed dredged material to SQS serves as a first-tier indicator for this purpose. Table 5 shows that there were no detected exceedances of SQS. However - while undetected - the reporting limit for hexachlorobenzene exceeded SQS for all three DMMUs. The DMMP agencies believe the probability that these reporting limit exceedances could be masking actual exceedances of SQS is low. Therefore, the exceedances were deemed insignificant and the agencies agreed that there was no need for analysis of Z-samples for this project. The sediment that will be exposed by dredging is not anticipated to have any exceedances of SQS.
8. **Beneficial-Use Analysis.** As indicated in the previous section, the proposed dredged material had no detected exceedances of SQS (and only a single undetected chemical with a reporting-limit exceedance, which was deemed insignificant). The Sediment Quality Standards pertain to marine sediment; therefore the dredged material is suitable for beneficial use in a marine environment.

To assess the suitability for upland beneficial use, the chemical results were compared to the Model Toxics Control Act (MTCA) guidelines (Ecology, 2005). Table 6 indicates that the concentration of arsenic exceeds the Method B guideline for carcinogens for all three DMMUs. Therefore, the dredged material may be unsuitable for some types of upland use. Ecology, DNR and the local health department should be consulted if upland beneficial use is contemplated. Also, while there is

no MTCA Method A guideline for total chromium, the total chromium value does exceed the guideline for chromium VI. Additional analysis may be required for upland beneficial use in order to determine the chromium VI content of the sediment.

9. **Suitability Determination.** This memorandum documents the evaluation of the suitability of sediment proposed for dredging from Delta Marine Industries for beneficial use or open-water disposal. The approved sampling and analysis plan was followed with the exceptions noted above. 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 11,905 cubic yards are suitable** for open-water disposal at the Elliott Bay non-dispersive site. The dredged material is also suitable, from a chemical and toxicity standpoint, for beneficial use in a marine environment. Upland beneficial use would require additional consultation with Ecology, DNR and the local health department.

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 meeting with DNR and the Corps of Engineers will be required. A dredging quality control plan must be developed and submitted to the Enforcement Section of 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.

10. **References.**

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

Ecology, 2005. *Model Toxics Control Act – Chapter 70.105D RCW and Cleanup Regulation - Chapter 173-340 WAC.* Washington State Department of Ecology, October 2005.

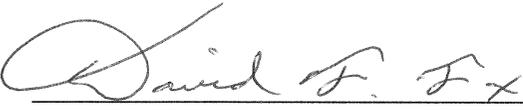
AMEC, 2007a. *Sediment Characterization Investigation, Delta Marine, PSDDA Sediment Sampling, Seattle, Washington.* Prepared by AMEC Earth & Environmental, Kirkland, Washington for Delta Marine Industries. September 2007.

AMEC, 2007b. *Draft Sampling and Analysis Plan, Delta Marine, PSDDA Sediment Sampling, Seattle, Washington.* Prepared by AMEC Earth & Environmental, Kirkland, Washington for Delta Marine Industries. May 2007.

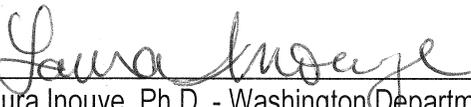
PSDDA, 1988. *Evaluation Procedures Technical Appendix – Phase I – Central Puget Sound.* U.S. Army Corps of Engineers Seattle District, U.S. Environmental Protection Agency Region 10, Washington State Department of Ecology, Washington State of Natural Resources. June 1988.

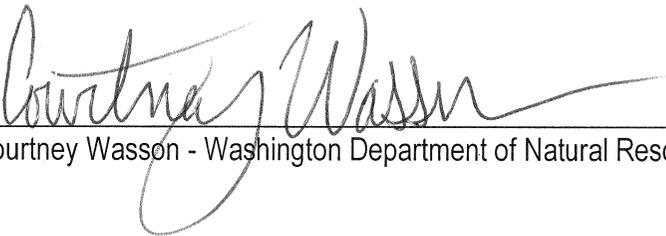
11. Agency Signatures.

Concur:

10/19/07 
Date David Fox, P.E. - Seattle District Corps of Engineers

10/19/07 
Date Erika Hoffman - Environmental Protection Agency

10/19/2007 
Date Laura Inouye, Ph.D. - Washington Department of Ecology

10/25/07 
Date Courtney Wasson - Washington Department of Natural Resources

Copies furnished:

DMMP signatories
Amy Klein, Seattle District Regulatory
Cindy Bartlett, AMEC
Meg Strong, AMEC
Jeff Layton, Layton & Sell

Table 2. Sampling and Compositing.

		DMMU 1	DMMU 2	DMMU 3	DMMU 4	Total
SAP volume (CY):		6,226		2,629	3,905	12,760
Revised volume (CY):		4,000	0	4,000	3,905	11,905
S t a t i o n	S-1	-4' to -11'	---	---	---	
	S-2	-7.9' to -11'	---	---	---	
	S-3	---	---	-10' to -17'	---	
	S-4	---	---	-14' to -17'	---	
	S-5	---	---	---	-13.7' to -17'	
	S-6	---	---	---	-9.5' to -17'	

Notes:

- 1) The design depth for DMMU-1 is -10 feet MLLW; the sampled depths include 1 foot of overdepth.
- 2) The design depth for DMMU-3 and DMMU-4 is -15 feet MLLW; the sampled depths include 2 feet of overdepth.
- 3) DMMU volumes have been adjusted for bulking during dredging.

