CENWS-OD-ME-TS

MEMORANDUM FOR: RECORD August 4, 2016

SUBJECT: DMMP TIER 1 DETERMINATION REGARDING THE SUITABILITY OF PROPOSED DREDGED MATERIAL FROM J.E. McAMIS, LONGVIEW, WASHINGTON.

1. Introduction. This memorandum reflects the consensus determination of the Dredged Material Management Program (DMMP) agencies (U.S. Army Corps of Engineers, Washington State Department of Ecology, Washington State Department of Natural Resources, and the Environmental Protection Agency) regarding the testing status and suitability of up to 17,281 cubic yards (cy) of dredged material from J.E. McAmis. This evaluation resulted in a no-test determination.

2. Project. In 2015 J.E. McAmis purchased the former Longview Booming property with the intention of developing it for their dredging and marine construction contracting business. See Figure 1 for the vicinity map. J.E. McAmis proposes to dredge an entrance channel and turning basin to -8 + 2 feet Columbia River Datum (CRD), extending the federal navigation channel within the Old Mouth Cowlitz River (OMCR), see Figure 2. Work on the federal navigation channel (FNC) within the OMCR has been proposed and will be implemented by a different party. The proposed dredging project will facilitate safe access to the J.E. McAmis property for vessels routinely used in operation of the facility. The deepening of the entrance channel and turning basin may occur in phases as time and funding allow. Estimated dredge prism volumes are in Table 1.

   Open-water disposal is the preferred disposal option for the Project, or alternatively, placement of the dredged material at a separately permitted upland area or beneficial use application.

3. Site History. The site appears to have first been developed in 1924 when the Long-Bell Lumber Company constructed a lumber mill. The mill was sold in 1956 and operated as IP-Long-Bell until 1960. The Longview Log Booming Company purchased the property in 1985 and used the property for log handling, storage, and maintenance activities until the 1990's. The property was purchased by J.E. McAmis in 2015.

   The J.E. McAmis property is currently surrounded by undeveloped land to the east and across the OMCR channel to the south. To the north is the Cowlitz County Landfill, which began accepting municipal solid waste and non-hazardous waste such as wood chips, pulp sludge, boiler ash and log-sort yard debris in 1975. To the west is Longview Fibre, a mill producing unbleached paper and containerboard products.

4. Evaluation. Since 2003, five separate sampling events have occurred within the OMCR in areas either near or adjacent to the JE McAmis property. Results of these sampling events are discussed in detail below. Figures 2 and 3 show the location of the collected samples. Chemical results for all sampling events are presented in Table 2.

- In September 2003, the Portland District USACE sampled sediment in the OMCR. Four cores were collected and analyzed for chemical and physical parameters. Samples contained 43-97% fines, and all chemical concentrations were below the lower screening level (SL1).

(USACE, 2006)

- In August 2006, the Portland District USACE collected four vibracore samples in the OMCR by reoccupying the approximate locations of the 2003 sampling events. Core penetration was hindered by wood chips and debris in the sediments. Samples were analyzed for chemical and physical parameters according to the Interim Final Sediment Evaluation Framework in use at the time. Core samples contained 51-90% fines, and all chemical concentrations were below the SL1. (USACE, 2007)
- In August 2011, the Portland District USACE collected three vibracores and one ponar grab sample of sediments in the OMCR. The vibracore samples were split into six samples representing the dredge prism and new surface material. All samples were submitted for physical analysis, with fines ranging from 1.5 – 97.4%. Two samples had very low fines – the z-sample for core 1 and the grab sample – and these two samples were not submitted for chemical analysis. All chemical results were below the SL1. (USACE, 2012)
- In January 2013, Longview Fibre collected 24 vibracore samples within the OMCR and composited them to represent 9 DMMUs. All 9 DMMUs were tested for the full suite of DMMP physical and chemical parameters. In addition, 2 DMMUs were tested for dioxin. All chemical results were below the SL1. Dioxin concentrations were low, ranging from 0.631 to 0.839 pptr TEQ (ELS, 2014). All 316,264 cy of dredged material were found suitable for flow-lane disposal in the Columbia River (DMMP, 2014).
- In March 2015, six grab samples were collected offshore of the J.E. McAmis property and analyzed for metals and polycyclic aromatic hydrocarbons (PAHs). The physical characteristics of the sediment were described in field observations as silt mixed with wood debris (PBS, 2015). PAHs were found below the SL1 in all samples, and all metals except silver were below the SL1. Silver was undetected in all samples, but had an elevated detection limit above the SL2 (1.7 mg/kg) in all samples. Results for silver for all earlier sampling events were below the SL1 (0.57 mg/kg), with the highest detected concentration found of 0.07 mg/kg in the 2006 USACE sampling event.

Since 2003, a total of 28 samples from within the OMCR have been collected and chemically analyzed. The COC list varied for each of the sampling events, with no single event analyzing for the complete current list of freshwater COCs (DMMP, 2015a). The existing results indicate that sediments within the OMCR are below the SL1 for all analyzed parameters. Deviations from the existing freshwater COC list include the following:

- No results for beta-hexachlorocyclohexane and carbazole[1]
- No results for endrin. All other non-DDT pesticides analyzed have been undetected at very low levels in all samples, indicating there is a low likelihood that endrin would be present in the project sediments at levels of concern.
- None of the available results for DDD, DDE, and DDT include the 2,4'-isomers, even though the current freshwater screening levels which were adopted in 2014, are based on the sum of 4,4' and 2,4'-isomers. All but two of the samples had undetected levels of DDT's at levels far below the SL1, and the two instances of detections were one to two orders of magnitude below the respective SL1. Therefore, the available evidence clearly demonstrates that there is very low

[1] No analysis was performed for beta-hexachlorocyclohexane or carbazole in earlier evaluations because those were conducted prior to the inclusion of these compounds in the Freshwater COC list (RSET, 2015). These compounds were omitted from the March 2015 study as this was not pre-coordinated with the agencies. Elevated concentrations of these chemicals are thought to be rare in Columbia River sediments.

concern for the presence of DDTs within the OMCR.

