CENWS-OD-TS-DMMO

MEMORANDUM FOR: RECORD **September 6, 2011**

SUBJECT: DETERMINATION REGARDING THE SUITABILITY OF PROPOSED DREDGED MATERIAL FROM LAKESHORE MARINA IN DON MORSE PARK, CHELAN WASHINGTON FOR BENEFICIAL RE-USE WITHIN LAKE CHELAN.

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 8,000 cubic yards (cy) of dredged material from Lakeshore Marina in Don Morse Park Marina for beneficial re-use.

2. **Background**. The City of Chelan proposes to dredge approximately 8,000 cubic yards of material from the Lakeshore Marina, Don Morse Park, as part of a marina redevelopment and expansion project. The project also includes the burying of an existing concrete bulkhead, and placing approximately 50,000 cubic yards of sand and gravel to return the beach to a more natural and stable configuration. Small volumes of material have been dredged from the marina in the past and paced on the beach, but no sediment testing was done.

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

Table 1. Project Summary

Project ranking	Moderate
Proposed dredging volume	8,000 cubic yards
Proposed dredging depth	
Previous Testing	none
SAP received	January 4, 2011
SAP approved	January 24, 2011
Sampling date	March 31, 2011, April 28, 2011
Final data report received	August 8, 2011
DAIS Tracking number	DMPLC-1-A-F-311
Regulatory Public Notice	
Recency Determination (Low Rank = 7 years)	April 28, 2016

4. **Project Ranking and Sampling Requirements**. In a moderate-ranked area the number of samples and analyses are calculated using the following guidelines (DMMP, 2008a):
   - Maximum volume of sediment represented by each field sample = 4,000 cubic yards
   - Maximum volume of sediment represented by each analysis 8,000

5. **Sampling**. Sampling took place on March 21, 2011. Sample cores were taken from two locations. The upper four feet from each sample location was composited for DMMU 1 and the lower portion of each sample was composited for DMMU 2 (Figure 2). Z-samples were collected from each sample location and archived.

6. **Chemical Analysis**. The approved sampling and analysis plan (Watershed Company 2011) was followed and quality control guidelines specified by the PSEP and DMMP programs were generally met. The sediment conventional results can be found in Table 3. The grain-size data show that the proposed dredged material is predominantly sand.

   Both samples were analyzed for DMMP chemicals of concern, with comparison to the interim freshwater guidelines for most chemicals of concern, and to the marine screening values for those chemicals of concern (e.g. p,p"-DDT) for which there are no freshwater guidelines. The chemical results (see Table 4) indicated that there were exceedances of DMMP screening levels (SL) in DMMU 1 for p,p'-DDE, p,p'-DDD and chlordane and in DMMU 2 for p,p'-DDT, p,p'-DDE, p,p'-DDD and chlordane.

7. **Sediment Exposed by Dredging (SED)**. The DMMP antidegradation guidelines (DMMP, 2008b) state that chemical analysis of the z-sample is required if the testing results for the overlying sediment are a) found to be unsuitable for unconfined aquatic disposal, or b) if any other project in the same waterbody has shown evidence of subsurface sediments with greater contamination than surface sediments, or c) if there is any other site-specific reason to believe that the SED may fail to meet the antidegradation policy. Due to screening level exceedances, the agencies determined that z-sample analysis was required for this project. The two z-samples were composited for one analysis and analyzed for pesticides. Pesticides were undetected in the z-sample.

8. **Bioassays**. The exceedances of DMMP screening levels would normally trigger the requirement for bioassay testing prior to dredging and disposal. In this case, the DMMP agencies did not require bioassay testing because the applicant proposes to dredge this material in the dry and although the material will be used for fill as part of the restoration of the lakeshore, the dredged material will be isolated from the lake with at least 3 feet of pea gravel.

9. **Suitability Determination**. This memorandum documents the evaluation of the suitability of sediment proposed for dredging from Don Morse Park for in-water disposal. The approved sampling and analysis plan was followed. The data gathered were deemed sufficient and acceptable for regulatory decision-making under the DMMP program.