Table 3. Sediment Conventional Data.

		DMMU 1	DMMU 3	DMMU 4
DAIS ID:		C1	C2	C3
GRAIN SIZE	% Gravel:	0.9	0.3	0.0
	% Sand:	27.1	41.7	34.1
	% Silt:	59.4	44.8	49.0
	% Clay:	12.7	13.2	17.0
	% Fines (clay+silt):	72.1	58.0	66.0
Total Solids (%):		46.2	57.8	47.5
Volatile Solids (%):		7.7	6.2	8.8
Total Organic Carbon (%):		2.44	1.75	2.10
Total Sulfides (mg/kg):		1450	2150	1950
Total Ammonia (mg N/kg):		96	67	103

Table 4. Chemical results compared to DMMP regulatory guidelines.

CHEMICAL	SL	BT	ML	DMMU 1		DMMU 3		DMMU 4	
				conc	QL	conc	QL	conc	QL
METALS (mg/kg dry)									
Antimony	150	---	200	10	U	9	U	10	U
Arsenic	57	507	700	10		10		10	
Cadmium	5.1	11.3	14	0.5		0.4	U	0.4	U
Chromium	---	267	---	30		24.4		27	
Copper	390	1,027	1,300	55.2		35.1		39.6	
Lead	450	975	1,200	29		14		18	
Mercury	0.41	1.5	2.3	0.12		0.11		0.13	
Nickel	140	370	370	23		20		21	
Selenium	---	3.0	---	0.4	U	0.5		0.6	
Silver	6.1	6.1	8.4	0.6	U	0.6	U	0.6	U
Zinc	410	2,783	3,800	126		84		83	
ORGANOMETALLIC COMPOUNDS (ug/L interstitial water)									
Tributyltin (ion)	0.15	0.15	---	0.019	U	0.019	U	0.019	U
LPAH (ug/kg dry)									
2-Methylnaphthalene	670	---	1,900	20	U	20	U	20	U
Acenaphthene	500	---	2,000	20	U	20	U	20	U
Acenaphthylene	560	---	1,300	20	U	20	U	20	U
Anthracene	960	---	13,000	20	U	20	U	20	U
Fluorene	540	---	3,600	20	U	20	U	20	U
Naphthalene	2,100	---	2,400	20	U	20	U	20	U
Phenanthrene	1,500	---	21,000	78		58		49	
Total LPAH	5,200	---	29,000	78		58		49	
HPAH (ug/kg dry)									
Benzo(a)anthracene	1,300	---	5,100	64		47		32	
Benzo(a)pyrene	1,600	---	3,600	78		54		39	
Benzo(g,h,i)perylene	670	---	3,200	46		31		25	
Benzofluoranthenes	3,200	---	9,900	193		143		102	
Chrysene	1,400	---	21,000	85		74		53	
Dibenzo(a,h)anthracene	230	---	1,900	20	U	20	U	20	U
Fluoranthene	1,700	4,600	30,000	250		180		140	
Indeno(1,2,3-c,d)pyrene	600	---	4,400	46		32		24	
Pyrene	2,600	11,980	16,000	180		120		91	
Total HPAH	12,000	---	69,000	942		681		561	
CHLORINATED HYDROCARBONS (ug/kg dry)									
1,2,4-Trichlorobenzene	31	---	64	8.7	U	7.9	U	7.4	U
1,2-Dichlorobenzene	35	---	110	1.7	U	1.6	U	1.5	U
1,3-Dichlorobenzene	170	---	---	1.7	U	1.6	U	1.5	U
1,4-Dichlorobenzene	110	---	120	1.7	U	1.6	U	1.5	U
Hexachlorobenzene	22	168	230	20	U	20	U	20	U
PHTHALATES (ug/kg dry)									
Bis(2-ethylhexyl)phthalate	1,300	---	8,300	370		260		460	
Butyl benzyl phthalate	63	---	970	20	U	20	U	20	U
Di-n-butyl phthalate	1,400	---	5,100	20	U	20	U	20	U
Di-n-octyl phthalate	6,200	---	6,200	20	U	20	U	20	U
Diethyl phthalate	200	---	1,200	20	U	20	U	20	U
Dimethyl phthalate	71	---	1,400	28		20	U	20	U

