CENWS-OD-TS-DMMO

MEMORANDUM FOR: RECORD August 2, 2007

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 CAMAS SLOUGH, CAMAS, WASHINGTON MAINTENANCE DREDGING PROJECT (2003-01135)

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 maintenance dredging of Camas Slough. This project involves maintenance dredging of 20,000 cy of material from three areas of Camas Slough yearly for five years for a total of 100,000 cy. This material will be disposed in an upland disposal site, without return water to Camas Slough, on Lady Island owned by the applicant, Georgia-Pacific Consumer Products LLC. Following disposal, this material may be re-used in construction projects on the island. 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 Camas paper mill site, owned by Georgia-Pacific Consumer Products LLC, is located on Camas Slough, a side channel of the Columbia River that flows from the Washougal River on the east end, into the Columbia mainstem on the west end. The area in front of the mill accumulates sediment from both the Washougal and Columbia Rivers. Dredging is required to maintain these navigation channels for staging and transport of materials associated with mill operations. Dredging is also proposed to maintain the fresh water intake structure that is operated seasonally (URS, 2007).

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

Table 1. Project Summary

Project ranking	moderate
Proposed dredging volume	20,000 cubic yards each year for five years
Proposed dredging depth	-11.5 ft msl except for DMMU 1 at -1.5 ft msl
SAP received	July 18, 2006
SAP approved	Conditional: August 22, 2006 Final: November 1, 2006
Sampling dates	November 28, 2006 through December, 5 2006
Data report submitted	March 27, 2007
DAIS Tracking number	CSMD7-1-A-O-243
USACE Permit Application Number	2003-01135
Recency Determination (moderate rank = 5 yr)	December, 2011

4. Project Ranking and Sampling Requirements. This project was ranked "moderate" based on its location in Camas Slough and the proximity to the paper mill. The sampling and analysis plan (URS, 2006) called for dredging of no more than 20,000 cubic yards of sediment per year for each of five years. Based on input from the resource agencies (U.S. Fish and Wildlife Service, Washington Department of Ecology) as well as the applicant, it was agreed that four dredged material management units (DMMUs), each a composite of 1 to 4 field samples from the dredging prism, would be tested (See Table 2).

   In addition, it was agreed that each of the ten cores to be obtained during characterization of the dredged prism would be drilled one foot below the dredge depth in order to evaluate the sediment to be exposed by dredging (z-sample).

5. Testing Requirements. Analysis of the dredge prism for the RSET Sediment Evaluation Framework contaminants of concern (See Table 5) and evaluation of potential water quality impacts due to the dredging process were required to better assess potential impacts to species listed under the Endangered Species Act and to provide information needed for the consultation process with the U.S. Fish and Wildlife Service. Dioxin was added to the list of contaminants of concern due to the proximity of the paper mill to Camas Slough. To evaluate the potential for water quality impacts of dredging, a Dredging Elutriate Test (DRET) was conducted on sediment from the dredge prism. It was also agreed that one of the one-foot z-samples per DMMU would be analyzed initially with the provision that analysis of additional z-samples may be required.

6. Sampling. The sampling of this project was delayed due to low river stage that prevented barge access to boring locations. Once the river stage increased to an acceptable level, sampling for this project took place November 28, 2006 through December 5, 2006. Initially, samples were collected using direct push drilling techniques using a drill rig (Geoprobe®) secured on a barge. However, due to limited access to three borings near the freshwater intake (borings B5, B6, and B7 – DMMU 1) an alternative sampling technique, a vibracore, was used at these locations. While penetration to the full dredge depth plus the one foot z-sample depth was achieved, the recovery was poor at some sampling locations, ranging from 33% to 85%. Table 2 includes sampling and compositing summary information. Table 4 presents more detailed information on the sampling effort.

Table 2. Sampling Summary

	DMMU 1	DMMU 2	DMMU 3	DMMU 4
DAIS ID:	C1	C2	C3	C4
Number of samples:	3	4	2	1
Samples Comprising DMMU:	B5a, B6a, B7a	B1a, B2a, B3a, B4a	B8a, B9a	B10a
z-samples Collected:	B5b, B6b, B7b	B1b, B2b, B3b, B4b	B8b, B9b B11b*	B10b
Minimum penetration depth (ft):	4	4	4	4
Maximum penetration depth (ft):	6	8	8	4
Mean penetration depth (ft):	5	5	6	4
Minimum recovery (%):	52	33	40	33

	DMMU 1	DMMU 2	DMMU 3	DMMU 4
Maximum recovery (%):	72	81	85	33
Mean recovery (%):	64	47	62	33

* Duplicate of B9b

Because of poor recovery, multiple cores were required at some locations in order to obtain sufficient sediment for analysis.

7. Chemical Analysis. The approved sampling and analysis plan was followed and quality control guidelines specified by the RSET and DMMP programs were met, with a few minor exceptions. 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 sand and gravel in DMMUs 1, 2, and 4, although sufficient percentages of fines are present in nearly all samples to potentially contain organic contaminants.

Table 3. Sediment Conventional Results.

		DMMU 1	DMMU 2	DMMU 3	DMMU 4
DAIS ID:		C1	C2	C3	C4
Volume (cubic yards):		20,000	79,000	5,000	21,000
GRAIN SIZE	% Gravel	4	4	1	4
	% Sand	83	60	44	48
	% Silt	10	9	44	34
	% Clay	3	26	9	10
	(clay+silt) % Fines	13	35	54	44
Total Solids, %		68	59	67	61
Volatile Solids, %		N/A	N/A	N/A	N/A
Total Organic Carbon, %		0.61	2.4	1.5	2.1
Total Sulfides, mg/kg		4	36	30	21
Total Ammonia, mg N/kg		29	123	192	62

The chemical results indicate that there were no exceedances of RSET freshwater screening level 1 (SL1) values (Table 5) in DMMUs 1, 2, and 3. The concentration of zinc in sediments from DMMU 4 – 144 mg/kg dry – exceeded the RSET SL1 value of 130 mg/kg dry weight. However, bioassay testing of this material is not required for the dredge prism to be disposed upland. There are no agreed upon RSET or DMMP freshwater values for dioxin. However, the MTCA Level C value for 2,3,7,8 TCDD was used as a way of determining environmental impact of these sediments in an upland environment. The dioxin data for Camas Slough are presented in Table 6.