- No results for mono, di-, or tetra-butyltin. Tributyltin results from 2003 and 2006 USACE characterizations were either undetected or detected at levels more than an order of magnitude below the SL1. This, combined with the lack of historical activities indicating the possible presence of butyltin compounds indicate that butyltin contamination is of very low concern.

4. Wood Debris and Debris Screening. The DMMP agencies were concerned about the presence of wood debris in the project sediments due to difficulty sampling (as described in the Longview Fibre sampling event) and the documented presence of wood debris in the 2015 grab sampling. Information regarding the quality and quantity of wood debris in the OMCR is lacking. What data is available is presented in Table 3, and indicates that sediments within the OMCR are primarily silts and clays with TOC content within the normal range for fine-grained sediments and low TVS content. If there was a significant fraction of wood debris in the sediments, it would be expected they would also have elevated TOC and TVS content. Therefore, the available evidence indicates that there is not likely to be wood debris in the project sediments at concentrations high enough (25% by weight) to be a concern for flow-lane disposal.

   The DMMP agencies implemented a debris screening requirement following the 2015 SMARM in order to prevent the disposal of solid waste and large debris at open-water disposal sites in Puget Sound (DMMP, 2015b). The proposed clarification states that "all projects must use a screen to remove debris unless it can be demonstrated that debris is unlikely to be present or that the debris present is large woody debris that can be easily observed and removed by other means during dredging." The Portland District Corps, which manages the flow-lane disposal sites on the Columbia River, is in the process of evaluating the debris screening requirement adopted by the DMMP agencies, and is working with the other RSET agencies to develop their own debris management program on the Columbia River.

   Due to the established record of the presence of wood debris of an unknown size within the OMCR, the DMMP agencies recommend debris screening using a 1 ft. x 1 ft. grid for this project. At a minimum, a debris management plan must be proposed in the dredge quality control plan and approved by the permitting agencies prior to dredging.

5. Summary In total, 28 samples from within the OMCR have been chemically analyzed since 2003. Chemical results from all sampling events have been below the SL1 for the parameters analyzed, with the single exception of undetected exceedances of silver in the 2015 grab sampling event. As discussed above, the silver exceedances are of little concern due to the much lower values, both detected and undetected, found in all the prior sampling events.

   Although none of the samples that were chemically analyzed were collected from within the proposed dredge prism, taken all together, these results indicate that there is a low likelihood of finding chemical contamination in the sediments within the OMCR and, by extension, in the J.E. McAmis dredge prism.

6 Tier 1 Determination. On the basis of the above information the DMMP agencies have determined that all 17,281 cy of proposed dredged material from J.E. McAmis is suitable for flow-lane disposal in the Columbia River. The sediment exposed by dredging meets the State of Washington's antidegration standard. Therefore, no further DMMP testing is needed for this project.

A Portland District Corps of Engineers agreement must be acquired for open-water disposal. Disposal at the selected flow-lane site must be in accordance with Portland District procedures.

A pre-dredge meeting with Ecology, EPA and the Corps of Engineers is required at least 7 days prior to dredging. A dredging and disposal quality control plan must be developed and submitted to the Regulatory Branch of the Seattle District Corps of Engineers and the Dredged Material Management Office at least 7 days prior to the pre-dredge meeting. Dredging, positioning, debris screening and disposal will all need to be addressed with enough detail to provide assurance to the agencies that the dredge plan will be properly implemented.

This Tier 1 determination does ***not*** constitute final agency approval of the project. During the public comment period that follows a public notice, the resource agencies will provide input on the overall project. A final decision will be made after full consideration of agency input, and after an alternatives analysis is done under section 404(b)(1) of the Clean Water Act.

5. References.

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DMMP, 2015a. *Dredged Material Evaluation and Disposal Procedures (Users Manual)*. Prepared by the Seattle District Dredged Material Management Office for the Dredged Material Management Program, December 2015.

DMMP, 2015b. Final DMMP Clarification Paper: Debris Screening Requirements for Dredged Material Disposed at Open-Water Sites. October 2, 2015.

PBS (PBS Engineering + Environmental), 2015. Limited Sediment Sampling Investigation 100 Tennant Way – South Adjacent Former Log Pond Longview, Washington 98683. April 2015.

RSET, 2015. RSET White Paper: Proposal to Revise Freshwater Sediment Screening Levels. Prepared by Laura Inouye (Ecology), Jeremy Buck (USFWS), June Bergquist (IDEQ), Jonathan Freedman (EPA), and James McMillian (USACE) for the RSET Agencies. October 1, 2015.

USACE, 2006. Old Mouth of the Cowlitz River Federal Project, Sediment Quality Evaluation Report, Portland District CENWP-EC-HR.

USACE, 2007. Cowlitz River Federal Project, Sediment Quality Evaluation Report, Portland District CENWP-EC-HR.

USACE, 2012. Memorandum for: Portland District Reservoir Control Section (EC-HR), Ms. Wendy Briner. Subject: Portland Sediment Evaluation (PSET) review of the Old Mouth of the Cowlitz River Sediment Quality Evaluation Report (SQER), Longview, Washington, Old Mouth of the Cowlitz River (Columbia River Mile [RM] 67.7). June 1, 2012.

6. Signatures.

The signed copy is on file in the Dredged Material Management Office.