CHEMICAL	SL	BT	ML	DMMU 1		DMMU 3		DMMU 4	
PHENOLS (ug/kg dry)									
2 Methylphenol	63	---	77	20	U	20	U	20	U
2,4-Dimethylphenol	29	---	210	20	U	20	U	20	U
4 Methylphenol	670	---	3,600	20	U	20	U	35	
Pentachlorophenol	400	504	690	99	U	99	U	99	U
Phenol	420	---	1,200	20	U	20	U	20	U
MISCELLANEOUS EXTRACTABLES (ug/kg dry)									
Benzoic acid	650	---	760	200	U	200	U	200	U
Benzyl alcohol	57	---	870	20	U	20	U	20	U
Dibenzofuran	540	---	1,700	20	U	20	U	20	U
Hexachlorobutadiene	29	---	270	20	U	20	U	20	U
Hexachloroethane	1,400	---	14,000	20	U	20	U	20	U
N-Nitrosodiphenylamine	28	---	130	20	U	20	U	20	U
VOLATILE ORGANICS (ug/kg dry)									
Ethylbenzene	10	---	50	1.7	U	1.6	U	1.5	U
Tetrachloroethene	57	---	210	1.7	U	1.6	U	1.5	U
Total Xylene	40	---	160	1.7	U	1.6	U	1.5	U
Trichloroethene	160	---	1,600	1.7	U	1.6	U	1.5	U
PESTICIDES AND PCBs (ug/kg dry)									
Aldrin	10	---	---	1.9	Y	0.99	U	0.99	U
Chlordane	10	37	---	7.6	Y	0.99	U	2.4	Y
Dieldrin	10	---	---	0.98	U	2	U	0.99	U
Heptachlor	10	---	---	0.98	U	0.99	U	0.99	U
Lindane	10	---	---	0.99	U	0.99	U	0.99	U
Total DDT	6.9	50	69	2	U	2	U	0.99	U
Total PCBs	130	---	3,100	103		20	U	20	U
Total PCBs (mg/kg OC)	---	38	---	4.2		1.1	U	1	U

Y = estimated concentration
 U = undetected
 QL = laboratory qualifier
 OC = organic carbon
 SL = screening level
 BT = bioaccumulation trigger
 ML = maximum level

Table 5. Chemical results compared to SMS regulatory guidelines.

CHEMICAL	SQS	CSL	DMMU 1		DMMU 3		DMMU 4	
			conc	QL	conc	QL	conc	QL
METALS (mg/kg dry)								
Arsenic	57	93	10		10		10	
Cadmium	5.1	6.7	0.5		0.4	U	0.4	U
Chromium	260	270	30		24.4		27	
Copper	390	390	55.2		35.1		39.6	
Lead	450	530	29		14		18	
Mercury	0.41	0.59	0.12		0.11		0.13	
Silver	6.1	6.1	0.6	U	0.6	U	0.6	U
Zinc	410	960	126		84		83	
LPAH (mg/kg OC)								
2-Methylnaphthalene	38	64	0.8	U	1.1	U	1.0	U
Acenaphthene	16	57	0.8	U	1.1	U	1.0	U
Acenaphthylene	66	66	0.8	U	1.1	U	1.0	U
Anthracene	220	1200	0.8	U	1.1	U	1.0	U
Fluorene	23	79	0.8	U	1.1	U	1.0	U
Naphthalene	99	170	0.8	U	1.1	U	1.0	U
Phenanthrene	100	480	3.2		3.3		2.3	
Total LPAH	370	780	3.2		3.3		2.3	
HPAH (mg/kg OC)								
Benzo(a)anthracene	110	270	2.6		2.7		1.5	
Benzo(a)pyrene	99	210	3.2		3.1		1.9	
Benzo(g,h,i)perylene	34	88	1.9		1.8		1.2	
Benzo(a)fluoranthene	230	450	7.9		8.2		4.9	
Chrysene	110	460	3.5		4.2		2.5	
Dibenzo(a,h)anthracene	12	33	0.8	U	1.1	U	1.0	U
Fluoranthene	160	1200	10.2		10.3		6.7	
Indeno(1,2,3-c,d)pyrene	34	88	1.9		1.8		1.1	
Pyrene	1000	1400	7.4		6.9		4.3	
Total HPAH	960	5300	38.6		38.9		26.7	
CHLORINATED HYDROCARBONS (mg/kg OC)								
1,2,4-Trichlorobenzene	0.81	1.8	0.36	U	0.45	U	0.35	U
1,2-Dichlorobenzene	2.3	2.3	0.07	U	0.09	U	0.07	U
1,4-Dichlorobenzene	3.1	9	0.07	U	0.09	U	0.07	U
Hexachlorobenzene	0.38	2.3	0.82	U	1.14	U	0.95	U
PHTHALATES (mg/kg OC)								
Bis(2-ethylhexyl)phthalate	47	78	15.2		14.9		21.9	
Butyl benzyl phthalate	4.9	64	0.8	U	1.1	U	1.0	U
Di-n-butyl phthalate	220	1700	0.8	U	1.1	U	1.0	U
Di-n-octyl phthalate	58	4500	0.8	U	1.1	U	1.0	U
Diethyl phthalate	61	110	0.8	U	1.1	U	1.0	U
Dimethyl phthalate	53	53	1.1		1.1	U	1.0	U

