CENWS-OD-TS 17 May 2000
Dredged Material Management Office

MEMORANDUM FOR RECORD

SUBJECT: DETERMINATION OF THE SUITABILITY OF DREDGED MATERIAL TESTED UNDER DMMP EVALUATION PROCEDURES FOR THE OLYMPIA HARBOR NAVIGATION PROJECT FOR DISPOSAL AT THE ANDERSON/KETRON OPEN WATER DISPOSAL SITE.

1. The Corps of Engineers proposes to dredge the navigation channel at Olympia, Washington. In addition, the Port of Olympia proposes to widen the entrance channel and to deepen the port's berthing area. The total proposed dredged volume is approximately 635,000 cubic yards. The following summary reflects the DMMP agencies (Corps of Engineers, Department of Ecology, Department of Natural Resources and the Environmental Protection Agency) consensus decision on the acceptability of the sampling plan and all relevant test data to make a determination of suitability for the disposal of the material at a PSDDA open-water disposal site.

2. The ranking for this area is "low" based on the DMMP agency review of sediment chemistry data from the 1988 sampling and testing of the Olympia Harbor Navigation Improvement Project, and the lack of any ongoing sources of chemical contamination.

3. A sampling and analysis plan was completed for this project and approved by the PSDDA agencies on 14 February 1999. Sampling for this project was performed from 26 April to 7 May 1999. Additional sampling and testing data for bioaccumulation are discussed in paragraph 7.

SAP approval date	14 February 1999
Sampling dates	26 April to 7 May 1999
Data Report submittal date	June 1999
Recency determination dates	May 2004 to May 2006

4. Core samples were taken from a total of 64 locations and composited for ~~thirteen~~ seventeen analyses. The sampling and compositing scheme is listed in Table 1. Sample depths could not be achieved at stations 6. 7 (composite TBW-2), and Station 47 (composite M). Core refusal occurred before reaching the planned sampling depths. In ea se the maximum bore length was collected and all bores reached native materi e resulting under-representation of deeper native sediments (assumed to contaminated) in the DMMU composite results in potentially

Attachment 1

higher chemical concentrations. This result is more conservative and is therefore usable in making a suitability determination for these samples.

5. There were no exceedances of 1999 DMMP screening levels for the standard list of chemicals of concern. All detection limits were below screening level.

6. A tiered approach was used in the analysis for Tributyltin (TBT). Composites in the berthing are (B1 and B2) were analyzed for TBT. If there were no TBT exceedances in these samples, TBT testing would not be required for the rest of the samples. Composite B1 had a porewater TBT level of 0.28 ug/L, above the screening level of 0.15 ug/L. This exceedance triggered the requirement to test all remaining DMMUs for TBT. One of these DMMU also exceeded the screening level for TBT (TBW-1). DMMU exceeding the screening level for TBT are required to undergo bioaccumulation testing in order to determine suitability for open-water disposal.

7. A separate sampling and analysis effort was undertaken for the bioaccumulation testing of samples B1 and TBW-1. A sampling plan addendum was approved by the agencies in July 1999. Sampling for TBT bioaccumulation analysis was completed in August 1999.

8. Bioaccumulation testing was performed with bivalve *Macoma nasuta* and the polychaete *Nephtys caecoides.* The two species were tested together in the same 18-liter glass aquarium. At the time of project initiation, the standard DMMP bioaccumulation protocol called for 28-day test duration. The project proponents agreed to extend the test to 45 days, based on the recommendation of the DMMP agencies. The extended test provides a better approximation of steady-state tissue concentrations for TBT.

9. Six replicate aquaria (five test replicates and one replicate for steady state monitoring) were run for the two test sediments, the two reference sediments and the negative control.

10. Tissue concentrations from the 45-day exposure were compared to the reference sediments. Initial sediment chemistry was used to adjust the observed tissue concentrations. The sediment chemistry results between the first and second rounds of TBT testing differed, and so a ratio of the two was used to adjust the bioaccumulation tissue concentrations to reflect a "worst case" analytical result. These TBT chemistry results are listed in Table 3.

11. The DMMP agencies agreed to use the target tissue level developed for the East Waterway project, 3 ppm dry weight of TBT in tissue, as the value appropriate for the Olympia Harbor Navigation Project. Given the limited residue-effects data for the Olympia area, it was determined that the number calculated for Elliott Bay would be the closest approximation available for making a determination of suitability. The method of calculation and the data supporting this value is documented in the

suitability determination for the East Waterway project suitability determination (1999), paragraph 18, and in the "Review of Tissue Residue Effects Data for Tributyltin, Mercury and Polychlorinated Biphenyls", prepared by EVS solutions for the Port of Seattle.

12. TBT concentrations in tissues from *Macoma* and *Nephtys* exposed to test sediments were significantly less than the target tissue level of 3 ppm dry weight TBT in tissue. TBT tissue concentrations were also compared to reference and significant differences were observed for both DMMU. These results are listed in Table 4. The DMMP agencies agreed that comparing statistical difference from reference is a necessary but not a sufficient condition to determine a DMMU unsuitable for open-water disposal. Sediments from these two DMMU are suitable because all TBT tissue concentrations are significantly less than the target tissue level, TBT is undetected in most test replicates and differs from reference only when conservative assumptions are applied to non-detected values, and TBT concentrations in the retested samples were all lower than the screening level.

13. In summary, the DMMP-approved sampling and analysis plan was followed, and quality assurance, quality control guidelines specified by the DMMP were followed. The data gathered were deemed sufficient and acceptable for regulatory decision-making under the DMMP program. Based on the results of the chemical testing, the consensus determination of the DMMP agencies is that all 635,000 cubic yards from the Olympia Navigation Channel and the Port of Olympia's berthing area are suitable for open-water disposal.

14. This memorandum documents the suitability of proposed dredged sediments for disposal at a PSDDA open water disposal site or for beneficial use. It does not constitute final agency approval of the project. A dredging plan for this project must be completed as part of the final project approval process. A final decision will be made after full consideration of agency and public input, and after an alternatives analysis is done under section 404 (b) 1 of the Clean Water Act.

OLYMPIA HARBOR NAVIGATION PROJECT

Concur:

7/30/20
Date

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1 August 2020
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Table 1. Sampling/Compositing Scheme

	DMMU	Samples Composited by Core Section	DMMU Volume Represented (cy)
SURFACE SEDIMENTS			
Berthing Area Maintenance			
	B1	1A, 2A, 3A, 4A	30,335
Turning Basin Widening			
	TBW1	5A, 6A, 7A	23,471
Main Channel O & M Dredging			
	MC1	8A, 9A, 10A, 11A, 12A	35,494
	MC2	13A, 14A, 15A, 16A, 17A, 18A	44,114
	MC3	19A, 20A, 21A, 22A, 23A	38,595
	MC4	24A, 25A, 26A, 27A, 28A	36,646
	MC5	29A, 30A, 31A, 32A, 33A	36,053
	MC6	34A, 35A, 36A, 37A, 38A	34,841
	MC7	39A, 40A, 41A, 42A, 43A, 44A	40,779
Main Channel Widening			
	MCW1	45A, 46A, 47A, 48A, 49A	39,463
Outer Channel O & M Dredging			
	OC1	50A, 51A, 52A, 53A, 54A	43,977
	OC2	55A, 56A, 57A, 58A, 59A	36,325
	OC3	60A, 61A, 62A, 63A, 64A	39,052
SUBSURFACE SEDIMENTS			
Berthing Area Maintenance			
	B2	1B, 2B, 3B	15,010
Turning Basin Widening			
	TBW2	5B, 5C, 6B, 6C, 6D, 6E, 7B, 7C, 7D, 7E	52,499
Main Channel O & M Dredging			
	MC8	9B, 11B, 12B, 15B, 18B	23,419
Main Channel Widening			
	MCW2	45B, 45C, 46B, 46C, 47B, 47C, 48B, 49B, 49C, 49D	54,198
			624,271

Table 2. Sediment Conventional Parameters

Parameter	B1	B2	MC1	MC2	MC3	MC4	MC5	MC6	MC7	MC8
Total Solids (%)	49.9	72.2	40.4	40.8	45.7	42	38.6	38.2	44.1	61.6
Total Organic Carbon (%)	2.7	1.6	2.9	2.8	2.3	2.5	2.7	2.7	2.3	1.9
Bulk Ammonia (mg/kg)	7.8	58	4.8	4.9	87	9.2	78	68	77	69
Total Sulfides (mg/kg)	360	0.62U	460	90	19	430	900	170	960	48
Grain-size										
gravel	22.5	32.7	7.5	0.9	1.4	2.2	0.6	1.5	1.8	14.1
sand	39	50.3	26.9	25	27.1	20.1	19.2	28.5	30.8	52.8
silt	20.6	10.7	36.9	42.1	43.4	45.7	46.4	38.6	38.9	21.6
clay	18	6.3	28.6	31.8	28	31.9	33.9	31.5	28.5	11.6

Table 2. Sediment Conventional Parameters (Continued)

Parameter	MCW1	MCW2	OC1	OC2	OC3	TBW1	TBW2
Total Solids (%)	57.7	72	40.6	39.8	53.3	43	71.7
Total Organic Carbon (%)	1.4	0.74	2.4	2.3	1.7	3.2	1.0
Bulk Ammonia (mg/kg)	43	50	92	56	40	94	50
Total Sulfides (mg/kg)	430	1.3U	950	1100	46	130	26
Grain-size							
gravel	4	6.5	2.9	5	3.8	2.8	4.5
sand	52.1	65.8	28.5	22.3	49.6	18.3	71.3
silt	27.9	18.8	39.7	42.5	28.2	49.8	16.8
clay	16.1	9	29	29.9	18.4	29.2	7.5

Table 3. TBT Sediment Chemistry Data

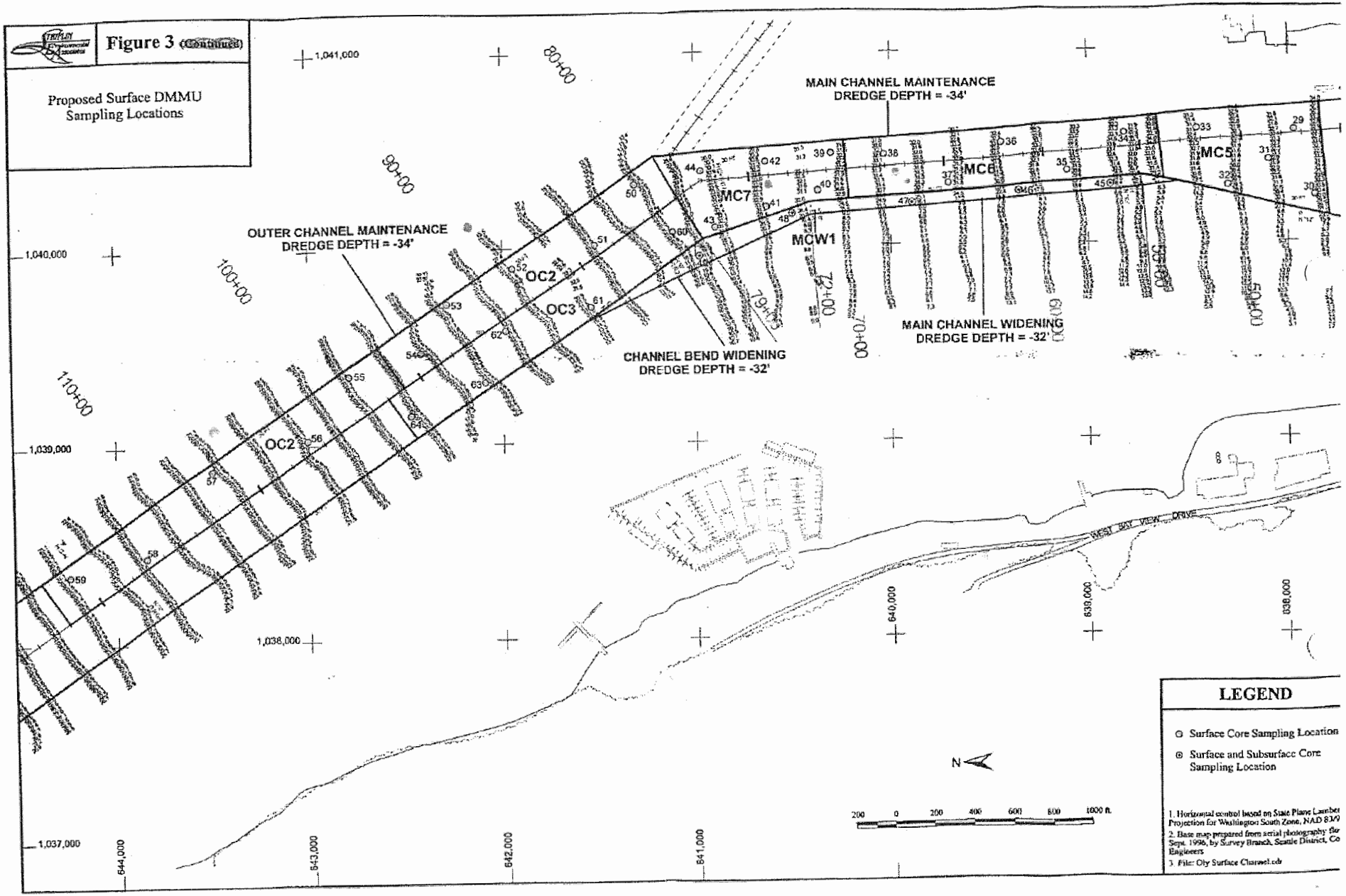
Parameter	DMMU B1			DMMU TBW1		
	Initial (4/99)	Retest (8/99)	Ratio I/R	Initial (4/99)	Retest (8/99)	Ratio I/R
TBT Porewater (ug/L)	0.28	0.14	2.0	0.16	0.02	8.0

Table 4. Bioaccumulation Test Results

Sample	Replicate	*Nephtys* Lipids (% dry wt)	*Nephtys* TBT (ug/kg dry wt)	*Macoma* Lipids (% dry wt)	*Macoma* TBT (ug/kg dry wt)
Control	A	2.3	10 U	1.3	10 U
	B	2.8	10 U	1.6	10 U
	D	2.2	10 U	1.8	10 U
	E	2.7	10 U	1.8	10 U
	F	3.1	10 U	1.3	10 U
CR02	A	1.7	10 U	1.7	2
	B	2.6	10 U	1.1	10 U
	D	3.0	10 U	1.6	10 U
	E	2.8	10 U	1.9	10 U
	F	2.0	10 U	2.0	10 U
CR23	A	2.3	20 U,G	2.2	10
	B	1.9	20 U,G	1.8	10 U
	D	2.8	10 U	1.4	10 U
	E	2.2	10 U	1.8	10 U
	F	1.8	10 U	2.2	10 U
TBW1	A	2.8	20 U,G	1.9	2
	B	2.0	10 U	1.5	17
	D	1.0	30 U,G	1.5	10 U
	E	1.6	20 U,G	1.5	10 U
	F	1.5	10 U	1.6	10 U
B1	A	1.9	4 U,G	1.4	51
	B	1.9	2 U	2.0	71
	D	1.6	10 U	1.7	72
	E	1.7	20 U,G	1.6	49
	F	2.2	10 U	1.7	54

Figure 3 (Continued)

Proposed Surface DMMU Sampling Locations



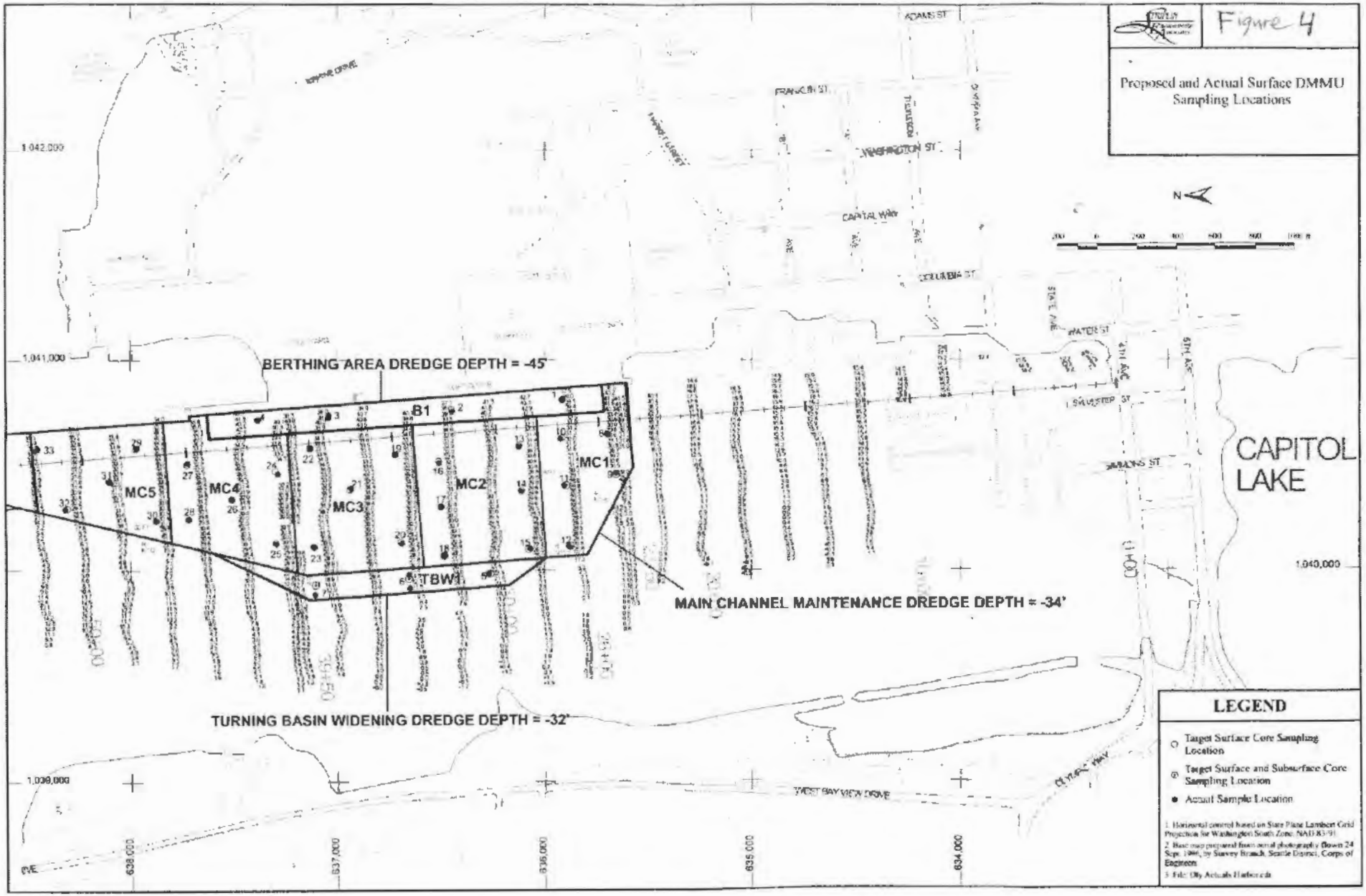


Figure 4
Proposed and Actual Surface DMMU Sampling Locations
BERTHING AREA DREDGE DEPTH = -45'
MAIN CHANNEL MAINTENANCE DREDGE DEPTH = -34'
TURNING BASIN WIDENING DREDGE DEPTH = -32'
B1
MC1
MC2
MC3
MC4
MC5
TBW1
CAPITOL LAKE
ADAMS ST
FRANKLIN ST
WASHINGTON ST
CAPITAL WAY
COLUMBIA ST
WATER ST
4TH AVE
5TH AVE
DEAMS ST
WEST BAY VIEW DRIVE
1,042,000
1,041,000
1,040,000
1,039,000
638,000
637,000
636,000
635,000
634,000
LEGEND
Target Surface Core Sampling Location
Target Surface and Subsurface Core Sampling Location
Actual Sample Location
1. Horizontal control based on State Plane Lambert Grid Projection for Washington South Zone, NAD 83/91.
2. Base map prepared from aerial photography flown 24 Sept. 1996, by Survey Branch, Seattle District, Corps of Engineers.
3. File: Oly Actuals Harbor.cdr

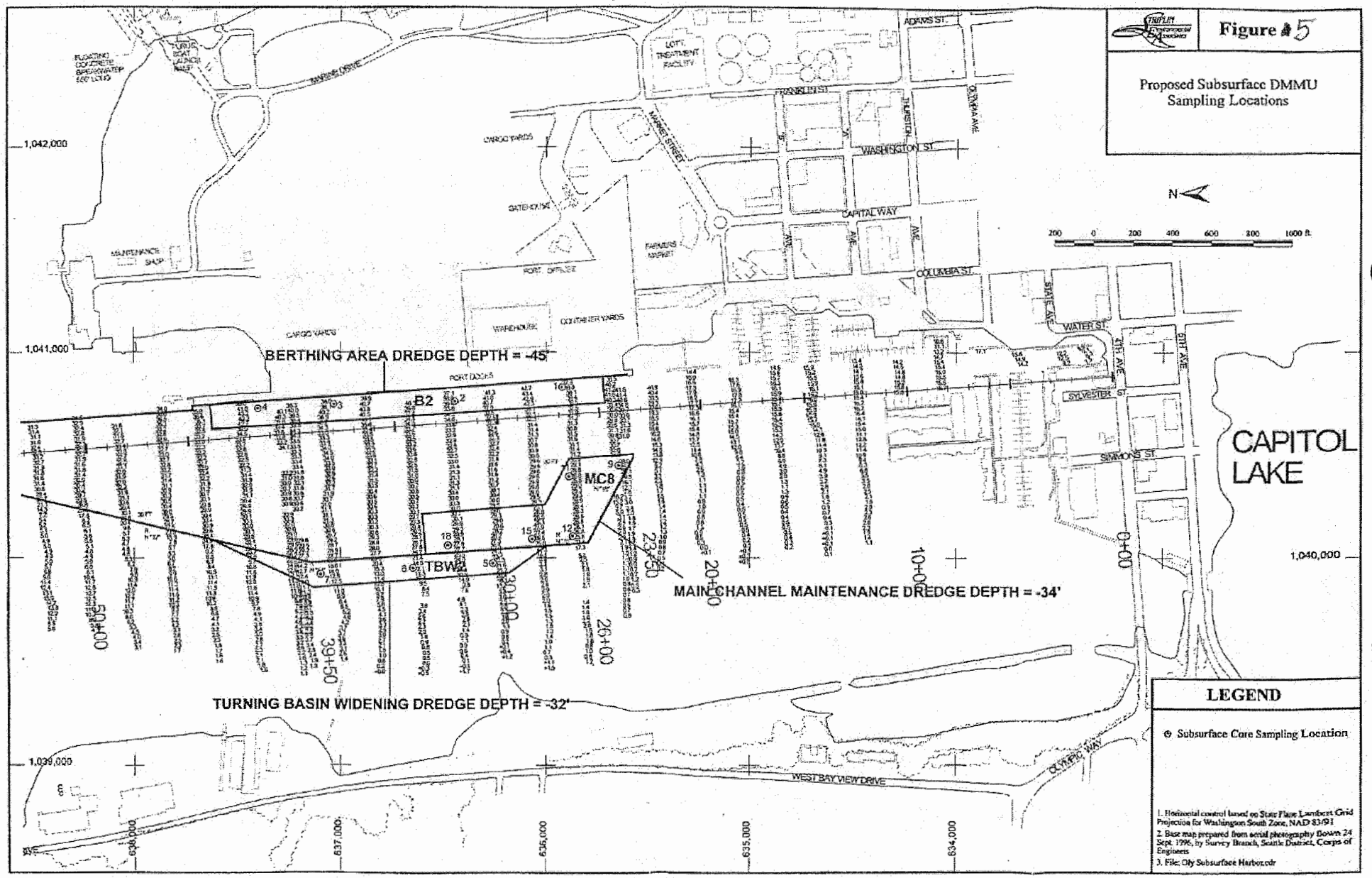


Figure #5
Proposed Subsurface DMMU Sampling Locations
N
200 0 200 400 600 800 1000 ft.
BERTHING AREA DREDGE DEPTH = -45'
MAIN CHANNEL MAINTENANCE DREDGE DEPTH = -34'
TURNING BASIN WIDENING DREDGE DEPTH = -32'
CAPITOL LAKE
B2
MC8
TBW2
ADAMS ST.
FRANKLIN ST.
WASHINGTON ST.
CAPITAL WAY
COLUMBIA ST.
WATER ST.
SYLVESTER ST.
SIMMONS ST.
WEST BAY VIEW DRIVE
OLYMPIC WAY
MARINE DRIVE
PORT DOCK 5
1,042,000
1,041,000
1,040,000
1,039,000
636,000
637,000
635,000
635,000
634,000
LEGEND
Subsurface Core Sampling Location
1. Horizontal control based on State Plane Lambert Grid Projection for Washington South Zone, NAD 83/91
2. Base map prepared from aerial photography flown 24 Sept. 1996, by Survey Branch, Seattle District, Corps of Engineers
3. File: Oly Subsurface Harbor.cdr

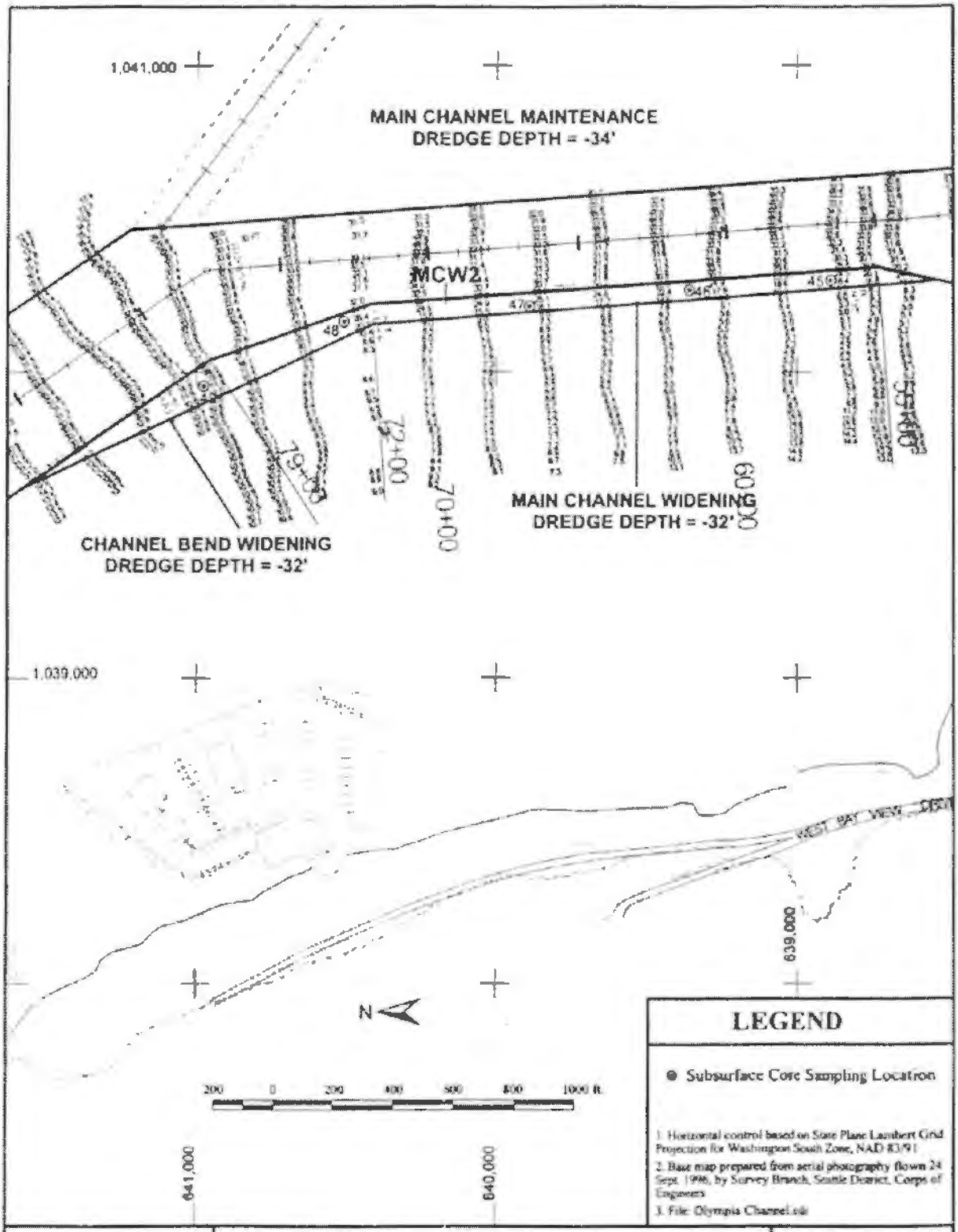


Figure 6 (Continued)
Proposed Subsurface DMMU Sampling Locations

Olympia Harbor
3/23/99
Oly Subsurface Channel.cdr