_____	_____
Date	Kelsey van der Elst - Seattle District Corps of Engineers
_____	_____
Date	Erika Hoffman - Environmental Protection Agency
_____	_____
Date	Laura Inouye, Ph.D. - Washington Department of Ecology
_____	_____
Date	Celia Barton - Washington Department of Natural Resources

Copies furnished:

DMMP signatories

Danette Guy, USACE Regulatory PM

Ben Johnson, Anchor QEA

Todd Thornburg, Anchor QEA

Table 1
Estimated Dredge Prism Volume and Area

Dredging to -8 feet Columbia River Datum		
Area	Dredging Surface Area (sf)	Dredging Volume (cy)
Entrance Channel	62,759	2,525
Turning Basin	47,289	4,939
Total (to -8 feet CRD)	110,048	7,464
Dredging to -10 feet Columbia River Datum		
Area	Dredging Surface Area (sf)	Dredging Volume (cy)
Entrance Channel	125,442	8,651
Turning Basin	51,592	8,630
Total (to -10 feet CRD)	117,034	17,281

Table 2
Existing Sediment Quality Data

Report	DMMP SL1 [1]	USACE - Old Mouth of the Cowlitz River[a]								USACE - Old Mouth of the Cowlitz River[b]						
Year		2003				2006				2011						
Sample ID		GC-01	GC-02	GC-03	BC-04	VC-01	VC-02	VC-03	VC-04	VC-01A	VC-01Z	VC-02A	VC-02Z	VC-03A	VC-03Z	PG-04
Sample Type		A	A	A	A	A	A	A	A	A	Z	A	Z	A	Z	Grab
Grain Size (%)																
Gravel	---	0	0	0.78	0	0	1.2	0	2	0.1	1.1	0.1	0.5	0.4	0	0
Sand	---	2.6	18	22	57	9.6	30	13	47	2.6	96.3	11.7	53.7	49.5	41.2	98.5
Silt/Clay	---	97	82	77	43	90	69	87	51	97.4	2.6	88.2	46	50.1	58.8	1.5
Conventional Parameters																
Total Solids (%)	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Organic Carbon (%)	---	0.86	1.2	0.9	0.61	0.85	0.81	0.95	0.55	0.660	--	0.594	0.895	0.464	0.203	--
Metals (mg/kg)																
Arsenic	14	2.9	2.3	1.9	1.4	1.5	1.3	1.7	0.99	1.65	--	1.42	1.15	1.21	0.63	--
Antimony	---	2.4 U	2 U	1.92 U	1.95 U	0.05 U	0.04 U	0.04 U	0.05 U	0.03 J	--	0.03 J	0.02 J	0.03 J	0.03 J	--
Cadmium	2.1	0.40 U	0.33 U	0.32 U	0.33 U	0.13	0.20	0.18	0.15	0.09	--	0.082	0.065	0.095	0.033	--
Chromium	72	--	--	--	--	--	--	--	--	4.35	--	4.68	4.49	5.16	2.36	--
Copper	400	53	35	32	19	27	23	27	18	31.7	--	27.2	16.1	26.2	13.9	--
Lead	360	4.6	2.8	2.5	1.8	3.2	3.0	3.3	1.9	2.13	--	1.83	1.72	2.01	0.729	--
Mercury	0.66	0.027	0.031	0.02 J	0.026	0.025	0.021	0.017	0.014	0.017 J	--	0.017	0.038	0.013 J	0.006 J	--
Nickel	38	10	8.9	8.6	6.2	6.8	7.1	6.6	5.6	6.17	--	6.15	7.39	6.43	4.13	--
Selenium	11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	0.57	0.40 U	0.33 U	0.32 U	0.33 U	0.055	0.07	0.075	0.055	0.046	--	0.044	0.035	0.035	0.017 J	--
Zinc	3,200	44	29	29	21	28	32	29	22	25.5	--	22.3	22	22.8	12.5	--
Polycyclic Aromatic Hydrocarbons (PAHs) (µg/kg)																
2-Methylnaphthalene	---	4.1 U	4.1 U	4.1 U	4.1 U	2 U	1.9 J	1.9 U	1.7 U	7.3 U	--	7.7 U	2.6 J	2.5 J	6.5 U	--
Acenaphthene	---	4.1 U	4.1 U	4.1 U	4.1 U	2.5 J	6.6 J	2.1 J	1.4 U	7.3 U	--	7.7 U	2.7 J	6.4 J	6.5 U	--
Acenaphthylene	---	4.1 U	4.1 U	4.1 U	4.1 U	3.4 J	6.9 J	5 J	2 U	1.2 J	--	1.7 J	4.8 J	1.6 J	6.5 U	--
Anthracene	---	17	4.1 U	4.1 U	4.1 U	6.4 J	29	11	2 U	7.3 U	--	2.6 J	6.7	6.2 J	6.5 U	--
Benzo(a)anthracene	---	96	5.1 J	9.1	3.5 U	15	94	31	6.3 J	2.3 J	--	9.4	7.9	3.0 J	6.5 U	--
Benzo(a)pyrene	---	42	3.5 U	3.9 J	3.5 U	12	44	18	3.3 J	3.2 J	--	7.1 J	8	2.8 J	6.5 U	--
Benzo(b) Fluoranthene	---	--	--	--	--	--	--	--	--	3.4 J	--	12	8.7	4.1 J	6.5 U	--
Benzo(k) Fluoranthene	---	--	--	--	--	--	--	--	--	2.1 J	--	5.8 J	3.1 J	1.5 J	6.5 U	--
Total benzofluoranthenes	---	88	11.0	10.2	3.51 U	34 J	101	59	8.5 J	--	--	--	--	--	--	--
Benzo(ghi)perylene	---	14	3.5 U	3.5 U	3.5 U	8.1 J	16	10	3.3 U	2.8 J	--	3.8 J	5.7 J	1.8 J	6.5 U	--
Chrysene	---	120	8	10	3.5 U	25	110	61	9.4 J	4 J	--	18	11	4.9 J	6.5 U	--
Dibenz(a,h)anthracene	---	4.1 U	3.5 U	3.5 U	3.5 U	3.5 U	4.3 J	3.4 U	3.1 U	7.3 U	--	7.7 U	6.6 U	6.9 U	6.5 U	--
Fluoranthene	---	11	16	25	3.5 U	45	72	74	25	9.3	--	22	22	17	6.5 U	--
Fluorene	---	4.1 U	4.1 U	4.1 U	4.1 U	2.7 J	8.4 J	3.4 J	2.4 U	7.3 U	--	1.3 J	2.7 J	5.5 J	6.5 U	--
Indeno(1,2,3,cd)pyrene	---	15	3.5 U	3.5 U	3.5 U	10	21	13	2.7 U	2.2 J	--	4.4 J	5.0 J	1.7 J	6.5 U	--
Naphthalene	---	4.1 U	4.1 U	4.1 U	4.1 U	2.1 U	5.6 J	2 U	1.9 U	3.6 J	--	7.7 U	16	3 J	6.5 U	--
Phenanthrene	---	7.4 J	7.0 J	8.4	4.1 U	14	49	21	5.8 J	6.2 J	--	6.7 J	19	19	6.5 U	--
Pyrene	---	4.1 U	13	22	3.5 U	40	48	60	22	8.2	--	19	23	15	6.5 U	--
Total HPAHs	---	387	53	5.5	3.5 U	174	510	326	68	37.5	--	101.5	94.4	51.8	6.5 U	--
Total LPAHs	---	25	7.0	8.4	4.1 U	27	107	43	5.8 J	11	--	12.3	54.5	44.2	6.5 U	--
Total PAHs	17,000	412	60	14	8	201	618	369	74	48.5	--	113.8	148.9	96	6.5 U	--
Total cPAH TEQ[2]	---	55.0	4.8	5.6	4.6	15.1	57.0	23.4	4.6	5.0	--	11.2	11.2	4.6	9.8	--

Table 2
Existing Sediment Quality Data

Report	DMMP SL1 [1]	USACE - Old Mouth of the Cowlitz River[a]								USACE - Old Mouth of the Cowlitz River[b]						
Year		2003				2006				2011						
Sample ID		GC-01	GC-02	GC-03	BC-04	VC-01	VC-02	VC-03	VC-04	VC-01A	VC-01Z	VC-02A	VC-02Z	VC-03A	VC-03Z	PG-04
Sample Type		A	A	A	A	A	A	A	A	A	Z	A	Z	A	Z	Grab
Chlorinated Hydrocarbons (µg/kg)																
Hexachlorobenzene	---	--	--	--	--	--	--	--	--	7.3 U	--	7.7 U	6.6 U	6.9 U	6.5 U	--
1,2,4-Trichlorobenzene	---	--	--	--	--	--	--	--	--	7.3 U	--	7.7 U	6.6 U	6.9 U	6.5 U	--
1,2-Dichlorobenzene	---	--	--	--	--	--	--	--	--	7.3 U	--	7.7 U	6.6 U	6.9 U	6.5 U	--
1,4-Dichlorobenzene	---	--	--	--	--	--	--	--	--	7.3 U	--	7.7 U	6.6 U	6.9 U	6.5 U	--
Phthalates (µg/kg)																
Dimethyl phthalate	---	--	--	--	--	--	--	--	--	1.1 J	--	7.7 U	6.6 U	6.9 U	6.5 U	--
Diethyl phthalate	---	--	--	--	--	--	--	--	--	1.4 J	--	7.7 U	6.6 U	6.9 U	6.5 U	--
Di-n-butyl phthalate	380	--	--	--	--	--	--	--	--	15 U	--	16 U	14 U	14 U	13 U	--
Butyl benzyl phthalate	---	--	--	--	--	--	--	--	--	7.3 U	--	7.7 U	6.6 U	6.9 U	6.5 U	--
Bis(2-ethylhexyl)phthalate	500	--	--	--	--	--	--	--	--	73 U	--	77 U	66 U	12 J	65 U	--
Di-n-octyl phthalate	39	--	--	--	--	--	--	--	--	7.3 U	--	7.7 U	6.6 U	6.9 U	6.5 U	--
Total Phthalates	---	16 U	14	14 U	14 U	5.6 U	5.2 U	5.4 U	7 J	--	--	--	--	--	--	--
Phenols (µg/kg)																
Phenol	120	--	--	--	--	--	--	--	--	22 U	--	23 U	20 U	21 U	20 U	--
2-Methylphenol	---	--	--	--	--	--	--	--	--	7.5 U	--	7.7 U	7.5 U	7.5 U	7.5 U	--
4-Methylphenol	260	--	--	--	--	--	--	--	--	6.3 J	--	7.7 U	11 J	5.5 J	7.5 U	--
2,4-Dimethylphenol	---	--	--	--	--	--	--	--	--	37 U	--	39 U	33 U	35 U	33 U	--
Pentachlorophenol	1,200	--	--	--	--	--	--	--	--	73 U	--	77 U	66 U	69 U	65 U	--
Total Phenols	---	16 U	28 U	28 U	28 U	14 U	16	14 U	12 U	--	--	--	--	--	--	--
Pesticides (µg/kg)																
Aldrin	---	--	--	--	--	--	--	--	--	0.73 U	--	0.77 U	0.66 U	0.86 U	0.65 U	--
Total Chlordane	---	--	--	--	--	--	--	--	--	0.73 U	--	0.77 U	0.66 U	0.86 U	0.65 U	--
Dieldrin	4.9	--	--	--	--	--	--	--	--	0.73 U	--	0.77 U	0.66 U	0.86 U	0.65 U	--
Heptachlor	---	--	--	--	--	--	--	--	--	0.73 U	--	0.77 U	0.66 U	0.86 U	0.65 U	--
4,4'-DDE	21[3]	--	--	--	--	--	--	--	--	0.73 U	--	0.12 J	0.66 U	0.86 U	0.65 U	--
4,4'-DDD	310[3]	--	--	--	--	--	--	--	--	0.73 U	--	0.77 U	8.6	0.86 U	0.65 U	--
4,4'-DDT	100[3]	--	--	--	--	--	--	--	--	0.73 U	--	0.77 U	0.66 U	0.86 U	0.65 U	--
Total DDT	---	1.1 U	1.1 U	1.1 U	1.1 U	0.48 U	1.2 U	1.8 U	1 U	--	--	--	--	--	--	--
Tributyltin (Bulk)	47	2.6 U	2.7 U	2.7 U	2.6 U	2.3	3.9	3.6	1.7	--	--	--	--	--	--	--
Tributylin (Pore Water)	---	0.009 U	0.009	0.009	0.009	0.0058	0.019	0.0045	--	--	--	--	--	--	--	--
Miscellaneous Semivolatile Compounds (µg/kg)																
Benzyl alcohol	---	--	--	--	--	--	--	--	--	15 U	--	16 U	14 U	14 U	13 U	--
Benzoic acid	2,900	--	--	--	--	--	--	--	--	440 U	--	460 U	400 U	420 U	390 U	--
Dibenzofuran	200	--	--	--	--	--	--	--	--	7.3 U	--	7.7 U	1.9 J	2.8 J	6.5 U	--
Hexachlorobutadiene	---	--	--	--	--	--	--	--	--	7.3 U	--	7.7 U	6.6 U	6.9 U	6.5 U	--
N-Nitrosodiphenylamine	---	--	--	--	--	--	--	--	--	7.3 U	--	7.7 U	6.6 U	6.9 U	6.5 U	--
Polychlorinated Biphenyls (PCBs) (µg/kg)																
Total PCBs	110	17 U	17 U	17 U	17 U	2.7 U	12 U	13 U	3.5 U	15 U	--	16 U	14 U	14 U	13 U	--
Bulk Petroleum Hydrocarbons (mg/kg)																
TPH - Gasoline	---	--	--	--	--	--	--	--	--	20 U	--	20 U	20 U	20 U	20 U	--
TPH - Diesel	340	--	--	--	--	--	--	--	--	50 U	--	50 U	48	34 J	50 U	--
TPH - Residual	3,600	--	--	--	--	--	--	--	--	100 U	--	100 U	93	46 J	100 U	--
Dioxin/Furans (ng/kg)																
Total TEQ	0.65 to 2.89[4]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2
Existing Sediment Quality Data

Report	DMMP SL1 [1]	Longview Fibre Paper and Packing[c]									100 Tenant Way Sediment Sampling Investigation[d]					
Year		2013									2015					
Sample ID		DMMU 1	DMMU 2	DMMU 3	DMMU 4	DMMU 5	DMMU 6	DMMU 7	DMMU 8	DMMU 9	S-1	S-2	S-3	S-4	S-5	S-6
Sample Type		A	B	A	B	A	B	A	A	A	Grab	Grab	Grab	Grab	Grab	Grab
Grain Size (%)																
Gravel	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sand	---	66.3	67.8	36.5	24.4	36.1	20.8	26.5	4.5	3.6	--	--	--	--	--	--
Silt/Clay	---	23.8	39.7	63.9	70.4	66.8	76.4	64.8	89.1	86.8	--	--	--	--	--	--
Conventional Parameters																
Total Solids (%)	---	76.9	77.3	72.1	69.4	72.3	70.1	70.3	69.9	66.4	50.2	41.4	35.8	37.7	43.2	34.5
Total Organic Carbon (%)	---	0.146	0.235	0.43	0.532	0.521	0.563	0.74	0.661	0.806	--	--	--	--	--	--
Metals (mg/kg)																
Arsenic	14	0.853	1.29	1.48	1.61	1.33	2.3	1.92	1.9	2.09	4.6	4.8 U	5.6 U	5.3	4.6 U	8.4
Antimony	---	0.095 UJ	0.093 UJ	0.11 UJ	0.1 UJ	0.11 UJ	0.11 UJ	0.12 UJ	0.11 UJ	0.12 UJ	4.0 U	4.8 U	5.6 U	5.3 U	4.6 U	5.8 U
Cadmium	2.1	0.034 J	0.045 J	0.087 J	0.085 J	0.058 J	0.0991	0.131	0.149	0.113	1.0 U	1.2 U	1.4 U	1.3 U	1.2 U	1.4 U
Chromium	72	3.47	4.63	4.51	5.14	4.94	7.63	6.51	6.21	5.93	8.4	9.7	9.5	13	12	11
Copper	400	16.1 J	20.4	23.9 J	28.7 J	21.9 J	32.8 J	26.6 J	30.3 J	31.6 J	38	26	36	53	42	52
Lead	360	0.835	1.31	1.72	1.96	1.54	2.72	2.83	2.59	2.61	4.8	7.2	12	10	6.9	9.3
Mercury	0.66	0.0064 U	0.011 J	0.013 J	0.013 J	0.013 J	0.012 J	0.018 J	0.014 J	0.02 J	0.04 U	0.048 U	0.056 U	0.053 U	0.049	0.058 U
Nickel	38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	11	0.16 U	0.16 UJ	0.17 U	0.19 U	0.18 U	0.19 UJ	0.17 UJ	0.31 J	0.21 J	4.0 U	4.8 U	5.6 U	5.3 U	4.6 U	5.8 U
Silver	0.57	0.027 J	0.031 J	0.039 J	0.05 J	0.035 J	0.058 J	0.055 J	0.062 J	0.059 J	2.0 U	2.4 U	2.8 U	2.6 U	2.3 U	2.9 U
Zinc	3,200	16.1 J	19.9 J	25.4 J	29.3 J	23.8 J	50.9 J	39.1 J	37.5 J	36.4 J	40	53	59	69	62	55
Polycyclic Aromatic Hydrocarbons (PAHs) (µg/kg)																
2-Methylnaphthalene	---	14 U	14 U	205	7.6 U	15 U	7.6 U	7.5 U	7.6 U	17 U	40 U	48 U	56 U	53 U	46 U	58 U
Acenaphthene	---	6.9 U	6.9 U	18	7.6 U	7.3 U	9.6 J	12 J	7.6 U	8 U	12 U	14 U	17 U	16 U	14 U	28
Acenaphthylene	---	6.9 U	6.9 U	7.4 U	7.6 U	7.3 U	7.6 U	7.5 U	7.6 U	8 U	12 U	14 U	17 U	16 U	14 U	17 U
Anthracene	---	6.9 U	6.9 U	7.4 U	7.6 U	7.3 U	7.6 U	20.9	7.6 U	8 U	12 U	14 U	17 U	16 U	14 U	17 U
Benzo(a)anthracene	---	6.9 U	6.9 U	7.5 J	7.6 U	15.4	33.5	49.5	8.3 J	8 U	12 U	14 U	39	16 U	14 U	17 U
Benzo(a)pyrene	---	6.9 U	6.9 U	7.4 U	7.6 U	7.3 U	16.4	33	7.6 U	8 U	12 U	14 U	39	16 U	14 U	17 U
Benzo(b) Fluoranthene	---	--	--	--	--	--	--	--	--	--	12 U	14 U	64	16 U	14 U	22
Benzo(k) Fluoranthene	---	--	--	--	--	--	--	--	--	--	12 U	14 U	23	16 U	14 U	17 U
Total benzofluoranthenes	---	6.9 U	6.9 U	17.6	13 J	26	50.9	76.8	15.7	24.1	--	--	--	--	--	--
Benzo(ghi)perylene	---	6.9 U	6.9 U	7.4 U	7.6 U	7.3 U	7.6 U	12 J	7.6 U	8 U	12 U	14 U	18	16 U	14 U	17 U
Chrysene	---	6.9 U	6.9 U	13 J	9.4 J	26	40.7	67.3	14 J	8 U	12 U	14 U	47	16 U	14 U	19
Dibenz(a,h)anthracene	---	6.9 U	6.9 U	7.4 U	7.6 U	7.3 U	7.6 U	7.5 U	7.6 U	8 U	12 U	14 U	17 U	16 U	14 U	17 U
Fluoranthene	---	6.9 U	6.9 U	24.1	17	42.5	98.4	124	24.7	23.8	12 U	36	120	22	30	64
Fluorene	---	6.9 U	6.9 U	13 J	7.6 U	7.3 U	7.7 J	9.1 J	7.6 U	8 U	12 U	14 U	17 U	16 U	14 U	40
Indeno(1,2,3,cd)pyrene	---	6.9 U	6.9 U	7.4 U	7.6 U	7.3 U	7.6 U	14 J	7.6 U	8 U	12 U	14 U	17 U	16 U	14 U	17 U
Naphthalene	---	14 U	14 U	57	7.6 U	15 U	7.6 U	7.5 U	7.6 U	17 UJ	10 U	48 U	56 U	53 U	46 U	58 U
Phenanthrene	---	6.9 U	6.9 U	22.5	7.6 U	19.4	52.8	69.3	14 J	9.8 J	12 U	14 U	34	16 U	14 U	100
Pyrene	---	6.9 U	6.9 U	22.5	15.9	37.1	87.4	103	22.7	22.7	12 U	14 U	59	16 U	19	35
Total HPAHs	---	6.9 U	6.9 U	84.3	54.8	147	327	480	85.4	70.6	--	--	--	--	--	--
Total LPAHs	---	14 U	14 U	110	7.6 U	19.4	70	111	14 J	9.8 J	--	--	--	--	--	--
Total PAHs	17,000	14 U	14 U	194.3	62.4	166.4	397.0	591.0	99.4	80.4	12 U	36	443	22	49	308
Total cPAH TEQ[2]	---	9.0	9.0	9.8	10.0	10.6	21.7	40.8	10.1	10.5	18.1	21.1	55.5	24.2	21.1	26.2

Table 2
Existing Sediment Quality Data

Report	DMMP SL1 [1]	Longview Fibre Paper and Packing[c]									100 Tenant Way Sediment Sampling Investigation[d]					
Year		2013									2015					
Sample ID		DMMU 1	DMMU 2	DMMU 3	DMMU 4	DMMU 5	DMMU 6	DMMU 7	DMMU 8	DMMU 9	S-1	S-2	S-3	S-4	S-5	S-6
Sample Type		A	B	A	B	A	B	A	A	A	Grab	Grab	Grab	Grab	Grab	Grab
Chlorinated Hydrocarbons (µg/kg)																
Hexachlorobenzene	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phthalates (µg/kg)																
Dimethyl phthalate	---	13.9 U	13.8 U	14.8 U	15.4 U	14.8 U	15.3 U	15.2 U	15.3 U	16.1 U	--	--	--	--	--	--
Diethyl phthalate	---	20 J	27 J	15 U	16 U	15 U	43.4	40.1	38.2	17 U	--	--	--	--	--	--
Di-n-butyl phthalate	380	14 U	14 U	15 U	16 U	15 U	16 U	18 U	16 U	17 U	--	--	--	--	--	--
Butyl benzyl phthalate	---	10.4 U	10.3 U	11.1 U	11.5 U	11.1 U	11.4 U	11.4 U	11.4 U	12 U	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	500	18 J	18 J	108	22 J	21 J	23 J	24 J	23 J	21 J	--	--	--	--	--	--
Di-n-octyl phthalate	39	13.9 J	13.8 U	14.8 U	15.4 U	14.8 U	15.3 U	15.2 U	15.3 U	16.1 U	--	--	--	--	--	--
Total Phthalates	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols (µg/kg)																
Phenol	120	35 U	35 U	37 U	39 U	37 U	39 U	38 U	39 U	41 U	--	--	--	--	--	--
2-Methylphenol	---	6.9 U	6.9 U	7.4 U	7.6 U	7.3 U	7.6 U	7.5 U	7.6 U	8 U	--	--	--	--	--	--
4-Methylphenol	260	35 U	35 U	37 U	39 U	37 U	39 U	38 U	39 U	41 U	--	--	--	--	--	--
2,4-Dimethylphenol	---	14 U	14 U	7.4 U	7.6 U	15 U	7.6 U	7.5 U	7.6 U	17 U	--	--	--	--	--	--
Pentachlorophenol	1,200	104 U	103 U	111 U	115 U	111 U	114 U	114 U	114 U	120 U	--	--	--	--	--	--
Total Phenols	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pesticides (µg/kg)																
Aldrin	---	0.52 U	0.52 U	0.55 U	0.58 U	0.55 U	0.57 U	0.57 U	0.57 U	0.6 U	--	--	--	--	--	--
Total Chlordane	---	0.52 U	0.52 U	0.55 U	0.58 U	0.55 U	0.57 U	0.57 U	0.57 U	0.6 U	--	--	--	--	--	--
Dieldrin	4.9	0.52 U	0.52 U	0.55 U	0.58 U	0.55 U	0.57 U	0.57 U	0.57 U	0.6 U	--	--	--	--	--	--
Heptachlor	---	0.52 U	0.52 U	0.55 U	0.58 U	0.55 U	0.57 U	0.57 U	0.57 U	0.6 U	--	--	--	--	--	--
4,4'-DDE	21[3]	0.52 U	0.52 U	0.55 U	0.58 U	0.55 U	0.57 U	0.57 U	0.57 U	0.6 U	--	--	--	--	--	--
4,4'-DDD	310[3]	0.52 U	0.52 U	0.55 U	0.58 U	0.55 U	0.57 U	0.57 U	0.57 U	0.6 U	--	--	--	--	--	--
4,4'-DDT	100[3]	0.52 U	0.52 U	0.55 U	0.58 U	0.55 U	0.57 U	0.57 U	0.57 U	0.6 U	--	--	--	--	--	--
Total DDT	---	0.52 U	0.52 U	0.55 U	0.58 U	0.55 U	0.57 U	0.57 U	0.57 U	0.6 U	--	--	--	--	--	--
Tributyltin (Bulk)	47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tributylin (Pore Water)	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Miscellaneous Semivolatile Compounds (µg/kg)																
Benzyl alcohol	---	17.3 U	17.2 U	18.4 U	19.2 U	18.4 U	19 U	18.9 U	19 U	20 U	--	--	--	--	--	--
Benzoic acid	2,900	277 U	276 U	148 U	154 U	295 U	153 U	152 U	153 U	321 U	--	--	--	--	--	--
Dibenzofuran	200	6.9 U	6.9 U	7.4 U	7.6 U	7.3 U	7.6 U	7.5 U	7.6 U	8 U	--	--	--	--	--	--
Hexachlorobutadiene	---	6.9 U	6.9 U	3.7 U	3.9 U	7.3 U	3.9 U	3.8 U	3.9 U	8 U	--	--	--	--	--	--
N-Nitrosodiphenylamine	---	17.3 U	17.2 U	18.4 U	19.2 U	18.4 U	19 U	18.9 U	19 U	20 U	--	--	--	--	--	--
Polychlorinated Biphenyls (PCBs) (µg/kg)																
Total PCBs	110	5.2 U	5.2 U	13.7	5.8 U	5.5 U	5.7 U	5.7 U	5.7 U	6 U	--	--	--	--	--	--
Bulk Petroleum Hydrocarbons (mg/kg)																
TPH - Gasoline	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TPH - Diesel	340	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TPH - Residual	3,600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dioxin/Furans (ng/kg)																
Total TEQ	0.65 to 2.89[4]	--	--	--	--	--	0.839	--	0.631	--	--	--	--	--	--	--

Table 2
Existing Sediment Quality Data

Notes

[1] USACE et al. 2015. Freshwater screening levels adopted from DMMP User Manual 2015.
[2] Based on full value of detection limit.
[3] The DMMP screening level is based on the sum of 2,2' and 4,4' isomers.
[4] Range of total TEQ background concentrations taken from Section 8.3.4 of the DMMP.

ND = Not detected; reporting limit not provided
U = Concentration not detected at the indicated reporting limit for OMCR samples or detection limit for S-# samples
J = Estimated value
B = Analyte is present in laboratory method blank
N = Matrix spike sample recovery is not within control limits

µg = microgram
DMMP = Dredged Material Management Program
DMMU = dredged material management unit
kg = kilogram
mg = milligram
ng = nanogram
SL1 = screening level 1
TEQ = toxicity equivalents
TPH = total petroleum hydrocarbons

References

[a] USACE 2006. Old Mouth of the Cowlitz River Federal Project, Sediment Quality Evaluation Report, Portland District CENWP-EC-HR.
[b] USACE 2011. Old Mouth of the Cowlitz River Federal Project, Sediment Quality Evaluation Report, Portland District CENWP-EC-HR.
[c] USACE 2014. Memorandom For: Record, Subject: Determination Regarding the Suitability of Proposed Dredged Material from Longview Fibre Paper and Packing Doing Business as Kapstone Kraft Paper Corporation, Cowlitz County, WA Evaluated Under Section 404 of the Clean Water Act for Flow-Lane Disposal in the Columbia River or For Beneficial Use. CENWS-OD-TS-DMMO. February 13, 2014.
[d] PBS (PBS Engineering + Environmental) 2015. Limited Sediment Sampling Investigation 100 Tennant Way – South Adjacent Former Log Pond Longview, Washington 98683. April 2015.

Table 3. Old Mouth Cowlitz River Sediment Conventionals Summary

Study	Conventional Parameters (percent)								
	Total Organic Carbon			Total Volatile Solids			Fines Content		
	Low	Mean	Max	Low	Mean	Max	Low	Mean	Max
USACE 2003	0.61	0.89	1.20	1.26	1.75	2.17	42.9	74.7	97.4
USACE 2006	0.55	0.79	0.95	2.88	2.99	3.14	51.2	74.4	90.4
USACE 2011	0.20	0.56	0.90	-	-	-	2.6	57.2	97.4
Longview Fibre 2013 - Site-wide	0.05	0.47	0.81	1.01	1.77	2.95	7.7	58.9	89.1
Longview Fibre 2013 - DMMU 8	0.66			2.30			89.1		
Longview Fibre 2013 - DMMU 9	0.81			2.95			86.8		

0 3,500
Scale in Feet

AERIAL SOURCE: Google Earth Pro, 2014.

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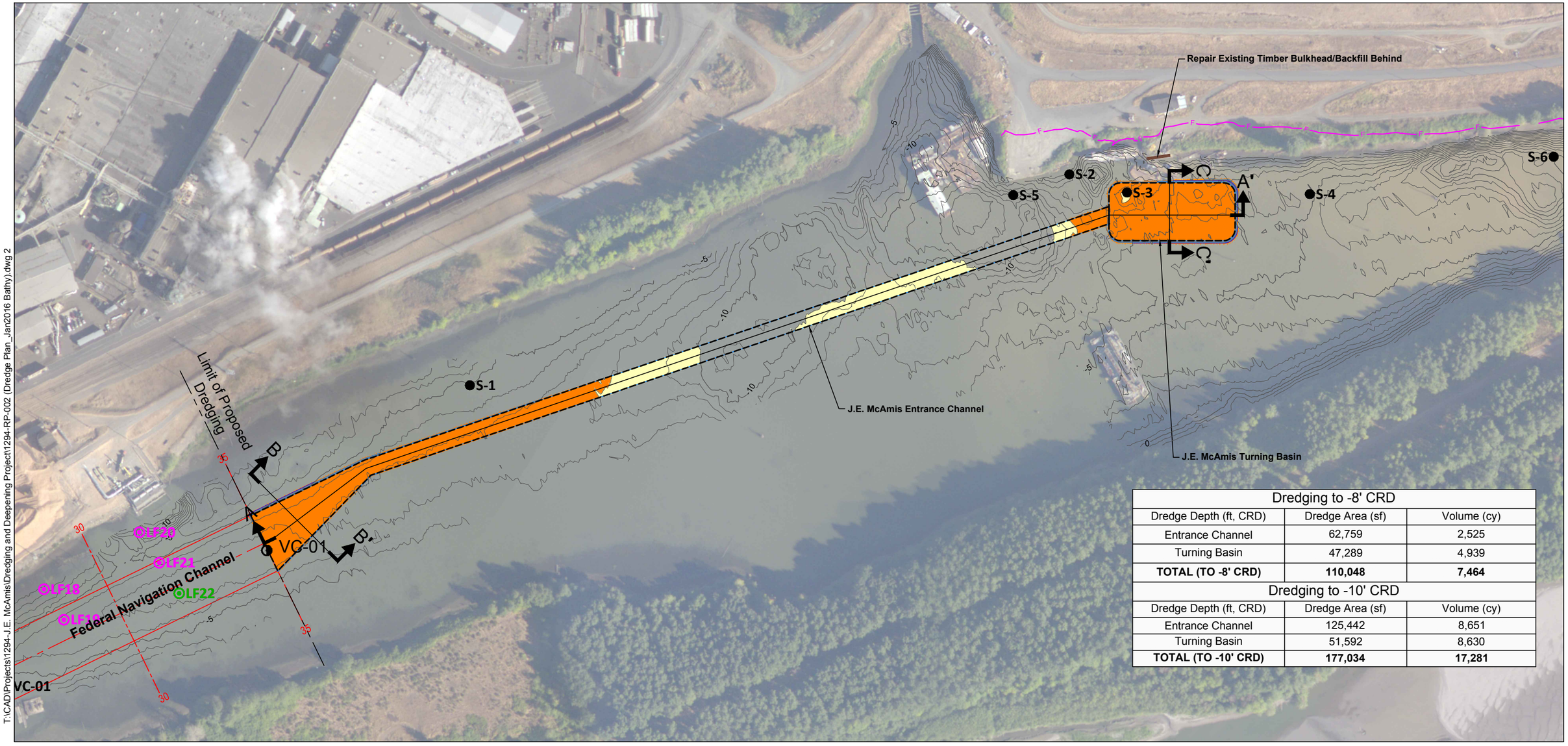
Figure 1
Vicinity Map
J.E. McAmis Dredging and Deepening Project



Dredging to -8' CRD		
Dredge Depth (ft, CRD)	Dredge Area (sf)	Volume (cy)
Entrance Channel	62,759	2,525
Turning Basin	47,289	4,939
TOTAL (TO -8' CRD)	**110,048**	**7,464**
Dredging to -10' CRD		
Dredge Depth (ft, CRD)	Dredge Area (sf)	Volume (cy)
Entrance Channel	125,442	8,651
Turning Basin	51,592	8,630
TOTAL (TO -10' CRD)	**177,034**	**17,281**

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LEGEND:

- Existing Bathymetric Contour in Feet (1-foot interval)
- Proposed Bathymetric Contour in Feet (1-foot interval)
- Federal Navigation Channel Boundary
- August 2011 Sample Location
- Sample Location, Other

SAMPLE LEGEND (USACE, 2014)

- LF-X DMMU 1-2
- LF-X DMMU 3-4
- LF-X DMMU 5-6
- LF-X DMMU 7
- LF-X DMMU 8
- LF-X DMMU 9

J.E. McAmis Entrance Channel and Turning Basin Dredge Areas		
Dredge Depth (ft)	Color	Area (sf)
-8.0 to Mudline		110,048
-10.0 to -8.0		66,986

SOURCE: Drawing prepared from CAD files provided by J.E. McAmis, Inc. dated 05-11-2015, titled "J.E. McAmis Log Booming". Updated bathymetry provided by NW Hydro, dated January 2016. Samples from USACE, dated 2014.
HORIZONTAL DATUM: Washington State Plane South, NAD83, U.S. Feet.
VERTICAL DATUM: Columbia River Datum (CRD).
DATUM CONVERSION: 0 feet CRD = -2.49 feet NAVD88.

0 240
Scale in Feet

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Figure 2
Proposed Dredge Prism and Historical Sample Locations
J.E. McAmis Dredging and Deepening Project

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LEGEND:

- Existing Bathymetric Contour in Feet (1-foot interval)
- Proposed Bathymetric Contour in Feet (1-foot interval)
- Federal Navigation Channel Boundary
- August 2011 Sample Location
- Sample Location, Other

SAMPLE LEGEND (USACE, 2014)

LF-X	DMMU 1-2	LF-X	DMMU 7
LF-X	DMMU 3-4	LF-X	DMMU 8
LF-X	DMMU 5-6	LF-X	DMMU 9

SOURCE: Drawing prepared from CAD files provided by J.E. McAmis, Inc. dated 05-11-2015, titled "J.E. McAmis Log Booming". Updated bathymetry provided by NW Hydro, dated January 2016. Samples from USACE, dated 2014.
HORIZONTAL DATUM: Washington State Plane South, NAD83, U.S. Feet.
VERTICAL DATUM: Columbia River Datum (CRD).
DATUM CONVERSION: 0 feet CRD = -2.49 feet NAVD88.

0 240
Scale in Feet

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Figure 3
Additional Sample Locations
J.E. McAmis Dredging and Deepening Project