CHEMICAL	SQS	CSL	DMMU 1		DMMU 3		DMMU 4	
PHENOLS (ug/kg dry)								
2 Methylphenol	63	63	20	U	20	U	20	U
2,4-Dimethylphenol	29	29	20	U	20	U	20	U
4 Methylphenol	670	670	20	U	20	U	35	
Pentachlorophenol	360	690	99	U	99	U	99	U
Phenol	420	1200	20	U	20	U	20	U
MISCELLANEOUS EXTRACTABLES (ug/kg dry)								
Benzoic acid	650	650	200	U	200	U	200	U
Benzyl alcohol	57	73	20	U	20	U	20	U
MISCELLANEOUS EXTRACTABLES (mg/kg OC)								
Dibenzofuran	15	58	0.8	U	1.1	U	1.0	U
Hexachlorobutadiene	3.9	6.2	0.8	U	1.1	U	1.0	U
N-Nitrosodiphenylamine	11	11	0.8	U	1.1	U	1.0	U
PCBs (mg/kg OC)								
Total PCBs (mg/kg carbon)	12	65	4.2		1.1	U	1	U

U = undetected
 QL = laboratory qualifier
 OC = organic carbon
 SMS = Sediment Management Standards
 SQS = sediment quality standard
 CSL = cleanup screening level

Table 6. Chemical results compared to MTCA regulatory guidelines.

CHEMICAL	Method A ¹	Method B ²	DMMU 1		DMMU 3		DMMU 4	
			conc	QL	conc	QL	conc	QL
METALS (mg/kg dry)								
Arsenic, inorganic	20	0.67	10		10		10	
Cadmium	2	---	0.5		0.4	U	0.4	U
Chromium (total)	---	---	30		24.4		27	
Chromium VI	19	---	---		---		---	
Copper	---	---	55.2		35.1		39.6	
Lead	250	---	29		14		18	
Mercury	2	---	0.12		0.11		0.13	
Silver	---	---	0.6	U	0.6	U	0.6	U
Zinc	---	---	126		84		83	
LPAH (ug/kg dry)								
Acenaphthene	---	---	20	U	20	U	20	U
Anthracene	---	---	20	U	20	U	20	U
Fluorene	---	---	20	U	20	U	20	U
Naphthalene	5,000	---	20	U	20	U	20	U
HPAH (ug/kg dry)								
Benzo(a)anthracene	---	140	64		47		32	
Benzo(a)pyrene	100	140	78		54		39	
Benzo(b,k)fluoranthenes	---	---	193		143		102	
Benzo(b)fluoranthene	---	140	83		72		47	
Benzo(k)fluoranthenes	---	140	110		71		55	
Chrysene	---	140	85		74		53	
Dibenzo(a,h)anthracene	---	140	20	U	20	U	20	U
Fluoranthene	---	---	250		180		140	
Indeno(1,2,3-c,d)pyrene	---	140	46		32		24	
Pyrene	---	---	180		120		91	
CHLORINATED HYDROCARBONS (ug/kg dry)								
1,2,4-Trichlorobenzene	---	---	8.7	U	7.9	U	7.4	U
1,2-Dichlorobenzene	---	---	1.7	U	1.6	U	1.5	U
1,4-Dichlorobenzene	---	42,000	1.7	U	1.6	U	1.5	U
Hexachlorobenzene	---	630	20	U	20	U	20	U
PHTHALATES (ug/kg dry)								
Bis(2-ethylhexyl)phthalate	---	71,000	370		260		460	
Butyl benzyl phthalate	---	---	20	U	20	U	20	U
Di-n-butyl phthalate	---	---	20	U	20	U	20	U
Di-n-octyl phthalate	---	---	20	U	20	U	20	U
Diethyl phthalate	---	---	20	U	20	U	20	U
Dimethyl phthalate	---	---	28		20	U	20	U

CHEMICAL	Method A ¹	Method B ²	DMMU 1		DMMU 3		DMMU 4	
PHENOLS (ug/kg dry)								
2,4-Dimethylphenol	---	---	20	U	20	U	20	U
Pentachlorophenol	---	8,300	99	U	99	U	99	U
Phenol	---	---	20	U	20	U	20	U
MISCELLANEOUS EXTRACTABLES (ug/kg dry)								
Benzoic acid	---	---	200	U	200	U	200	U
Benzyl alcohol	---	---	20	U	20	U	20	U
Dibenzofuran	---	---	20	U	20	U	20	U
Hexachlorobutadiene	---	13,000	20	U	20	U	20	U
N-Nitrosodiphenylamine	---	200,000	20	U	20	U	20	U
VOLATILE ORGANICS (ug/kg dry)								
Ethylbenzene	6,000	---	1.7	U	1.6	U	1.5	U
Tetrachloroethene	50	1,900	1.7	U	1.6	U	1.5	U
Total Xylene	9,000	---	1.7	U	1.6	U	1.5	U
Trichloroethene	30	2,500	1.7	U	1.6	U	1.5	U
PESTICIDES AND PCBs (ug/kg dry)								
Aldrin	---	59	1.9	Y	0.99	U	0.99	U
Chlordane	---	2,900	7.6	Y	0.99	U	2.4	Y
Dieldrin	---	63	0.98	U	2	U	0.99	U
Heptachlor	---	220	0.98	U	0.99	U	0.99	U
Heptachlor epoxide	---	110	---		---		---	
Lindane	10	770	0.99	U	0.99	U	0.99	U
Total DDT	---	---	2	U	2	U	0.99	U
DDT	3,000	2,900	2	U	2	U	0.99	U
DDE	---	2,900	2	U	2	U	0.99	U
Total PCBs	1,000	500	103		20	U	20	U

