CENWS-OD-TS-DMMO

MEMORANDUM FOR: RECORD **November 12, 2008**

SUBJECT: DMMP DETERMINATION ON THE SEDIMENT QUALITY OF THE EXPOSED SEDIMENT SURFACE AFTER DREDGING TO VERIFY COMPLIANCE WITH THE WASHINGTON STATE ANTIDEGRADATION POLICY FOR THE GRAYS HARBOR PUBLIC DEVELOPMENT AUTHORITY, SATSOP BARGE UNLOADING FACILITY, GRAYS HARBOR, WASHINGTON (NWS-2008-00670-SO).

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 quality of the sediment surface remaining after dredging the Barge Unloading Facility at the Chehalis River, which is owned and operated by the Satsop Development Park. The project area is on the southern bank of the Chehalis River at approximately River Mile 14.9, which is tidally influenced at the project site (Figure 1). This project involves maintenance dredging 7,000 cy of material from an existing barge slip and access channel. The dredged material will be trucked to an upland disposal site. Because this project does not involve in-water disposal, only a permit issued pursuant to Section 10 of the Rivers and Harbors Act is required from the Corps of Engineers.

2. **Background**. The barge slip site was originally constructed in the early 1980s to offload transformer and reactor components used in the Satsop nuclear power plant development. Components were brought by sea through Grays Harbor and up the Chehalis River. No nuclear components were ever transported through the barge slip facility. Prior to development of the barge slip, the area was cropland that extended to the bank of the river. No other development was historically present at the site or in the immediate project vicinity. Current and past land uses both upstream and downstream of the project site are mainly agricultural, composed of pasture lands and croplands near the project site. Maintenance dredging of the barge slip and debris removal in the navigation channel was last conducted in 1994, when the barge facility was used to remove equipment from the power facility. No sediment sampling was completed as part of the previous maintenance dredging project.

Table 1. Project Summary

Proposed dredging volume	7,000 cubic yards
Proposed disposal site	Upland; no return water
Project ranking	Low moderate
SAP received	August 13, 2008
SAP approved	August 28, 2008
Sampling dates	September 2, 2008
Data report submitted	November 5, 2008
DAIS Tracking number	GHPDA-1-A-F-262
USACE Permit Application Number	NWS-2008-00670-SO
Recency Determination (LM rank = 5-7 yrs)	September 2013 – September 2015

3. **Project Sampling**. Core samples were collected using a telescoping auger with a three-inch mud bucket. Samples were collected from three locations (Figure 2) per the approved SAP. Samples of the proposed dredge material were composited from the three locations and submitted for one analysis. One sample of the post-dredge surface (Z-layer) was also submitted for analysis.

4. **Chemical Analysis**. Two samples—one composite of the proposed dredge material, and one of the Z-layer—were analyzed at Analytical Resources, Inc. for the DMMP Chemicals of Concern for the Grays Harbor area, with the exception of TBT, volatile organic compounds (VOAs) and guaiacols. There were no exceedances of any CoCs in either of the samples, and most chemicals were not even detected. Chemical results are compared with DMMP criteria in Table 2 and with SMS criteria in Table 3.

5. **Sediment Evaluation**. No suitability determination is required for the proposed dredged material to be disposed at the upland facility. Chemical results do not indicate that there will be a deterioration of sediment quality due to exposure of the post-dredge surface subsequent to dredging. The DMMP has thus verified that the project as proposed will be in compliance with the State of Washington anti-degradation policy.

Table 2. Chemical results compared with DMMP criteria [1]

Chemical	SL	BT	ML	Dredge Material		Z Layer	
GRAIN SIZE							
% Gravel	---	---	---	0.2		9.4	
% Sand	---	---	---	11.4		42.7	
% Silt	---	---	---	59.5		38.2	
% Clay	---	---	---	15.3		9.6	
% Fines (clay+silt)	---	---	---	74.8		47.8	
CONVENTIONALS							
Total Solids, %	---	---	---	56		56.7	
Total Volatile Solids, %	---	---	---	6.1		5.68	
Total Organic Carbon, %	---	---	---	1.46		1.39	
Total Sulfides, mg/kg	---	---	---	26.3		20.6	
Total Ammonia, mg/kg	---	---	---	184		110	
METALS (mg/kg)							
Antimony	150	---	200	8	U	20	U
Arsenic	57	507.1	700	8	U	20	U
Cadmium	5.1	11.3	14	0.3	U	0.7	U
Chromium	---	267	---	33.6		35	
Copper	390	1027	1,300	61.2		66.3	
Lead	450	975	1,200	6		7	U
Mercury	0.41	1.5	2.3	0.06	U	0.07	U
Nickel	140	370	370	28		32	
Selenium	---	3	---	0.8	U	0.7	U
Silver	6.1	6.1	8.4	0.5	U	1	U
Zinc	410	2783	3,800	89		98	