In order to evaluate the effects of dredging on water quality, a DRET test was run on one composite of sediment representing all of the DMMUs proposed for dredging. The DRET was only run for organics because the preparation of the elutriate alters the solubility of some metals. Test results indicated that during dredging neither EPA nor Ecology acute water quality standards would be exceeded for chemicals with available standards. Tables 7 and 8 present the DRET data, including dioxin and available screening values.

8. 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). Because there are no SQS values for freshwater sediments, the RSET freshwater SL1 was used as a first tier indicator for this purpose. Table 5 shows that there were no detected exceedances of screening values in sediments for z-samples from DMMUs 1, 2 and 4. Therefore, these three DMMUs may be dredged without concern that unsuitable material will be exposed due to dredging. However, the concentrations of cadmium, zinc and PCBs exceeded screening values in sample B8b, the z-sample representing DMMU 3. In addition, the concentration of dioxin in sample B8b exceeded the concentration in the dredging prism. Therefore the sediment to be exposed by the dredging of DMMU3 violates Ecology's antidegradation policy. Based on these exceedances, in particular those for dioxin and PCBs, it was determined that further evaluation, including additional sampling and testing for PCBs and dioxin, would be required to determine whether additional dredging and/or capping would be required for DMMU 3. Following subsequent discussions and a meeting between the applicant and DMMP agencies, the applicant decided not to include the dredging of DMMU 3 in their 5-year maintenance dredging permit. As a result, no additional testing was performed.

9. Beneficial-Use Analysis. Finally, to assess the suitability of DMMUs 1, 2 and 4 for upland beneficial use, the chemical results were compared to the Model Toxics Control Act (MTCA) guidelines (Ecology, 2001). Table 5 indicates that the concentrations of all contaminants of concern are below MTCA Method A and C screening values for industrial land-use. However, while below screening values, Ecology and the local health district should be consulted if beneficial use is contemplated.

10. Suitability Determination. This memorandum documents the evaluation of the suitability of sediment proposed for dredging from Camas Slough for beneficial use and the quality of sediments to be exposed by dredging compared to the SQS and the State's antidegradation policy. The approved sampling and analysis plan was followed . 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 sediment to be exposed following dredging meets the Ecology antidegradation policy for DMMUs 1, 2, and 4. DMMU 3 does not meet the Ecology antidegradation policy and is, therefore, not suitable for dredging based on the available information. The applicant has stated in a letter dated May 17, 2007 that they are not including DMMU 3 in the permit application for maintenance dredging of Camas Slough. Upland disposal and beneficial use of this DMMU would require additional consultation with Ecology and the local health district.

    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 may provide input on the

overall project. A permit decision will include full consideration of all input received from agencies and the general public.

If a Section 10 permit is issued for this project, a pre-dredge meeting with Ecology and the Corps of Engineers will be required as a special condition of the permit. Any permit issued would also require the permittee to submit a dredging quality control plan to the Regulatory Branch of the Seattle District Corps of Engineers at least 7 days prior to the pre-dredge meeting.

11. References.

DMMP, 2001. *Quality of Post-Dredge Sediment Surfaces*. A clarification paper prepared by Tom Gries for the DMMP agencies, October 2001.

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

Ecology, 2001. *Cleanup Levels and Risk Calculations under the Model Toxics Control Act Cleanup Regulation (CLARC) Version 3.1. Publication No. 94-145*. Washington State Department of Ecology, November, 2001.

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.

RSET, 2006. *Northwest Regional Sediment Evaluation Framework – Interim Final*. Regional Sediment Evaluation Team. September 2006.

URS, 2007. *Sediment Evaluation Report Camas Slough Maintenance Dredging Project*, Camas Slough, Clark County, Camas, Washington. March 2007.

12. Agency Signatures.

Concur:

8/2/07 — Sandra Lemlich
Date — Sandra Lemlich - Seattle District Corps of Engineers

8/2/07 — [signature]
Date — Erika Hoffman - Environmental Protection Agency

8/2/07 — Laura Inouye
Date — Laura Inouye, Ph.D. - Washington Department of Ecology

8/8/07 — Courtney Wasson
Date — Courtney Wasson - Washington Department of Natural Resources

Copies furnished:

DMMP signatories
David Martin, Seattle District Regulatory
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DMMO file