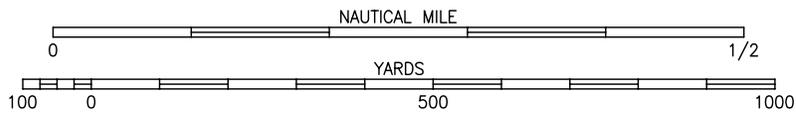
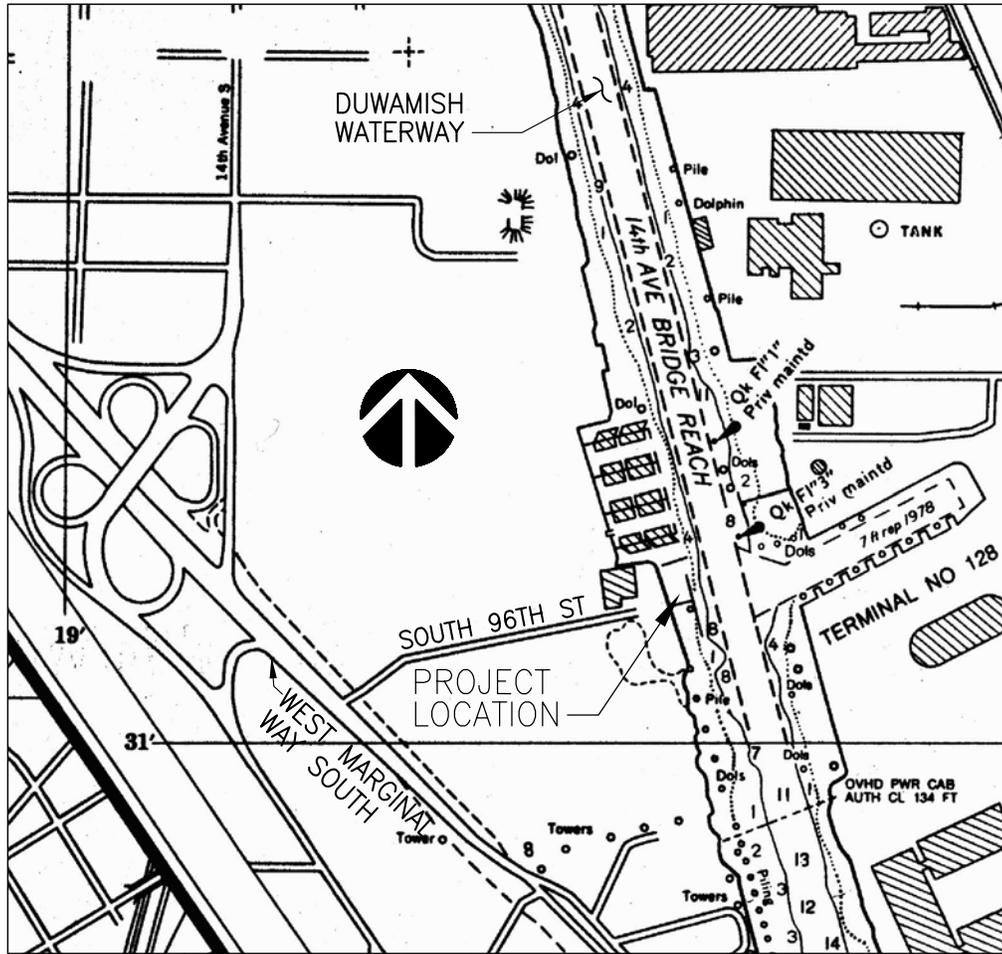
¹Soil, Method A, Unrestricted Land Use, Table Value

²Soil, Method B, Carcinogen, Standard Formula Value, Direct Contact (ingestion only), unrestricted land use