Chemical	SL	BT	ML	Dredge Material		Z Layer	
ORGANICS (µg/kg)							
Acenaphthylene	560	---	1,300	20	U	20	U
Acenaphthene	500	---	2,000	20	U	20	U
Anthracene	960	---	13,000	20	U	20	U
Fluorene	540	---	3,600	20	U	20	U
Naphthalene	2,100	---	2,400	20	U	20	U
Phenanthrene	1,500	---	21,000	10	J	11	J
2-Methylnaphthalene	670	---	1,900	20	U	20	U
Total LPAHs [2]	5,200	---	29,000	10	J	11	J
Benzo(a)anthracene	1,300	---	5,100	20	U	20	U
Benzo(a)pyrene	1,600	---	3,600	20	U	20	U
Total Benzofluoranthenes (b+k+j)	3,200	---	9,900	20	U	20	U
Benzo(g,h,i)perylene	670	---	3,200	20	U	20	U
Chrysene	1,400	---	21,000	20		20	U
Dibenzo(a,h)anthracene	230	---	1,900	20	U	20	U
Fluoranthene	1,700	4,600	30,000	30		17	J
Indeno(1,2,3-c,d)pyrene	600	---	4,400	20	U	20	U
Pyrene	2,600	11,980	16,000	27		14	J
Total HPAHs [3]	12,000	---	69,000	57		31	J
CHLORINATED HYDROCARBONS (µg/kg)							
Hexachlorobenzene	22	168	230	20	U	20	U
Hexachlorobutadiene	29	---	270	20	U	20	U
1,2-Dichlorobenzene	35	---	110	20	U	20	U
1,3-Dichlorobenzene	170	---	---	20	U	20	U
1,4-Dichlorobenzene	110	---	120	20	U	20	U
1,2,4-Trichlorobenzene	31	---	64	20	U	20	U
PHTHALATES (µg/kg)							
Diethyl phthalate	200	---	1,200	20	U	18	J
Dimethyl phthalate	71	---	1,400	20	U	20	U
Di-n-butyl phthalate	1,400	---	5,100	20	U	20	U
Butyl benzyl phthalate	63	---	970	20	U	20	U
Bis(2-ethylhexyl) phthalate	1,300	---	8,300	20	U	32	
Di-n-octyl phthalate	6,200	---	6,200	20	U	20	U
PHENOLS (µg/kg)							
Pentachlorophenol	400	504	690	99	U	100	U
Phenol	420	---	1,200	20	U	20	U
2 Methylphenol	63	---	77	20	U	20	U
4 Methylphenol	670	---	3,600	20	U	20	U
2,4-Dimethylphenol	29	---	210	20	U	20	U
MISCELLANEOUS EXTRACTABLES (µg/kg)							
Benzoic acid	650	---	760	200	U	200	U
Benzyl alcohol	57	---	870	20	U	20	U

Chemical	SL	BT	ML	Dredge Material		Z Layer	
Dibenzofuran	540	---	1,700	20	U	20	U
Hexachloroethane	1,400	---	14,000	20	U	20	U
N-Nitrosodiohenylamine	28	---	130	20	U	20	U
VOLATILE ORGANICS (µg/kg)							
Ethylbenzene	10	---	50	---		---	
Tetrachloroethene	57	---	210	---		---	
Trichloroethene	160	---	1,600	---		---	
Total Xylene (sum of o-,m-,p-)	40	---	160	---		---	
PESTICIDES (µg/kg)							
Aldrin	10	---	---	0.98	U	0.98	U
Chlordane	10	37	---	0.98	U	0.98	U
DDD				2	U	2	U
DDE				2	U	2	U
DDT				2	U	2	U
Total DDT	6.9	50	69	2	U	2	U
Dieldrin	10	---	---	2	U	2	U
Heptachlor	10	---	---	0.98	U	0.98	U
Lindane	10	---	---	0.98	U	0.98	U
PCBs (µg/kg)							
Aroclor 1016				20	U	20	U
Aroclor 1221				20	U	20	U
Aroclor 1232				20	U	20	U
Aroclor 1242				20	U	20	U
Aroclor 1248				20	U	20	U
Aroclor 1254				20	U	20	U
Aroclor 1260				20	U	20	U
Total PCBs	130		3,100	20	U	20	U

Notes for Tables:

[1] Dredged Material Management Program (DMMP) Criteria Guideline Chemistry Values updated July 2008; ScreeningLevel (SL), Bioaccumulation Trigger (BT), and Maximum Level (ML).