Table 4 - Sample Collection Summary

Station	Date	Existing Elevation (datum = USGS msl)	Design Elevation (datum = USGS msl)	Total Borehole Depth (feet bss)	Sample Interval (datum = USGS msl)	Sample Designation
B1	11/29/06	-10.3	-11.5	4.0	-10.3 to -11.5	B1a
					-11.5 to -12.5	B1b
B2	11/29/06	-8.8	-11.5	4.0	-8.8 to -11.5	B2a
					-11.5 to -12.5	B2b
B3	11/28/06	-6.5	-11.5	8.0	-6.5 to -11.5	B3a
					-11.5 to -12.5	B3b
B4	11/29/06	-9.0	-11.5	4.0	-9.0 to -11.5	B4a
					-11.5 to -12.5	B4b
B5	12/05/06	2.3	-1.5	5.0	2.3 to -1.5	B5a
					-1.5 to -2.5	B5b
B6	12/05/06	-0.8	-1.5	4.0	-0.8 to -1.5	B6a
					-1.5 to -2.5	B6b
B7	12/05/06	2.3	-1.5	6.0	2.3 to -1.5	B7a
					-1.5 to -2.5	B7b
B8	11/28/06	-8.5	-11.5	4.0	-8.5 to -11.5	B8a
					-11.5 to -12.5	B8b
B9[1]	11/28/06	-5.0	-11.5	8.0	-5.0 to -11.5	B9a
					-11.5 to -12.5	B9b
					-11.5 to -12.5	B11b (dup)
B10	11/27/06	-10.0	-11.5	4.0	-10.0 to -11.5	B10a
					-11.5 to -12.5	B10b
B12	11/29/06	-5.5	NA	4.0	-5.5 to -2.5	B12

Notes:
bss = below sediment surface
dup = duplicate
msl = mean sea level
USGS = U.S. Geological Survey
[1] = borehole B9 is in a location where dredging is not currently required; however it will characterize the sediments above the proposed dredge design elevation of -11.5 to allow dredging in this area should it become necessary during the duration of the 5-year permit.

Table 5 - Sediment Data Summary

	DMMU Composite Samples				Z-Horizon Samples					SEF Freshwater SLVs[1]		MTCA Industrial	
	DMMU1	DMMU2	DMMU3	DMMU4	B2b	B5b	B8b	B10b	B11b (Dup of B9b)	SL1	SL2	MTCA A	MTCA C
CONVENTIONALS:													
Total Solids (%)	67.7	58.9	66.6	61.1	66.2	60.5	56.8	64.0	69.2	---	---	---	---
Total Organic Carbon (% dry)	0.61	2.43	1.49	2.11	2.45	2.81	1.98	1.94	0.93	---	---	---	---
Ammonia (mg/kg dry)	28.9	123	192	61.8	82.5	62.7	309	56.0	109	---	---	---	---
Total Sulfide (mg/kg dry)	4.3	36.3	30.2	21.0	22.3	1.9	50.7	18.4	14.0	---	---	---	---
METALS (mg/kg dry)										**mg/kg dry**		**mg/kg dry**	
Antimony	6.3 U	5.6 U	5.0 U	7.0 U	6.4 U	7.0 U	5.9 U	6.7 U	6.2 U	---	---	---	1,400
Arsenic	7 U	7 U	6 U	8 U	8 U	8 U	7 U	8 U	7 U	20	51	200	87.5
Cadmium	0.8	1.1	0.8	1.0	1.0	1.0	**2.1**	**1.2**	0.7 U	1.1	1.5	10	3,500
Chromium	22.1	20.5	19.9	23	22.4	8.8	27.1	22	23.7	95	100	500	10,500
Copper	49.9	33.6	32.1	68.3 J	38.7	58.9	46.8	29.8	40.2	80	830	---	130,000
Lead	14.4	22.1	16.1	20	15.3	20	29.5	12.9	16.2	340	430	1,000	---
Mercury	0.022	0.043	0.077	0.063	0.027	0.052	0.183	0.054	0.042	0.28	0.75	1	1,050
Nickel	17.8	14.6	14.8	18.3	19.5	13.2	17.3	17	17.8	60	70	---	70,000
Silver	0.7 U	0.7 U	0.6 U	0.8 U	0.8 U	0.8 U	0.7 U	0.8 U	0.7 U	2.0	2.5	---	17,500
Zinc	88.6	106	97.4	**144**	108	111	**207**	128	92.4	130	400	---	1,050,000
ORGANICS													
Low Molecular Weight Polycyclic Aromatic Hydrocarbons (LPAHs) (ug/kg dry)										**ug/kg dry**		**ug/kg dry**	
Naphthalene	7.6 J	4.0 J	7.6 J	12	10 U	2.2 J	20	16	11 J	500	1,300	---	70,000,000
Acenaphthylene	10 U	10 U	2.7 J	2.5	10 U	10 U	10 U	10 U	4.5 J	470	640	---	--
Acenaphthene	10 U	10 UJ	2.2 J	10 U	10 U	10 U	4.0 U	10 U	10 UJ	1,100	1,300	---	210,000,000
Fluorene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	1,000	3,000	---	140,000,000
Phenanthrene	10 U	5.7 J	14	5.1 J	4.8 J	10 U	37	7.6 J	6.4 J	6,100	7,600	---	---
Anthracene	10 U	10 U	3.2 J	10 U	10 U	10 U	41	10 U	10 UJ	1,200	1,600	---	1,050,000,000
2-Methylnaphthalene	10 U	3.5 J	5.7 J	4.8 J	10 U	10 U	21	12	2.5 J	470	560	---	---
Total LPAH[2]	7.6 J	13.2 J	35.4 J	24.4 J	4.8 J	2.2 J	119	35.6 J	24.4 J	6,600	9,200	---	---
High Molecular Weight Polycyclic Aromatic Hydrocarbons (HPAHs) (ug/kg dry)										**ug/kg dry**		**ug/kg dry**	
Fluoranthene	10 U	7.9 J	19	8.4 J	11	10 U	58	9.9 J	5.0 J	11,000	15,000	---	140,000,000
Pyrene	10 U	6.5 J	10 U	6.0 J	9.2 J	10 U	33	67	5.2 J	8,800	16,000	---	105,000,000
Benzo(a)anthracene	10 U	4.6 J	8.1 J	3.2 J	5.8 J	10 U	15	3.7 J	10 UJ	4,300	5,800	---	18,000
Chrysene	10 U	5.6 J	11	5.2 J	6.9 J	10 U	26	6.3 J	10 UJ	5,900	6,400	---	18,000
Benzofluoranthenes (b+k)	10 U	5.1 J	14.8 J	5.2 J	6.6 J	10 U	26 J	6.6 J	10 UJ	600	4,000	---	36,000
Benzo(a)pyrene	10 U	10 U	8.1 J	10 U	5.8 J	10 U	17	3.7 J	10 UJ	3,300	4,800	---	18,000
Indeno(1,2,3-c,d)pyrene	10 U	10 U	6.5 J	10 U	4.4 J	10 U	10 U	3.5 J	10 UJ	4,100	5,300	---	18,000
Dibenzo(a,h)anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	800	840	---	18,000
Benzo(g,h,i)perylene	10 U	10 U	7.3 J	10 U	3.6 J	10 U	10 U	10 U	10 UJ	4,000	5,200	---	---
Total HPAH[2]	10 U	29.7 J	74.8 J	28 J	53.3 J	10 U	175 J	100.7 J	10.2 J	31,000	55,000	20,000	---
CHLORINATED HYDROCARBONS (ug/kg dry)										**ug/kg dry**		**ug/kg dry**	
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	---	---	---	---
1,4-Dichlorobenzene	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	---	---	---	---
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	---	---	---	---
1,2,4-Trichlorobenzene	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	---	---	---	---
Hexachlorobenzene (HCB)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	---	---	---	---