Y = estimated concentration

U = undetected

QL = laboratory qualifier



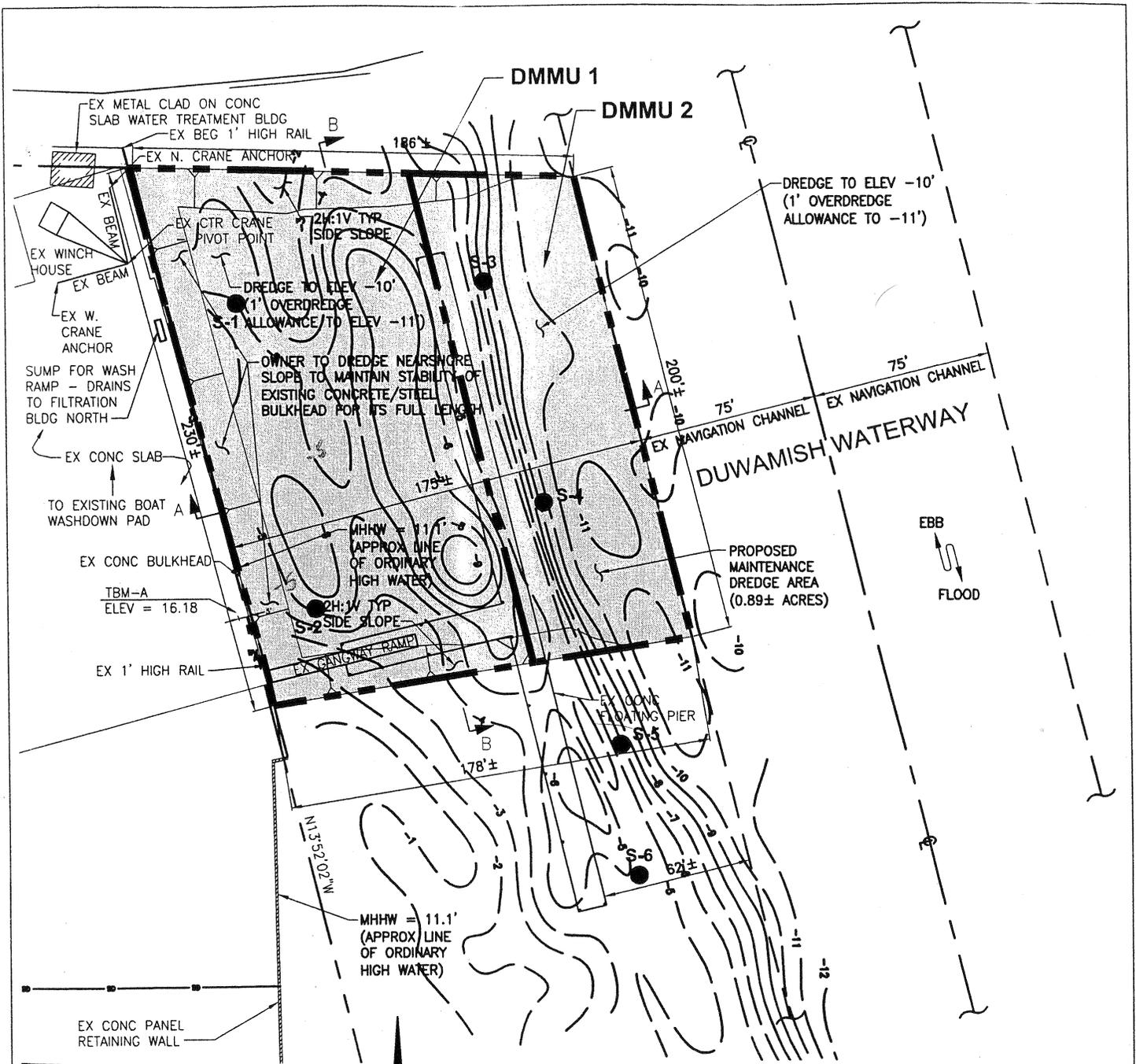
VICINITY MAP

SOURCE: NOAA CHART NO. 18450

FIGURE 1

PURPOSE: MAINTAIN EXISTING MOORAGE FACILITIES
 DATUM: MLLW = 0.0 FEET (N.O.S)
 SITE LOCATION: N47° 31' 8" LATITUDE
 122° 18' 21" LONGITUDE
 SITE ADDRESS: 1608 SOUTH 96TH STREET
 SEATTLE, WA

PROPOSED NEW DREDGING
 IN: DUWAMISH WATERWAY
 NEAR: SEATTLE
 COUNTY: KING
 STATE: WASHINGTON
 APPL. BY: DELTA MARINE INDUSTRIES
 REV:



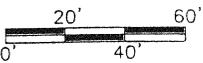
LEGEND

S-5 SOIL BORING LOCATION

NOTE:

MOORAGE AREA TO BE DREDGED BY CLAMSHELL BUCKET WITH UNCONFINED DISPOSED OF DREDGED MATERIAL AT THE PUGET SOUND DREDGED DISPOSAL ANALYSIS OPEN-WATER DISPOSAL SITE IN ELLIOTT BAY (SEE SHEET 5). ANY MATERIAL UNSUITABLE FOR OPEN-WATER DISPOSAL WILL BE DISPOSED OF AT AN UNSPECIFIED APPROVED UPLAND DISPOSAL SITE.