[2] Total LPAHs = The sum of Acenaphthylene, Acenaphthene, Anthracene, Fluorene, Napthalene and Phenanthrene.

[3] Total HPAHs = 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.

-- = Not available or not applicable

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

U Indicates that the target analyte was not detected at the reported concentration

Table 3. Chemical results compared with SMS criteria

Chemical	SQS	CSL	Dredge Material		Z Layer	
GRAIN SIZE						
% Gravel	---	---	0.2		9.4	
% Sand	---	---	11.4		42.7	
% Silt	---	---	59.5		38.2	
% Clay	---	---	15.3		9.6	
% Fines (clay+silt)	---	---	74.8		47.8	
CONVENTIONALS						
Total Solids, %	---	---	56		56.7	
Total Volatile Solids, %	---	---	6.1		5.68	
Total Organic Carbon, %	---	---	1.46		1.39	
Total Sulfides, mg/kg	---	---	26.3		20.6	
Total Ammonia, mg/kg	---	---	184		110	
METALS (mg/kg dry wt.)						
Antimony	---	---	8	U	20	U
Arsenic	57	93	8	U	20	U
Cadmium	5.1	6.7	0.3	U	0.7	U
Chromium	260	270	33.6		35	
Copper	390	390	61.2		66.3	
Lead	450	530	6		7	U
Mercury	0.41	0.59	0.06	U	0.07	U
Nickel	---	---	28		32	
Selenium	---	---	0.8	U	0.7	U
Silver	6.1	6.1	0.5	U	1	U
Zinc	410	960	89		98	
ORGANICS (mg/kg OC)						
Acenaphthylene	66	66	1.4	U	1.4	U
Acenaphthene	16	57	1.4	U	1.4	U
Anthracene	220	1,200	1.4	U	1.4	U
Fluorene	23	79	1.4	U	1.4	U
Naphthalene	99	170	1.4	U	1.4	U
Phenanthrene	100	480	0.7	J	0.8	J
2-Methylnaphthalene	38	64	1.4	U	1.4	U
Total LPAHs [2]	370	780	0.7	J	0.8	J
Benzo(a)anthracene	110	270	1.4	U	1.4	U
Benzo(a)pyrene	99	210	1.4	U	1.4	U
Total Benzofluoranthenes6	230	450	1.4	U	1.4	U
Benzo(g,h,i)perylene	31	78	1.4	U	1.4	U
Chrysene	110	460	1.4		1.4	U
Dibenzo(a,h)anthracene	12	33	1.4	U	1.4	U
Fluoranthene	160	1,200	2.1		1.2	J

Chemical	SQS	CSL	Dredge Material		Z Layer	
Indeno(1,2,3-c,d)pyrene	34	88	1.4	U	1.4	U
Pyrene	1,000	1,400	1.8		1.0	J
Total HPAHS	960	5,300	5.3		2.2	J
CHLORINATED HYDROCARBONS (mg/kg OC)						
Hexachlorobenzene	0.38	2.3	1.4	U	1.4	U
Hexachlorobutadiene	3.9	6.2	1.4	U	1.4	U
1,2-Dichlorobenzene	2.3	2.3	1.4	U	1.4	U
1,3-Dichlorobenzene	--	---	--	--	--	--
1,4-Dichlorobenzene	3.1	9	1.4	U	1.4	U
1,2,4-Trichlorobenzene	0.81	1.8	1.4	U	1.4	U
PHTHALATES (mg/kg OC)						
Diethyl phthalate	61	110	1.4	U	1.3	J
Dimethyl phthalate	53	53	1.4	U	1.4	U
Di-n-butyl phthalate	220	1,700	1.4	U	1.4	U
Butyl benzyl phthalate	4.9	64	1.4	U	1.4	U
Bis(2-ethylhexyl) phthalate	47	78	1.4	U	2.3	
Di-n-octyl phthalate	58	4,500	1.4	U	1.4	U
PHENOLS (µg/kg dry wt.)						
Pentachlorophenol	360	690	99	U	100	U
Phenol	420	1,200	20	U	20	U
2 Methylphenol	63	63	20	U	20	U
4 Methylphenol	670	670	20	U	20	U
2,4-Dimethylphenol	29	29	20	U	20	U
MISCELLANEOUS EXTRACTABLES						
Benzoic acid (µg/kg dry wt.)	650	650	200	U	200	U
Benzyl alcohol (µg/kg dry wt)	57	73	20	U	20	U
Dibenzofuran (mg/kg OC)	15	58	1.4	U	1.4	U
Hexachloroethane (mg/kg OC)	--	--	--	--	--	--
N-Nitrosodiohenylamine (mg/kg OC)	11	11	1.4	U	1.4	U
PCBs (mg/kg OC)						
Aroclor 1016	--	--	1.4	U	1.4	U
Aroclor 1221	--	--	1.4	U	1.4	U
Aroclor 1232	--	--	1.4	U	1.4	U
Aroclor 1242	--	--	1.4	U	1.4	U
Aroclor 1248	--	--	1.4	U	1.4	U
Aroclor 1254	--	--	1.4	U	1.4	U
Aroclor 1260	--	--	1.4	U	1.4	U
Total PCBs (mg/kg OC)	12	65	1.4	U	1.4	U

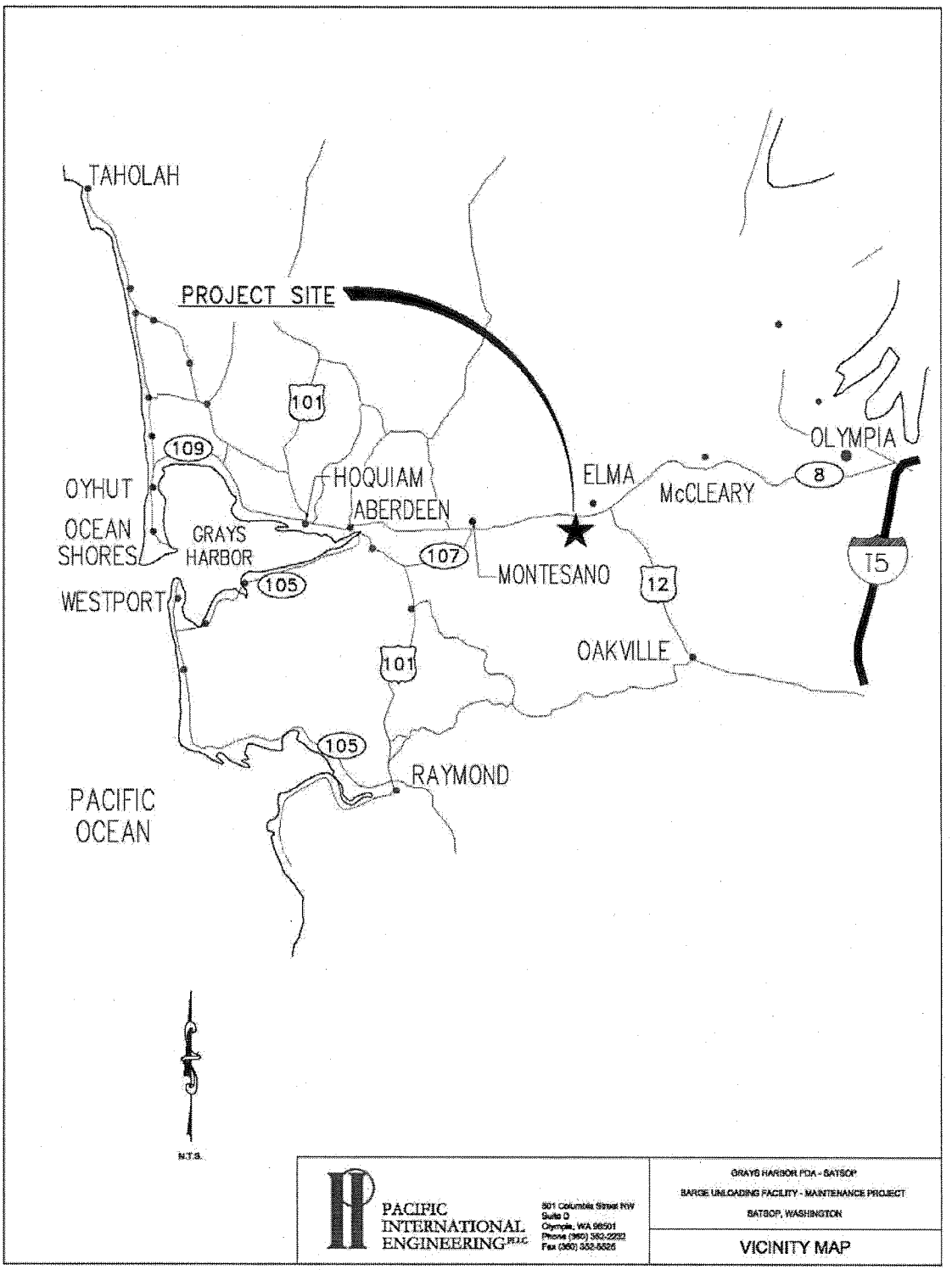

Figure 1. Project vicinity map

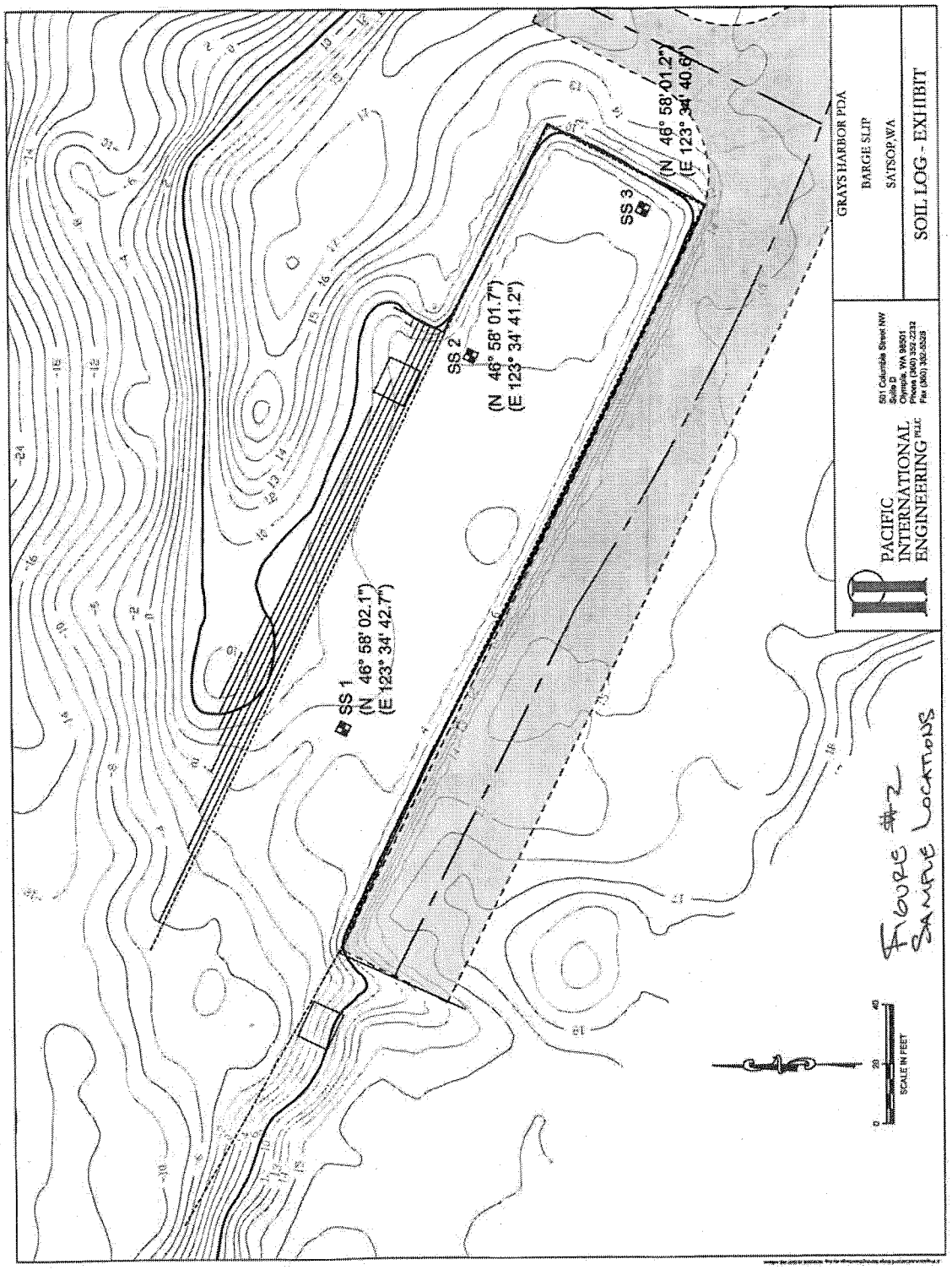

Figure 2. Project area and sample locations

Concur:

12/9/08
Date

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