Table 5 - Sediment Data Summary cont.

	DMMU Composite Samples				Z-Horizon Samples					SEF Freshwater SLVs[1]		MTCA Industrial	
	DMMU1	DMMU2	DMMU3	DMMU4	B2b	B5b	B8b	B10b	B11b	SL1	SL2	MTCA A	MTCA C
PHTHALATES (ug/kg dry)										ug/kg dry		ug/kg dry	
Dimethyl phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	46	440	---	---
Diethyl phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	---	---	---	---
Di-n-butyl phthalate	10 U	6.6 J	6.8 J	10 U	10 U	10 U	10 U	9.6 J	10 UJ	---	---	---	---
Butyl benzyl phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	260	370	---	70,000,000
Bis(2-ethylhexyl)phthalate	25 J	33 J	25 J	32 J	14 J	7.9 J	110 J	36 J	17 J	220	320	---	9,380,000
Di-n-octyl phthalate	7.1 J	10 U	10 U	10 U	10 J	10 U	10 U	10 U	10 UJ	26	45	---	70,000,000
PHENOLS (ug/kg dry)										ug/kg dry		ug/kg dry	
Phenol	30 U	30 U	30 U	71	30 U	30 U	30 U	46	30 U	---	---	---	2,000,000,000
2-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	---	---	---	---
4-Methylphenol	10 U	140	79	140	10 U	10 U	320	210	15	---	---	---	---
2,4-Dimethylphenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	---	---	---	70,000,000
Pentachlorophenol	100 U	100 UJ	100 U	100 U	100 U	100 U	100 U	100 U	100 U	---	---	---	1,090,000
MISCELLANEOUS EXTRACTABLES (ug/kg dry)										ug/kg dry		ug/kg dry	
Benzyl alcohol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	---	---	---	1,050,000,000
Benzoic acid	200 UJ	200 UJ	200 UJ	200 UJ	200 UJ	200 UJ	200 UJ	200 UJ	200 UJ	---	---	---	14,000,000,000
Dibenzofuran	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	400	440	---	---
Hexachloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	---	---	---	3,500,000
Hexachlorobutadiene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	---	---	---	1,680,000
N-Nitrosodiphenylamine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	---	---	---	2,570
PESTICIDES & PCBs (ug/kg dry)										ug/kg dry		ug/kg dry	
p,p'-DDE	1.0 U	0.88 J	4.0	1.2 J	0.30 J	0.35 J	7.6 J	1.6 U	1.0 U	---	---	---	386,000
p,p'-DDD	1.0 U	1.2 J	1.8 J	1.6 J	0.35 J	1.0 U	2.9	1.4	1.0 U	---	---	---	547,000
p,p'-DDT	0.17 J	1.4	3.1	0.57 J	0.34 J	0.56 J	6.6 J	1.5	1.0 U	---	---	---	386,000
Total DDT[2]	0.17 J	3.48 J	8.9 J	3.37 J		0.91 J	17.1 J	2.9	1.0 U	---	---	5,000	---
Aldrin	1.0 U	1.0 U	1.0 U	0.6 J	1.0 U	1.0 U	1.3 U	1.0 U	1.0 U	---	---	---	7,720
Chlordane	10.0 U	10.0 U	12.0 U	10.0 U	10.0 U	10.0 U	26.0 U	10.0 U	10.0 U	---	---	---	375,000
Dieldrin	1.0 U	3.4 U	4.7	1.0 U	1.0 U	1.0 U	15	1.0 U	1.0 U	---	---	---	8,200
Heptachlor	1.0 U	0.58 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	---	---	---	29,200
Alpha-BHC	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	---	---	---	---
Gamma-BHC (Lindane)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	---	---	---	101,000
Total PCBs[2]	10 U	16	42	22	10 U	10 U	**86**	50 J	3.7 J	60	120	10,000	---
Dioxins/Furans (pg/kg dry)													
2,3,7,8-TCDD	0.084 U	0.305	0.606	0.236	0.104 U	0.210 U	1.61	0.304 U	0.048 U	---	---	---	8.75
TEQ (u=0)	0.100	1.5	4.4	0.8	0.2	0.400	12	1	0.400				
TEQ (u=1/2 dl)	0.3	1.8	4.7	1.1	0.4	0.7	12.4	1.4	0.5	---	---	---	---

Notes:

-- criteria for this analyte is not available.

J = analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample

U = analyte is non-detect, reported at the Method Reporting Limit (MRL)

Bold = analyte was detected above a screening level concentration

[1] SEF - Northwest Regional Sediment Evaluation Framework, Interim Final, September 2006

[2] Summation calculations based upon SEF guidelines section 7.7.4 (all non-detect values summed as zero)

DMMU = Dredged Material Management Unit

DMMU-1 = composite of B5a, B6a and B7a

DMMU-2 = composite of B1a, B2a, B3a and B4a

DMMU-3 = composite of B8a and B9a

DMMU-4 = B10a

Table 6. Camas Slough Dioxin Sediment Data

Analyte	TEF	DMMU1			DMMU2			DMMU3			DMMU4			Z- Sample B2b		
		ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ
2,3,7,8-TCDD	1	0.084	U	0.042	0.305		0.305	0.606		0.606	0.236		0.236	0.104	U	0.052
1,2,3,7,8-PeCDD	1	0.085	U	0.0425	0.301	U	0.1505	0.339	U	0.1695	0.246	U	0.123	0.105	U	0.0525
1,2,3,4,7,8-HxCDD	0.1	0.138	J	0.0138	0.47		0.047	0.521	J	0.0521	0.301		0.0301	0.134	J	0.0134
1,2,3,6,7,8-HxCDD	0.1	0.351	U	0.01755	2.52	U	0.126	6.44		0.644	1.39	U	0.0695	0.539	U	0.02695
1,2,3,7,8,9-HxCDD	0.1	0.354	U	0.0177	1.42	U	0.071	2.64	U	0.132	0.902	U	0.0451	0.411	U	0.02055
1,2,3,4,6,7,8-HpCDD	0.01	6.26		0.0626	49.9		0.499	145		1.45	24.8		0.248	9.3		0.093
OCDD	0.0003	38.1		0.01143	553		0.1659	2440		0.732	277		0.0831	78.3		0.02349
2,3,7,8-TCDF	0.1	0.091	U	0.00455	0.168		0.0168	1.67		0.167	0.797		0.0797	0.207	U	0.01035
1,2,3,7,8-PeCDF	0.03	0.048	U	0.00072	0.274		0.00822	0.354		0.01062	0.157		0.00471	0.117		0.00351
2,3,4,7,8-PeCDF	0.3	0.075		0.0225	0.673		0.2019	0.508		0.1524	0.199		0.0597	0.113	U	0.01695
1,2,3,4,7,8-HxCDF	0.1	0.103		0.0103	0.673		0.0673	1.2		0.12	0.331		0.0331	0.154		0.0154
1,2,3,6,7,8-HxCDF	0.1	0.065	U	0.00325	0.41		0.041	0.998		0.0998	0.3		0.03	0.124	U	0.0062
2,3,4,6,7,8-HxCDF	0.1	0.053	U	0.00265	0.268		0.0268	0.574		0.0574	0.133		0.0133	0.102		0.0102
1,2,3,7,8,9-HxCDF	0.1	0.048	U	0.0024	0.0469	U	0.002345	0.402		0.0402	0.062		0.0062	0.058	U	0.0029
1,2,3,4,6,7,8-HpCDF	0.01	0.89	U	0.00445	8.29		0.0829	21.6		0.216	3.42	U	0.0171	1.32	U	0.0066
1,2,3,4,7,8,9-HpCDF	0.01	0.073		0.00073	0.589		0.00589	2.11		0.0211	0.318		0.00318	0.108		0.00108
OCDF	0.0003	2.01	U	0.000302	22.1		0.00663	69.4		0.02082	7.94	U	0.00119	2	U	0.0003
Total TEQ (u=1/2dl):				0.3			1.8			4.7			1.1			0.4
Total TEQ (u=0):				0.1			1.5			4.4			0.8			0.2

Table 6 Cont'd. Camas Slough Dioxin Sediment Data

Analyte	TEF	Z-Sample B5b			Z-Sample B8b			Z-Sample B10b			Z-Sample B11b			Background B-12		
		ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ	ng/kg-dw	LQ	TEQ
2,3,7,8-TCDD	1	0.2	U	0.1	1.61		1.61	0.304	U	0.152	0.048	U	0.024	0.069	U	0.0345
1,2,3,7,8-PeCDD	1	0.342	U	0.171	0.716	U	0.358	0.211	U	0.1055	0.056	U	0.028	0.0469	U	0.02345
1,2,3,4,7,8-HxCDD	0.1	0.56	J	0.056	1.06	J	0.106	0.274	J	0.0274	0.083	U	0.00415	0.062	J	0.0062
1,2,3,6,7,8-HxCDD	0.1	0.869	U	0.04345	17		1.7	1.75	U	0.0875	0.327	U	0.01635	0.351	U	0.01755
1,2,3,7,8,9-HxCDD	0.1	1.07	U	0.0535	6.12		0.612	1.07	U	0.0535	0.268	U	0.0134	0.221	U	0.01105
1,2,3,4,6,7,8-HpCDD	0.01	16.1		0.161	417		4.17	55.7		0.557	12		0.12	7.17		0.0717
OCDD	0.0003	107		0.0321	7310		2.193	537		0.1611	321		0.0963	47.4		0.01422
2,3,7,8-TCDF	0.1	0.259	U	0.01295	3.91		0.391	0.769		0.0769	0.074	U	0.0037	0.253	U	0.01265
1,2,3,7,8-PeCDF	0.03	0.104		0.00312	0.596		0.01788	0.14		0.0042	0.047	U	0.00071	0.053	U	0.000795
2,3,4,7,8-PeCDF	0.3	0.167		0.0501	0.929		0.2787	0.186	U	0.0279	0.059		0.0177	0.069		0.0207
1,2,3,4,7,8-HxCDF	0.1	0.241		0.0241	1.64		0.164	0.596		0.0596	0.173		0.0173	0.086		0.0086
1,2,3,6,7,8-HxCDF	0.1	0.137		0.0137	1.01		0.101	0.487		0.0487	0.243		0.0243	0.059		0.0059
2,3,4,6,7,8-HxCDF	0.1	0.141		0.0141	0.742		0.0742	0.148		0.0148	0.084		0.0084	0.048	U	0.0024
1,2,3,7,8,9-HxCDF	0.1	0.0493	U	0.002465	0.089		0.0089	0.0486	U	0.00243	0.046	U	0.0023	0.0469	U	0.002345
1,2,3,4,6,7,8-HpCDF	0.01	1.69	U	0.00845	53.5		0.535	4.27	U	0.02135	8.38		0.0838	0.853	U	0.004265
1,2,3,4,7,8,9-HpCDF	0.01	0.143		0.00143	3.28		0.0328	0.551		0.00551	0.294		0.00294	0.054	U	0.00027
OCDF	0.0003	3.51	U	0.000527	181		0.0543	11.3		0.00339	9.52		0.00286	1.84	U	0.000276
Total TEQ (u=1/2dl):				0.7			12.4			1.4			0.5			0.2
Total TEQ (u=0):				0.4			12.0			1.0			0.4			0.1

Table 7 - DRET Data Summary

	DRET Elutriate	EPA NRWQC CMC[1]	Ecology FW Acute WQC
CONVENTIONALS:			
Total Organic Carbon (%)	18.1	---	---
Dissolved Organic Carbon (%)	1.6	---	---
ORGANICS			
Low Molecular Weight Polycyclic Aromatic Hydrocarbons (LPAHs) (ug/L)			
Naphthalene	0.26	---	---
Acenaphthylene	0.20 U	---	---
Acenaphthene	0.20 U	---	---
Fluorene	0.20 U	---	---
Phenanthrene	0.032 J	---	---
Anthracene	0.20 U	---	---
2-Methylnaphthalene	0.49 J	---	---
Total LPAH[2]	0.78 J	---	---
High Molecular Weight Polycyclic Aromatic Hydrocarbons (HPAHs) (ug/L)			
Fluoranthene	0.025 J	---	---
Pyrene	0.027 J	---	---
Benzo(a)anthracene	0.20 U	---	---
Chrysene	0.20 U	---	---
Benzofluoranthenes (b,k)	0.20 U	---	---
Benzo(a)pyrene	0.20 U	---	---
Indeno(1,2,3-c,d)pyrene	0.20 U	---	---
Dibenzo(a,h)anthracene	0.20 U	---	---
Benzo(g,h,i)perylene	0.20 U	---	---
Total HPAH[2]	0.052 J	---	---
CHLORINATED HYDROCARBONS (ug/L)			
1,3-Dichlorobenzene	0.20 U	---	---
1,4-Dichlorobenzene	0.20 U	---	---
1,2-Dichlorobenzene	0.20 U	---	---
1,2,4-Trichlorobenzene	0.20 U	---	---
Hexachlorobenzene (HCB)	0.20 U	---	---
PHTHALATES (ug/L)			
Dimethyl phthalate	0.20 U	---	---
Diethyl phthalate	0.15 J	---	---
Di-n-butyl phthalate	0.20 U	---	---
Butyl benzyl phthalate	0.20 U	---	---
Bis(2-ethylhexyl)phthalate	0.29 J	---	---
Di-n-octyl phthalate	0.20 U	---	---
PHENOLS (ug/L)			
Phenol	0.50 U	---	---
2-Methylphenol	0.50 U	---	---
4-Methylphenol	0.84	---	---
2,4-Dimethylphenol	2.0 U	---	---
Pentachlorophenol	1.0 U	---	---
MISCELLANEOUS EXTRACTABLES (ug/L)			
Benzyl alcohol	5.0 U	---	---
Benzoic acid	3.0 J	---	---
Dibenzofuran	0.20 U	---	---
Hexachloroethane	0.20 U	---	---
Hexachlorobutadiene	0.20 U	---	---
N-Nitrosodiphenylamine	0.20 U	---	---
PESTICIDES & PCBs (ug/L)		**ug/L**	**ug/L**
Total DDT	0.11 U	---	1.1
p,p'-DDE	0.11 U	---	---
p,p'-DDD	0.11 U	---	---
p,p'-DDT	0.11 U	1.1	1.1
Aldrin	0.11 U	3.0	2.5
Chlordane (beta)	0.11 U	2.4	2.4
Dieldrin	0.0036 J	0.24	2.50
Heptachlor	0.0023 J	0.52	0.52
Alpha-BHC	0.11 U	---	---
Gamma-BHC (Lindane)	0.11 U	0.95	2.00
Total PCBs[2]	0.41 U	---	2
Dioxins/Furans (pg/L)			
2,3,7,8-TCDD	1.31 U	---	---
TEQ (u=1/2 dl)	5.4	---	---
TEQ (u=0)	3.4	---	---

Notes:

DRET - Dredging Elutriate Test

-- criteria for this analyte is not available.

J = analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample

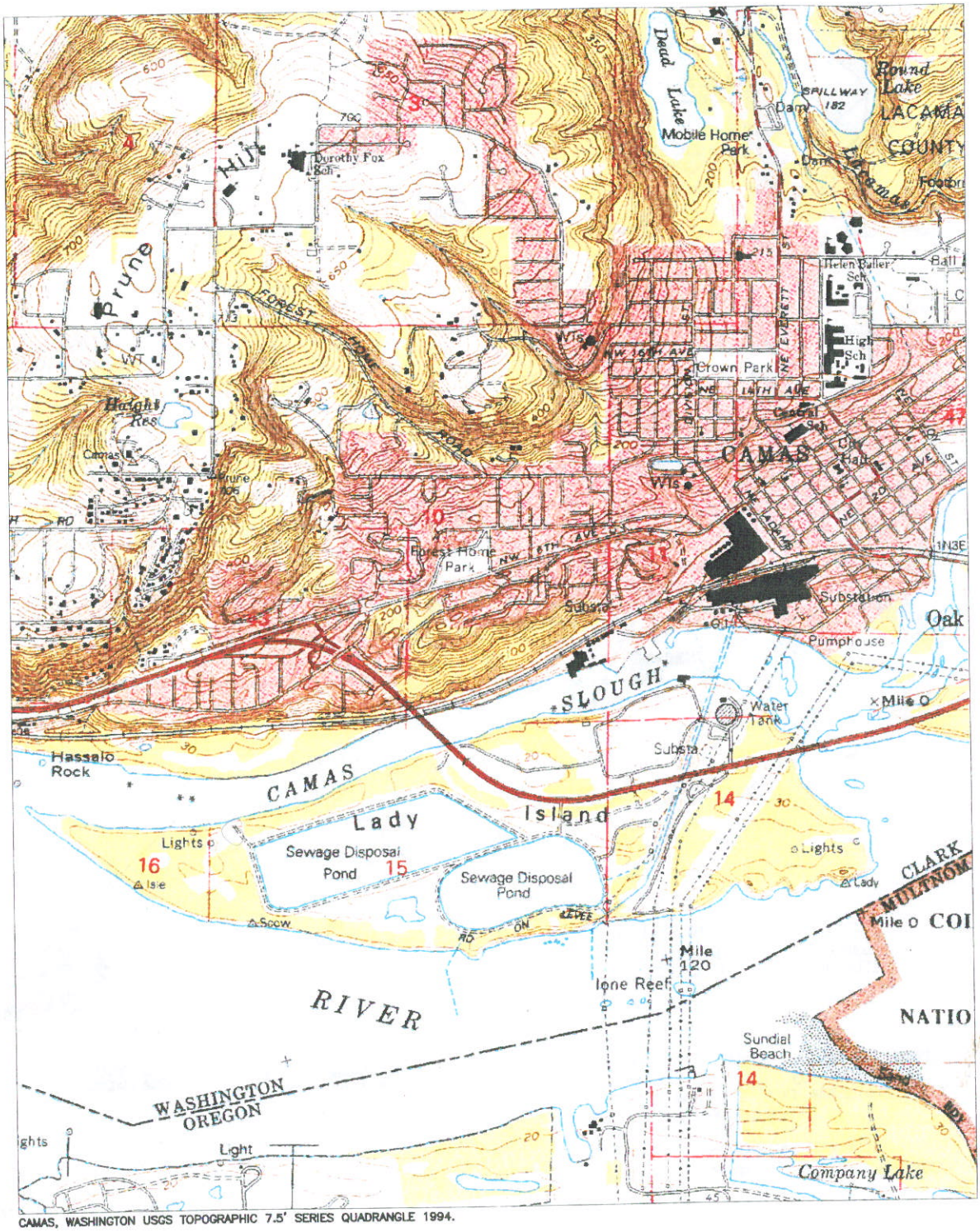
U = non-detect, reported at the Method Reporting Limit (MRL)

[1]National Recommend Water Quality Criteria for Priority Toxic Pollutants (NRWQC), U.S. Environmental Protection Agency (EPA), 2004. Criteria Maximum Concentration (CMC) or "acute" concentration

[2] Summation calculations based upon SEF guidelines section 7.7.4 (all non-detect values summed as zero)

Table 8. Camas Dioxin Dredging Elutriate Data

Analyte	TEF	DRET Elutriate		
		pg/L	LQ	TEQ
2,3,7,8-TCDD	1	0.503	U	0.2515
1,2,3,7,8-PeCDD	1	0.503	U	0.2515
1,2,3,4,7,8-HxCDD	0.1	0.503	U	0.02515
1,2,3,6,7,8-HxCDD	0.1	9.74	U	0.487
1,2,3,7,8,9-HxCDD	0.1	4.62	U	0.231
1,2,3,4,6,7,8-HpCDD	0.01	226		2.26
OCDD	0.0003	3760		1.128
2,3,7,8-TCDF	0.1	2.29	U	0.1145
1,2,3,7,8-PeCDF	0.05	1.27	U	0.03175
2,3,4,7,8-PeCDF	0.3	1.2	U	0.18
1,2,3,4,7,8-HxCDF	0.1	1.62	U	0.081
1,2,3,6,7,8-HxCDF	0.1	0.503	U	0.02515
2,3,4,6,7,8-HxCDF	0.1	1.23	U	0.0615
1,2,3,7,8,9-HxCDF	0.1	0.989	U	0.04945
1,2,3,4,6,7,8-HpCDF	0.01	34.8	U	0.174
1,2,3,4,7,8,9-HpCDF	0.01	3.12	U	0.0156
OCDF	0.0003	110		0.033
Total TEQ (u=1/2 dl):				5.4
Total TEQ (u=0):				3.4



CAMAS, WASHINGTON USGS TOPOGRAPHIC 7.5' SERIES QUADRANGLE 1994.

VICINITY MAP

GEORGIA-PACIFIC CONSUMER PRODUCTS LLC
CAMAS SLOUGH MAINTENANCE DREDGING PROJECT
CAMAS, WASHINGTON

MARCH 2007
25696219

URS

FIGURE 1

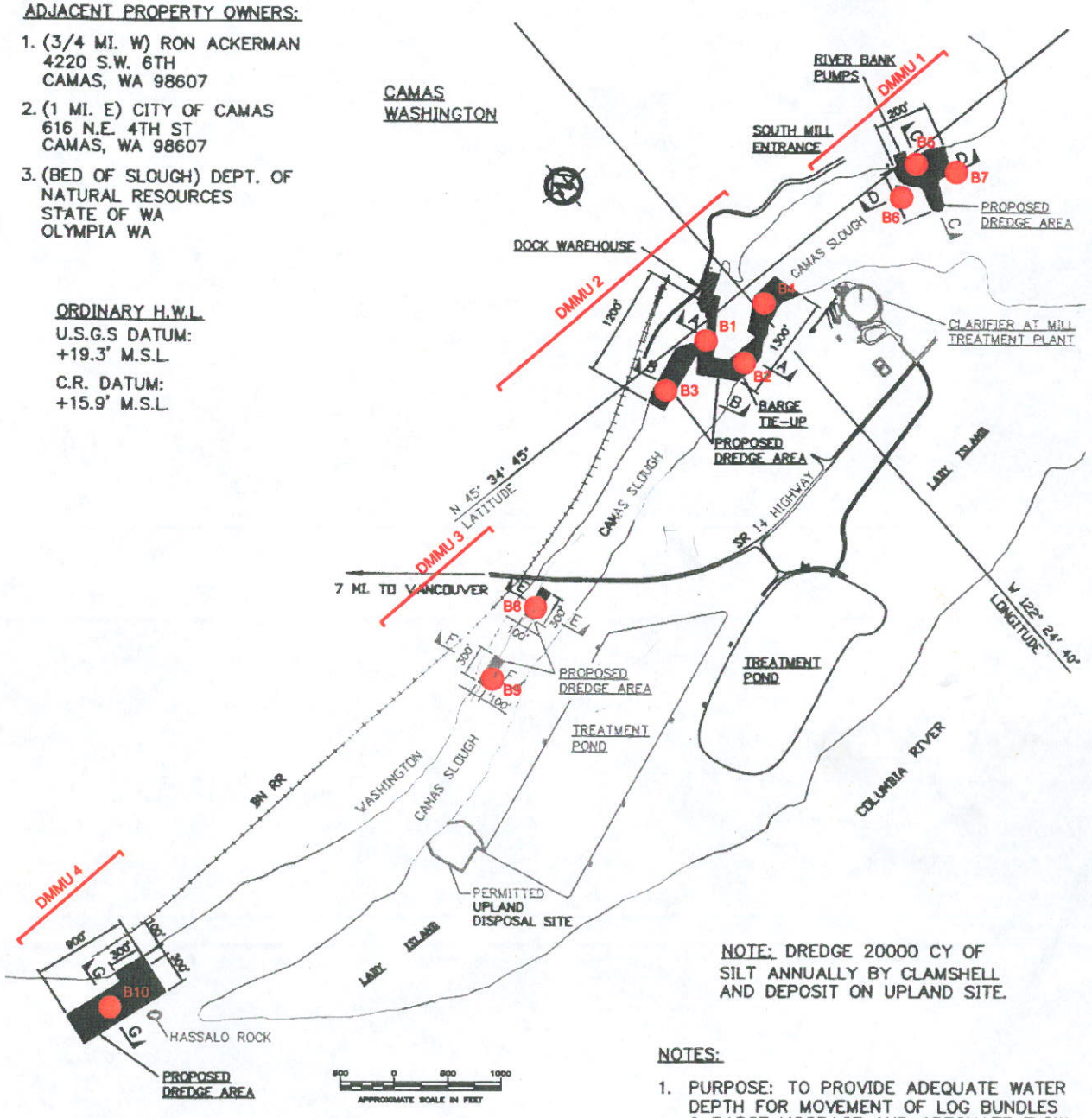
O:\25696219 GP Fort Jones Camas Revised BE\4200 Sediment Report\Figures\Fig 1 Vicinity Map.dwg Mar 06, 2007 - 7:52am

ADJACENT PROPERTY OWNERS:

1. (3/4 MI. W) RON ACKERMAN
   4220 S.W. 6TH
   CAMAS, WA 98607
2. (1 MI. E) CITY OF CAMAS
   616 N.E. 4TH ST
   CAMAS, WA 98607
3. (BED OF SLOUGH) DEPT. OF
   NATURAL RESOURCES
   STATE OF WA
   OLYMPIA WA

ORDINARY H.W.L.
U.S.G.S DATUM:
+19.3' M.S.L.

C.R. DATUM:
+15.9' M.S.L.



NOTE: DREDGE 20000 CY OF SILT ANNUALLY BY CLAMSHELL AND DEPOSIT ON UPLAND SITE.

NOTES:

1. PURPOSE: TO PROVIDE ADEQUATE WATER DEPTH FOR MOVEMENT OF LOG BUNDLES & BARGE MOORAGE AND ADEQUATE FLOW TO RIVER BANK PUMPS.
2. DATUM U.S. GEOLOGICAL SURVEY
3. ADJACENT PROPERTY OWNERS: SEE ABOVE

BASE MAP FROM CAMAS MILL

SITE MAP WITH DREDGING AREAS AND BORING LOCATIONS

GEORGIA-PACIFIC CONSUMER PRODUCTS LLC
CAMAS SLOUGH MAINTENANCE DREDGING PROJECT
CAMAS, WASHINGTON

MARCH 2007
25696219

URS

FIGURE 2

O:\25696219 GP Fort James Camas Revised BE\4200 Sediment Report\Figures\Fig 2 Site Map with Dredging Areas and Boring Locations.dwg Mar 06, 2007 - 7:54am