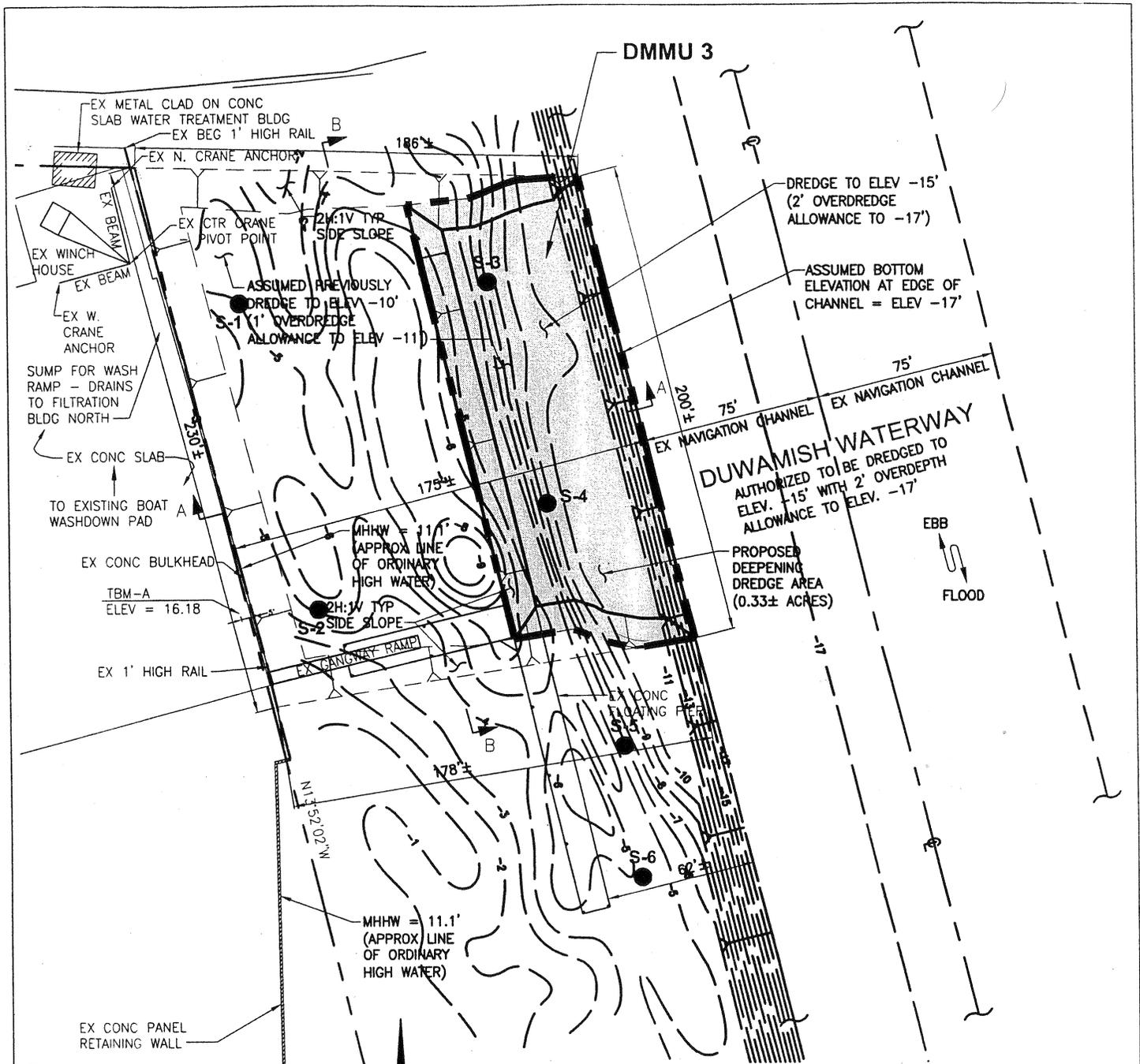
DETAILED SITE PLAN



**FIGURE 2A
OPTION 1**

PROPOSED PSSDA SAMPLING LOCATIONS

PROPOSED MAINTENANCE DREDGING
 IN: DUWAMISH WATERWAY
 NEAR: SEATTLE
 COUNTY: KING
 STATE: WASHINGTON
 APPL. BY: DELTA MARINE INDUSTRIES
 SHEET: 3 OF 5 DATE: 5/10/2007
 REV:



LEGEND

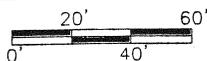
S-5 SOIL BORING LOCATION

NOTE:

MOORAGE AREA TO BE DREDGED BY CLAMSHELL BUCKET WITH UNCONFINED DISPOSED OF DREDGED MATERIAL AT THE PUGET SOUND DREDGED DISPOSAL ANALYSIS OPEN-WATER DISPOSAL SITE IN ELLIOTT BAY (SEE SHEET 5). ANY MATERIAL UNSUITABLE FOR OPEN-WATER DISPOSAL WILL BE DISPOSED OF AT AN UNSPECIFIED APPROVED UPLAND DISPOSAL SITE.