   Although there were SL exceedances for total DDT and chlordane, the DMMP agencies concluded that the 8,000 cubic yards of material to be dredged at Don Morse Park are acceptable for use as fill within Lake Chelan for beach restoration as long as it will be capped with at least three feet of clean sand and gravel. The surface to be exposed by dredging was evaluated and meets the state of Washington's anti-degradation requirements.

10. **References**.

The Watershed Company, 2010. *Sampling and Analysis Plan for the City of Chelan's Don Morse Park Shoreline Restoration*, December 21, 2010.

Nelson Geotechnical Associates, 2011. Sampling and Analysis Report, Don Morse Park, Chelan Washington, August 2011.

DMMP, 2008a. *Dredged Material Evaluation and Disposal Procedures (Users Manual)*. Prepared by the Seattle District Dredged Material Management Office for the Dredged Material Management Program, July 2008.

DMMP, 2008b. *Quality of Post-Dredge Sediment Surfaces (Updated)*. A Clarification Paper Prepared by David Fox (USACE), Erika Hoffman (EPA) and Tom Gries (Ecology) for the Dredged Material Management Program, June 2008.

10. Agency Signatures.

Concur:

10/3/11 — Date
Stephanie Stirling - Seattle District Corps of Engineers

10/6/11 — Date
Erika Hoffman - Environmental Protection Agency

10/6/2011 — Date
Laura Inouye, Ph.D. - Washington Department of Ecology

10/6/11 — Date
Celia Barton - Washington Department of Natural Resources

Copies furnished:

DMMP signatories
Darren Habel, OD-RG
Kenny Booth, The Watershed Company

Figure 1. Project Location, Don Morse Park, Lake Chelan

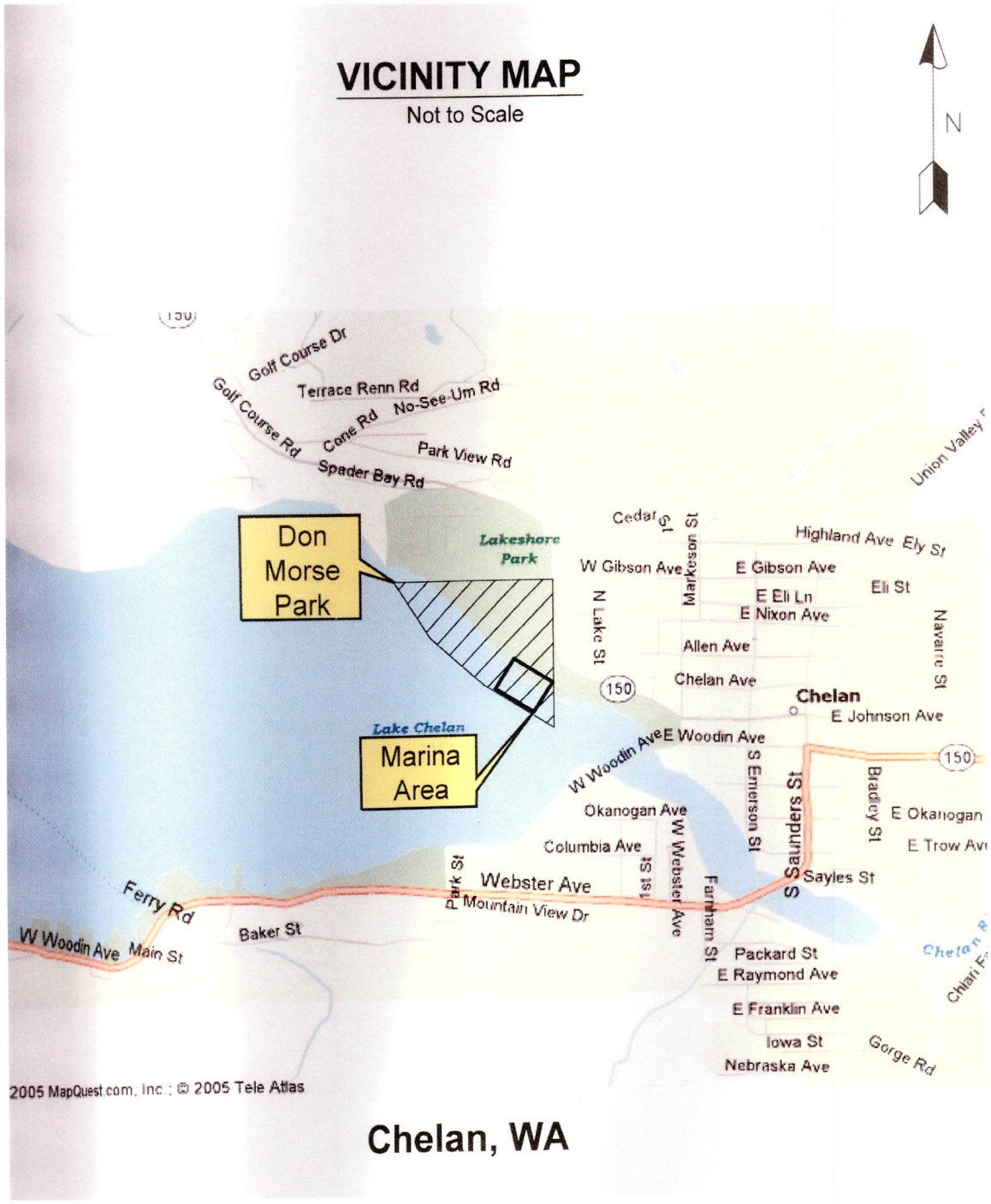

Figure 2. Sample locations, Don Morse Park.

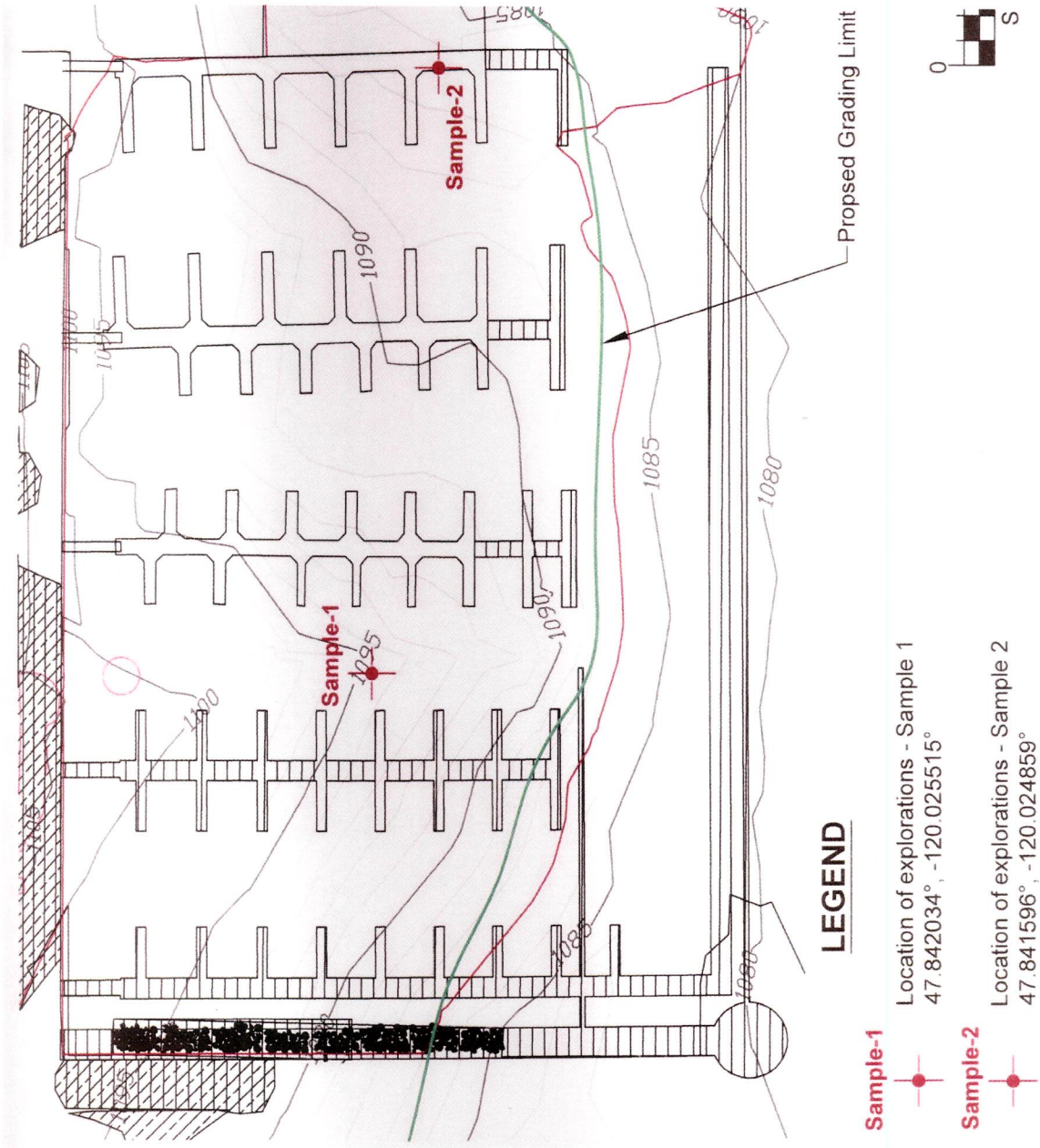

Table 2. Sampling and Compositing Scheme

DMMU Number	Composite Surface Grab Sample Identification
DMMU-1	• 1A • 2A
DMMU-2	• 1B • 2B

Table 3. Sediment Conventional Data.

		DMMU 1	DMMU 2
	DAIS ID:	S1	S2
GRAIN SIZE	% Gravel:	3.1	3.6
	% Sand:	83.1	85.9
	% Silt:	12.0	8.9
	% Clay:	1.8	1.8
	% Fines (clay+silt):	13.8	10.7
	Total Solids (%):	89.7	83.9
	Volatile Solids (%):	1.04	1.21
	Total Organic Carbon (%):	0.351	0.68
	Total Sulfides (mg/kg):	1.23 U	585.0
	Total Ammonia (mg N/kg):	2.35	6.06

Table 4. Chemical results compared to DMMP regulatory guidelines.							
CHEMICAL	SL1	BT	SL2	DMMU 1		DMMU 2	
METALS (mg/kg dry)				conc	QL	conc	QL
Antimony		---		5	u	6	u
Arsenic	20	---	51	6		6	u
Cadmium	1.1	---	1.5	0.2	u	0.2	u
Chromium	95	---	100	11.2		12	
Copper	80	---	830	14.2		13.8	
Lead	340	---	430	7		12	
Mercury	0.28	---	0.75	0.03		0.03	u
Nickel	60	---	70	8		9	
Silver	2.0	---	2.5	0.3	u	0.4	u
Zinc	130	---	400	44		44	
Organometallic Compounds							
Tributyltin (ug/kg dry)				<3.5	u	<3.8	u
LPAH (ug/kg dry)							
2-Methylnaphthalene	470	---	560	19	u	20	u
Acenaphthene	1100	---	1300	19	u	20	u
Acenaphthylene	470	---	640	19	u	20	u
Anthracene	1200	---	1600	19	u	20	u
Fluorene	1000	---	3000	19	u	20	u
Naphthalene	500	---	1300	19	u	20	u
Phenanthrene	6100	---	7600	19	u	14	u
Total LPAH	6600	---	9200	<133		<134	
HPAH (ug/kg dry)							
Benzo(a)anthracene	4300	---	5800	19	u	12	
Benzo(a)pyrene	3300	---	4800	19	u	20	u
Benzo(g,h,i)perylene	4000	---	5200	19	u	20	u
Benzofluoranthenes	600	---	4000	19		20	
Chrysene	5900	---	64000	13		13	
Dibenzo(a,h)anthracene	800	---	840	19	u	20	u
Fluoranthene	11,000	---	15,000	14		24	
Indeno(1,2,3-c,d)pyrene	4100	---	5300	18		20	u
Pyrene	8800	---	16,000	13		23	
Total HPAH	31,000	---	55,000	<154		<172	
CHLORINATED HYDROCARBONS (ug/kg dry)							
1,2,4-Trichlorobenzene		---		19	u	20	u
1,2-Dichlorobenzene		---		19	u	20	u
1,3-Dichlorobenzene		---		19	u	20	u
1,4-Dichlorobenzene		---		19	u	20	u
Hexachlorobenzene		---		19	u	20	u

PHTHALATES (ug/kg dry)							
Bis(2-ethylhexyl)phthalate	220	---	320	20		20	
Butyl benzyl phthalate	260	---	370	19	u	20	u
Di-n-butyl phthalate	---	---	---	19	u	58	
Di-n-octyl phthalate	26	---	45	19	u	20	u
Diethyl phthalate	---	---	---	19	u	20	u
Dimethyl phthalate	46	---	440	19	U	20	u
PHENOLS (ug/kg dry)							
2 Methylphenol				19	u	20	u
2,4-Dimethylphenol				19	u	20	u
4 Methylphenol				19	u	20	u
Pentachlorophenol				96	u	99	u
Phenol				19	u	20	u
MISCELLANEOUS EXTRACTABLES (ug/kg dry)							
Benzoic acid				19		180	uj
Benzyl alcohol				190	u	20	u
Dibenzofuran	400	---	400	19	u	18	uj
Hexachlorobutadiene				0.95	u	18	uj
N-Nitrosodiphenylamine				19	u	19	uj
PESTICIDES AND PCBs (ug/kg dry)							
Aldrin	9.5	---	---	0.95	u	0.99	u
Chlordane	2.8	37	---	62	e	17	e
Dieldrin	1.9	---	---	1.9	u	2.0	u
Heptachlor	1.5	---	---	0.95	u	0.99	u
Lindane	---	---	---	0.95	u	0.99	u
p,p'-DDD	16	---	---	41	e	56	e
p,p'-DDE	9.0	---	---	19	e	38	e
P,p'DDT	12	---	---	7.6		13	
Total PCBs	60	---	120	4	u	3.6	u
Total PCBs (mg/kg OC)	---		---		u		u

u = undetected
e=estimated

QL = laboratory qualifier
OC = organic carbon
SL = screening level
BT = bioaccumulation trigger
ML = maximum level

Table 5. Z-sample Results

	SL[1]	BT[2]	ML[3]	Composite Samples Z-sample	MDL[4] Z-sample
Pesticides (µg/kg)					
p,p'-DDD	16	---	---	< 1.9 U[5]	0.13
p,p'-DDE	9.0	---	---	< 1.9 U	0.12
p,p'-DDT	12	---	---	< 1.9 U	0.18
Aldrin	9.5	---	---	< 0.95 U	0.052
trans-Chlordane	2.8	---	---	< 0.95 U	0.073
cis-Chlordane	2.8	---	---	< 0.95 U	0.048
Dieldrin	1.9	---	---	< 1.9 U	0.095
Heptachlor	1.5	---	---	< 0.95 U	0.13
gama-BHC (Lindane)	---	---	---	< 0.95 U	0.046
Total PCBs	130	387	3,100	14.25	0.874
Miscellaneous Extractables (µg/kg)					
Hexachlorobutadiene	11	---	---	< 0.95 U	0.13
Chlorinated Hyrocarbons (µg/kg)					
Hexachlorobenzene	22	168	230	< 0.95 U	0.089