DREDGE VOLUME OF AREA DEEPENED TO -17':
2,390 CY

DETAILED SITE PLAN



**FIGURE 2 B
OPTION 2**

PROPOSED PSDDA SAMPLING LOCATIONS
PROPOSED REVISION TO PERMIT NO. 200200175

PROPOSED NEW DREDGING

IN: DUWAMISH WATERWAY

NEAR: SEATTLE

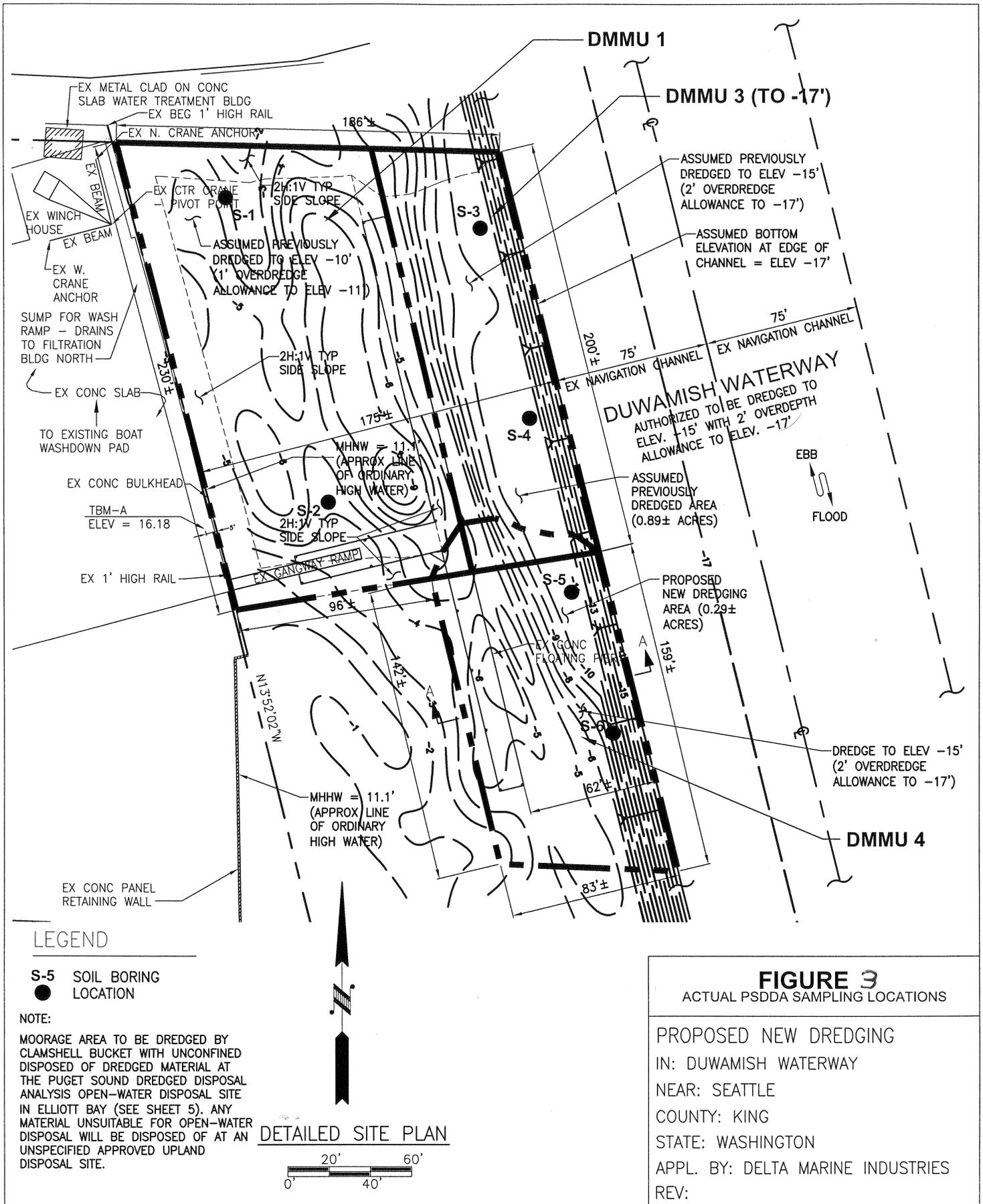
COUNTY: KING

STATE: WASHINGTON

APPL. BY: DELTA MARINE INDUSTRIES

SHEET: 3 OF 5 DATE: 5/10/2007

REV:



LEGEND

S-5 SOIL BORING LOCATION

NOTE:
 MOORAGE AREA TO BE DREDGED BY CLAMSHELL BUCKET WITH UNCONFINED DISPOSED OF DREDGED MATERIAL AT THE PUGET SOUND DREDGED DISPOSAL ANALYSIS OPEN-WATER DISPOSAL SITE IN ELLIOTT BAY (SEE SHEET 5). ANY MATERIAL UNSUITABLE FOR OPEN-WATER DISPOSAL WILL BE DISPOSED OF AT AN UNSPECIFIED APPROVED UPLAND DISPOSAL SITE.

DETAILED SITE PLAN

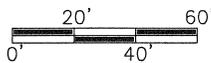


FIGURE 3
 ACTUAL PSDDA SAMPLING LOCATIONS

PROPOSED NEW DREDGING
 IN: DUWAMISH WATERWAY
 NEAR: SEATTLE
 COUNTY: KING
 STATE: WASHINGTON
 APPL. BY: DELTA MARINE INDUSTRIES
 REV: