

MEMORANDUM FOR: RECORD

November 20, 2012

SUBJECT: DETERMINATION REGARDING THE SUITABILITY OF DREDGED MATERIAL FROM OLYMPIA YACHT CLUB, EVALUATED UNDER SECTION 404 OF THE CLEAN WATER ACT FOR UNCONFINED OPEN-WATER DISPOSAL AT THE ANDERSON-KETRON ISLAND NONDISPERSIVE SITE.

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 16,241 cubic yards (cy) of dredged material from Olympia Yacht Club for disposal at the Anderson-Ketron Island nondispersive open-water site.
2. **Background.** The proposed dredging project is located at the Olympia Yacht Club Marina, which is a privately operated marina that is a mix of open moorage, boathouses, covered moorage, a guest dock, and a passive use dry-dock. Associated upland amenities include a clubhouse, a caretaker house, and vehicle parking.

The marina is located at the southern end of Puget Sound in Lower Budd Inlet, Olympia, Washington (Exhibit 1). It is at the end of the main channel that provides marine traffic access into Lower Budd Inlet. Inside channels within the marina provide access to individual berths along six docks (Exhibit 2).

Potential sources of contamination in the marina include an existing outfall that discharges into Lower Budd Inlet, the passive use dry-dock, and historical contamination associated with a wide variety of industry within the basin. The dry-dock is used for boat maintenance by members of the yacht club. However, the yacht club prohibits hull scraping while using the dry-dock (Skillings-Connolly, 2012).

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

Table 1. Project Summary

Project ranking	High
Proposed dredging volume	16,241 cubic yards
Proposed dredging depth	-10 feet MLLW design depth -12 feet MLLW with overdepth
1 st draft SAP received	May 26, 2011
Comments provided on 1 st draft SAP	June 6, 2011
2 nd draft SAP received	July 1, 2011
Comments provided on 2 nd draft SAP	July 9, 2011

3 rd draft SAP received	August 17, 2011
SAP approved, subject to minor revisions	August 18, 2011
Final revised SAP submitted	December 20, 2011
Sampling date	December 20, 2011
1 st draft data report received	May 2, 2012
Comments provided on 1 st draft report	May 11, 2012
2 nd draft data report received	August 6, 2012
Comments provided on 2 nd draft report	August 17, 2012
3 rd draft data report received	October 8, 2012
Comments provided on 3 rd draft report	October 25, 2012
Final data report received	November 2, 2012
DAIS tracking number	OLYYC-1-A-F-329
USACE permit application number	NWS-2012-793
Recency Determination (high rank = 2 years)	December 20, 2013

4. **Project Ranking and Sampling Requirements.** The Olympia Yacht Club project was ranked “high” due to its location in Lower Budd Inlet (DMMP, 2008a).

In a high-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 (typically a 4-foot core) = 4,000 cubic yards
- Maximum volume of sediment represented by each analysis in the upper 4-feet of the dredging prism (surface sediment) = 4,000 cubic yards
- Maximum volume of sediment represented by each analysis beyond the upper 4-feet of the dredging prism (subsurface sediment) = 12,000 cubic yards

Exhibit 3 shows the bathymetry at Olympia Yacht Club, with the -10 foot design-depth highlighted. Exhibit 4 shows the location of the cross-sections provided in Exhibit 5. Because the dredge prism, including overdepth, was less than 5 feet deep in most places, the entire dredge prism was characterized as surface material.

The SAP included a total project volume of 15,579 cy (this volume was later recalculated to be 16,241 cy). Based on the DMMP guidelines, the proposed dredge volume required a minimum of four analyses, or dredged material management units (DMMUs). The minimum number of samples required was one per DMMU. However, in order to get a better spatial representation, the DMMP agencies requested an additional sample be taken from each DMMU. Exhibit 3 shows the DMMU boundaries and sampling locations. DMMU 1 consisted of two spatially disjunct areas. Therefore, a total of 3 samples were taken from this unit. Table 2 includes the volume and number of samples for each DMMU.

5. **Sampling.** Field sampling took place December 20, 2011 using a vibracore sampler. Table 3 includes sampling coordinates, mudline elevations and sampling depths. Exhibit 3 shows both target and actual sampling locations. Profiles of the samples taken at each sampling station can be seen in Exhibit 6. Two-foot long z-samples - collected and archived from each sampling station - can be seen in these profiles.

Deviations from the target sampling coordinates were minor in most cases. Exceptions were SC-4 and SC-5. SC-4 was inadvertently taken just outside the dredging footprint, as can be seen in Exhibit 3; and the recorded coordinates for SC-5 put it 46 feet from its target location. In the case of SC-5, the contractor determined that the recorded sample coordinates were in error. The sampling procedure that was utilized along the pier face for stations SC-5, SC-7 and SC-9 could not have resulted in SC-5 being located at the recorded coordinates. Photographs taken at SC-5 and SC-9 (see Exhibit 7) corroborate this explanation. On the basis of this evidence, the contractor assigned approximate coordinates to this station. These approximate coordinates are what is listed in Table 3 and shown in Exhibit 3.

Real-time tidal correction of the measured mudline elevations was performed in the field, but upon later examination these tide-corrected measurements were found to be unreliable. The recorded mudline elevations simply did not make sense given the location of the samples and the water depths predicted from the bathymetric data. Another indication that there were problems with the field notes came from a comparison of vibracore sampling times with the times listed on the chain-of-custody forms for the sulfides subsamples. The times listed for sulfides subsampling should have lagged the time the vibracore samples were taken. Yet, six of the cores had recorded sulfides subsampling times occurring before the time of sampling, in one case almost 3 hours before. Time is critical when doing tidal corrections for water depth. On the day of sampling, the rate of change in tidal stage was as high as 3.5 ft/hr. Without precise field notes, it is impossible to reconstruct the derivation of tide-corrected mudline elevations. Another indication that there might be problems with the field notes was that four of the stations were recorded as having the exact same uncorrected water depth at the time of sampling. Three of these stations were predicted to have approximately the same water depth (relative to MLLW), but given the rapidly changing tides, the raw water-depth measurements should have differed from one another. On the basis of these pieces of evidence, the water depths recorded in the field notes were determined to be invalid by the contractor.

To address this issue, the contractor returned to the site on September 18, 2012 and did numerous spot checks of the May 2011 bathymetry data. Exhibit 8 shows the locations at which spot checks were done. The tide-corrected measurements were very close to what would be expected from the 2011 survey, with differences in the range of 0.1-0.5 feet. On the basis of these spot checks, the contractor decided to use the hydrographic survey data to derive mudline elevations at the sampling stations. These derived mudline elevations are what is listed in Table 3 and used in the sample profiles in Exhibit 6.

The profiles in Exhibit 6 reveal one more minor issue with the samples taken. At stations SC-4, SC-8 and SC-9, the depths at which the z-samples were taken did not correspond with the planned depths. The z-samples at these three stations were collected approximately 4.0 ft, 0.8

ft and 0.5 ft too deep respectively.

The deviations from the sampling and analysis plan and unreliable field notes posed a challenge to the DMMP agencies in determining whether the samples and resulting data were useable in making a suitability determination. Agency deliberations concluded with a decision to accept the sampling and testing results. These deliberations are documented in the following bullets:

- The evidence provided for the corrected location of SC-5 was convincing. If this sample was indeed taken in the same manner as SC-7 and SC-9, then it would have to have been close to the pier face, not out in the middle of the fairway, close to the finger piers. The photos at SC-5 and SC-9 corroborate this assertion. Also, SC-5 is located within a DMMU subunit that was found unsuitable for open-water disposal. So the precise location of SC-5 is not critical for decision-making. Had it been at the recorded location, the decision for this subunit would not have changed.
- The sample at station SC-4 was taken outside the dredge prism, but as can be seen from Exhibit 2, it is located on a mudflat that appears to be consistent in nature. The DMMP agencies believe the sample adequately represents the sediment in this mudflat. Evidence of the representativeness of this sample can be seen in the dioxin data, which shows a clear and consistent difference between sediment on the west side of the main boardwalk and sediment on the east side of the boardwalk. Stations SC-2 and SC-3 – on the west side of the main boardwalk - had dioxin concentrations of 1.86 and 0.25 pptr TEQ respectively. The mean concentration of the five sampling stations on the east side of the boardwalk was 8.1 pptr. The dioxin concentration at SC-4 was 0.23 pptr, which is consistent with the other concentrations seen on the west side of the boardwalk.
- The spot checks done on the May 2011 bathymetric survey validated use of the survey data for determining mudline elevations at the sampling stations.
- The sampling stations on the east side of the main boardwalk are near physical structures that helped pinpoint their locations. This helped ensure that the coordinates, and thereby the estimated mudline elevations, for stations SC-8 and SC-9 in DMMU 4 are relatively accurate.
- Approximately 0.8 ft and 0.5 ft of sediment from what should have been the z-sample stratum at stations SC-8 and SC-9 were included in the composite representing DMMU 4. There is evidence from the z-sample composite for dioxin that this deeper material is cleaner than the shallower material. Therefore, including cleaner material in the DMMU 4 composite would have decreased the concentration of chemicals of concern in this laboratory sample. The potential effects of this dilution were evaluated. The length of the core sections from SC-8 and SC-9 taken from the dredging prism were 3.6 and 5.5 ft respectively, a total of 9.1 ft in length. The combined length of core sections taken from the z-stratum was 1.3 ft. If chemical concentrations in the z-material are assumed to be zero, then – in the worst-case scenario – the correction factor that would need to be applied to the concentrations found in DMMU 4 is $10.4/9.1$, or 1.14. This correction factor

is not large enough to cause any of the standard chemicals-of-concern (COCs) to exceed the screening level (SL) in DMMU 4. For dioxin, application of this correction factor in the volume-weighted average (VWA) concentration calculations, would increase the VWA for the suitable material from 3.22 to 3.56 ppt TEQ, still below the site management objective of 4.0 ppt TEQ.

6. **Physical and Chemical Analysis.** Results from the physical and chemical analysis of project samples are included in Appendix 1. The sediment conventional results show that the proposed dredged material is predominantly sand, with very little silt or clay. However, total organic carbon was relatively high for such sandy sediment, ranging from a low of 1.3 percent in DMMU 4 to a high of 3.2 percent in DMMU 2. Ammonia and sulfides concentrations were low.

Results from the analysis of standard COCs included only one exceedance of the DMMP SLs. Mercury was detected at a concentration of 0.505 mg/kg in DMMU 3 (SL = 0.41 mg/kg). There were no detected SL exceedances in DMMUs 1, 2 and 4. However, there were four COCs that were undetected, but had method detection limits above their respective screening levels: hexachlorobenzene; 2-methylphenol; 2,4-dimethylphenol; and hexachlorobutadiene. Re-analysis was not possible as the archived sediment samples were no longer available. The agencies reviewed data from other sampling locations in near proximity to Olympia Yacht Club and determined that it is unlikely that any of these four chemicals are present in the dredged material prism at concentrations above their respective screening levels.

Dioxins were also required to be analyzed for this project. Olympia Yacht Club chose to analyze each of the nine individual samples from the dredge prism for dioxin rather than the four composited DMMU samples. The dioxin concentrations in these individual samples ranged from 0.23 to 14.8 parts per trillion (ppt) toxicity equivalents (TEQ, with nondetects = ½ estimated detection limit). A composite of the z-samples from these nine cores had a concentration of 0.14 ppt TEQ. TEQ calculations are shown in Appendix 2. The dioxin data were subject to EPA Stage 4 validation by EcoChem. Validation qualifiers are included in Appendix 2.

7. **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, 2008b). For Olympia Yacht Club, the main chemical of concern was dioxin. The z-sample composite had a very low dioxin concentration, indicating that the sediment to be exposed by dredging will meet the state's antidegradation standard. However, given the issues noted previously with field records and sampling depths, there is still some uncertainty regarding how well some of the z-samples represent the material that will be exposed by dredging. Additionally, due to the elevated dioxin concentrations on the east side of the main boardwalk, the DMMP agencies are concerned that dredging residuals could result in contamination of the newly exposed surface. To address these concerns, post-dredge sampling and testing will be required for this project. Several grab samples – providing adequate spatial representation – will need to be taken on the east side of the main boardwalk, composited, and analyzed for dioxin. If the results do not meet the State's antidegradation standard, the area east of the main boardwalk will need to be covered with 6 to 12 inches of

clean sand to isolate the degraded surface from the water column.

Mercury is of lesser concern, but testing of the z-samples associated with failed DMMU 3 was not possible due to expiration of the 28-day holding time for mercury prior to the results for DMMU 3 being available for review by the agencies. Since post-dredge sampling and testing for dioxin will already be taking place, the agencies are requiring that post-dredge sampling and testing for mercury also be conducted. Several samples will need to be taken from the newly exposed surface within the footprint of DMMU 3, composited, and tested for mercury. If the results do not meet the State's antidegradation standard, the area within the footprint of DMMU 3 will need to be covered with 6 to 12 inches of clean sand to isolate the degraded surface from the water column.

8. **Suitability Determination.** With respect to the standard DMMP COCs, DMMU 3 exceeded the SL for mercury and would need to be subjected to biological testing in order to be considered for open-water disposal. However, Olympia Yacht Club decided not to conduct bioassays on this DMMU. Therefore, the DMMP agencies concluded that the 3,974 cubic yards of sediment in DMMU 3 are unsuitable for open-water disposal. DMMUs 1, 2 and 4 had no detected exceedances of SL, so these DMMUs would be suitable for open-water disposal with respect to the standard COCs.

With respect to dioxin, a review of the data clearly showed that concentrations on the east side of the marina (to the east of the main boardwalk) are higher than on the west side of the marina. The dioxin concentration at station SC-5 for example, was much higher than at SC-4. Because of this difference, Olympia Yacht Club proposed splitting DMMU 2 into two subunits (Exhibit 9), thereby segregating SC-4 from SC-5. The DMMP agencies agreed to this proposal, subject to review of the resulting VWA calculations for the project. Volumes for these subunits were calculated - as shown in Exhibit 9 - and used in the following VWA calculations. These calculations showed that the VWA for the dredged material in DMMUs 1, 2a and 4 would be 3.22 pptr TEQ. The VWA for DMMUs 2b and 3 would be 10.4 pptr.

Volume-Weighted Average Dioxin Concentrations for Proposed DMMU Boundaries:

Open-Water Disposal:

DMMU	Sample	Dioxin Concentration (pptr TEQ)	Avg. Dioxin Concentration (pptr TEQ)	Representative Volume (CY)	(Conc.) x (Vol.)
1	SC-1	9.62	9.62	367	3530.54
	SC-2	1.86	1.055	3598	3795.89
	SC-3	0.25			
2a	SC-4	0.23	0.23	1496	344.08
4	SC-8	5.75	5.78	3888	22472.64
	SC-9	5.81			
			Σ	9349	30143.15

Total Volume-Weighted Average Concentration = $\Sigma(\text{Conc.} \times \text{Vol.}) / \Sigma(\text{Vol.}) = 3.22 \text{ pptr TEQ}$

Upland Disposal:

DMMU	Sample	Dioxin Concentration (pptr TEQ)	Avg. Dioxin Concentration (pptr TEQ)	Representative Volume (CY)	(Conc.) x (Vol.)
2b	SC-5	14.82	14.82	2918	43244.76
3	SC-6	3.44	7.15	3974	28414.1
	SC-7	10.86			
			Σ	6892	71658.86

Total Volume-Weighted Average Concentration = $\Sigma(\text{Conc.} \times \text{Vol.}) / \Sigma(\text{Vol.}) = 10.40$ pptr TEQ

These volume-weighted averages were compared to the DMMP interim disposal guidelines established in December 2010 (DMMP, 2010). The interim guidelines are as follows for non-dispersive sites:

DMMUs with dioxin concentrations below 10 pptr TEQ will be allowed for open-water disposal as long as the volume-weighted average concentration of dioxins in material from the entire dredging project does not exceed the Disposal Site Management Objective of 4 pptr TEQ.

The VWA for DMMUs 1, 2a and 4 is below the disposal site management objective of 4 pptr TEQ, and none of the individual concentrations is above 10 pptr. Therefore, these units - consisting of a total of 9,349 cy - are suitable for open-water disposal with respect to dioxin. DMMUs 2b and 3 - consisting of a total of 6,892 cy - are unsuitable.

In summary, considering the results for both the standard COCs and dioxin, DMMUs 2b and 3 – totaling 6,892 cy – are unsuitable for open-water disposal. DMMUs 1, 2a and 4 – totaling 9,349 cy – are suitable for disposal at the Anderson-Ketron open-water site, subject to the following provisions:

A pre-dredge meeting with DNR, Ecology, EPA and the Corps of Engineers is required at least 7 days prior to dredging. A dredging quality control plan must be developed and submitted to the Regulatory Branch of the Seattle District Corps of Engineers at least 7 days prior to the pre-dredge meeting. The dredging quality control plan must clearly show how the unsuitable material in DMMUs 2b and 3 will be dredged and handled separately from suitable material in DMMUs 1, 2a and 4. Dredging, positioning, de-watering, transloading 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. The unsuitable material must be completely dredged and removed before the suitable material may be dredged. A bathymetric survey will be required after removal of the unsuitable material to verify completion. The agencies will review the bathymetry and provide approval to then remove the suitable material. At the time the dredging quality control plan is submitted, an approved sampling and analysis plan must have

been submitted to the agencies and approved for the post-dredge characterization of the newly-exposed surface.

A DNR site-use authorization must be acquired for open-water disposal. Disposal at the Anderson-Ketron Island site must be by bottom-dump barge.

This suitability determination does not constitute final agency approval of the 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.

9. References.

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.

DMMP, 2010. *Dredged Material Management Program – New Interim Guidelines for Dioxin*. DMMP agencies, December 2010.

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

Skillings-Connolly, 2011. *Sampling and Analysis Plan, Olympia Yacht Club Dredging Project*. Prepared by Skillings Connolly, Inc. for the Olympia Yacht Club. August 2011.

Skillings-Connolly, 2012. *Sediment Characterization Report, Olympia Yacht Club Dredging Project*. Prepared by Skillings Connolly, Inc. for the Olympia Yacht Club. October 2012.

10. Agency Signatures.

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

Concur:

Date David Fox, P.E. - 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
Patrick Skillings, Skillings Connolly, Inc.
Walt Scheffer, Olympia Yacht Club
Darren Habel, CENWS-OD-RG
Pete Striplin, Ecology TCP

OLYMPIA YACHT CLUB

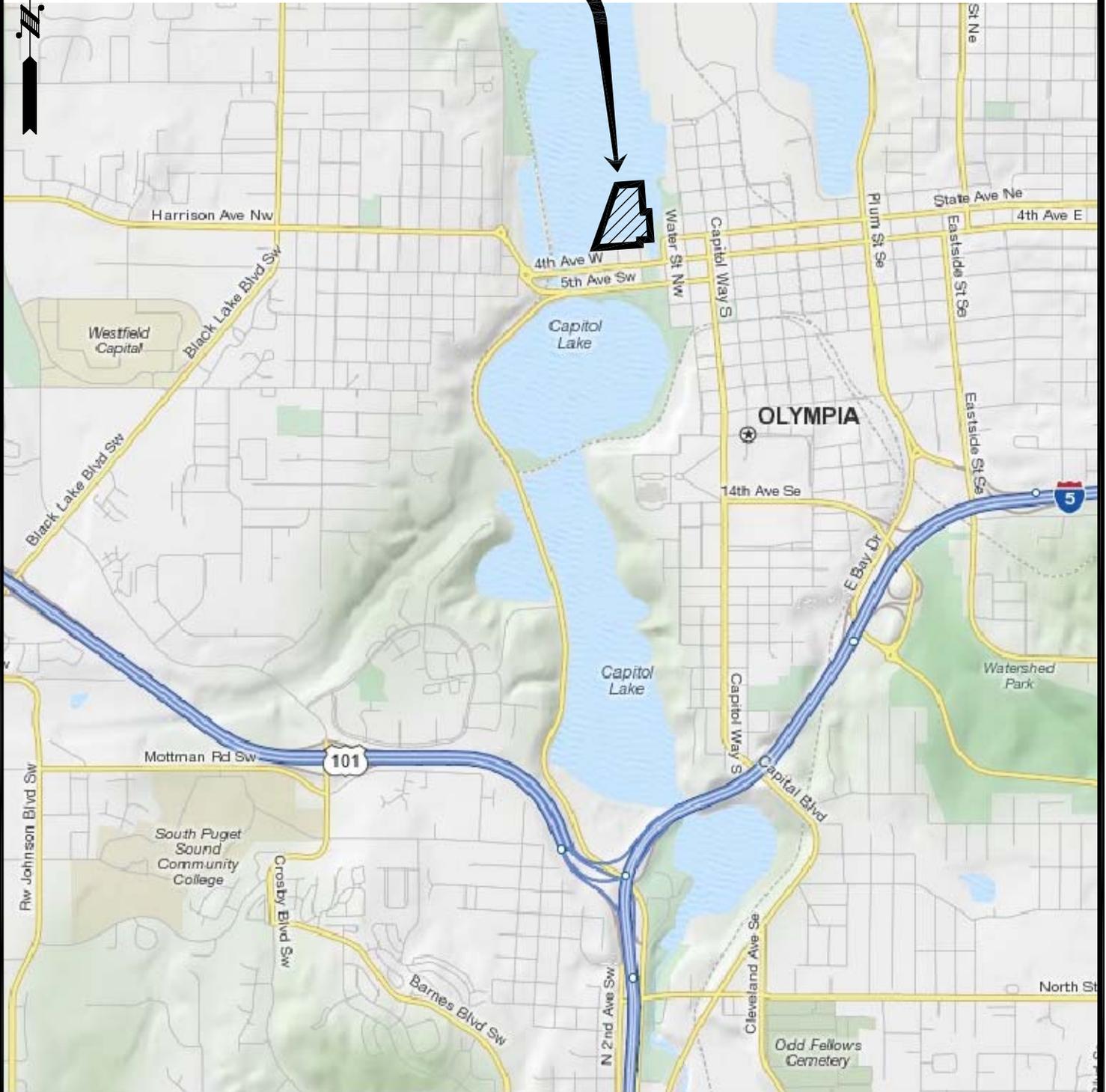


EXHIBIT 1
OLYMPIA YACHT CLUB
VICINITY MAP

JOB NO.

10070

DATE

5/25/2011

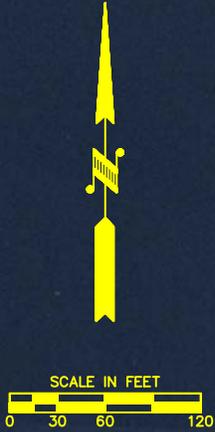
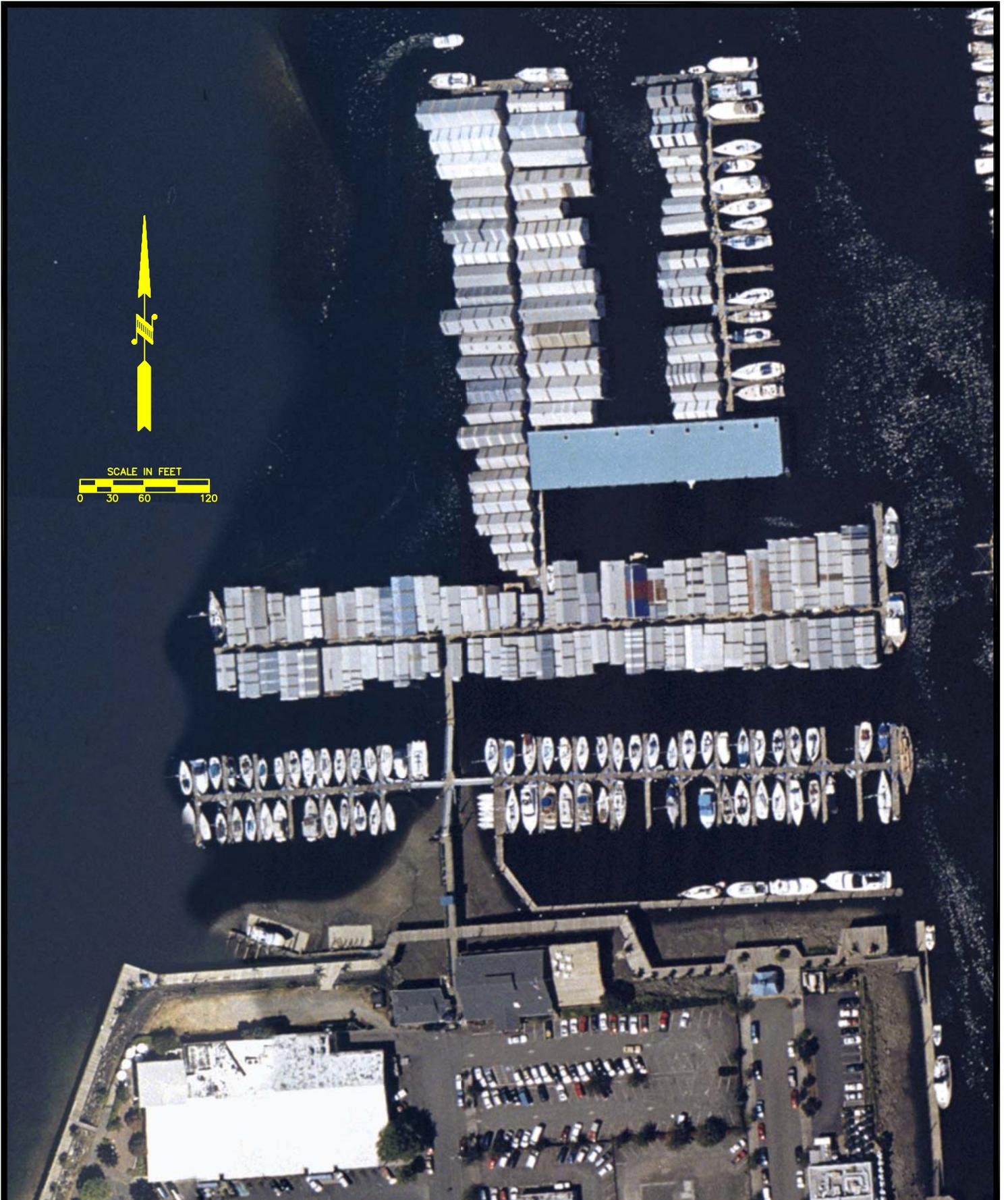


EXHIBIT 2
 OLYMPIA YACHT CLUB
 MARINA

JOB NO.

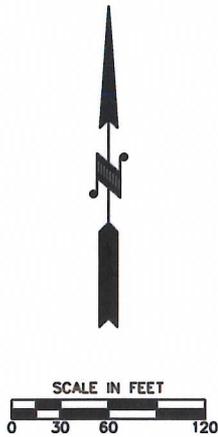
10070

DATE

5/25/2011

LEGEND:

- DREDGE BOUNDARY
- SC-# ● PROPOSED SAMPLE LOCATION
- ACTUAL SAMPLE LOCATION
- TOE OF SLOPE



BUDD INLET

OUTER HARBOR LINE

DMMU#1
367 CYDS
0.07 AC.



DESCHUTES WATERWAY

DMMU#1
3,598 CYDS
0.56 AC.

DMMU#2
4,414 CYDS
0.62 AC.

DMMU#3
3,974 CYDS
0.61 AC.

DMMU#4
3,888 CYDS
0.66 AC.

TOE OF SLOPE

INNER HARBOR LINE

INNER HARBOR LINE

DRY DOCK

OUTFALL

SIMMONS STREET

SYLVESTER STREET

CAPITOL WATERWAY

NOTE: THE VOLUMES AND DREDGE BOUNDARIES LINES SHOWN HERE DIFFER SLIGHTLY FROM THE ORIGINAL SAP SUBMITAL. THEY HAVE BEEN UPDATED TO MATCH CURRENT DESIGN.

DATE OF BATHYMETRIC SURVEY: 5/18/11



**EXHIBIT 3
DMMU MAP
OLYMPIA YACHT CLUB**

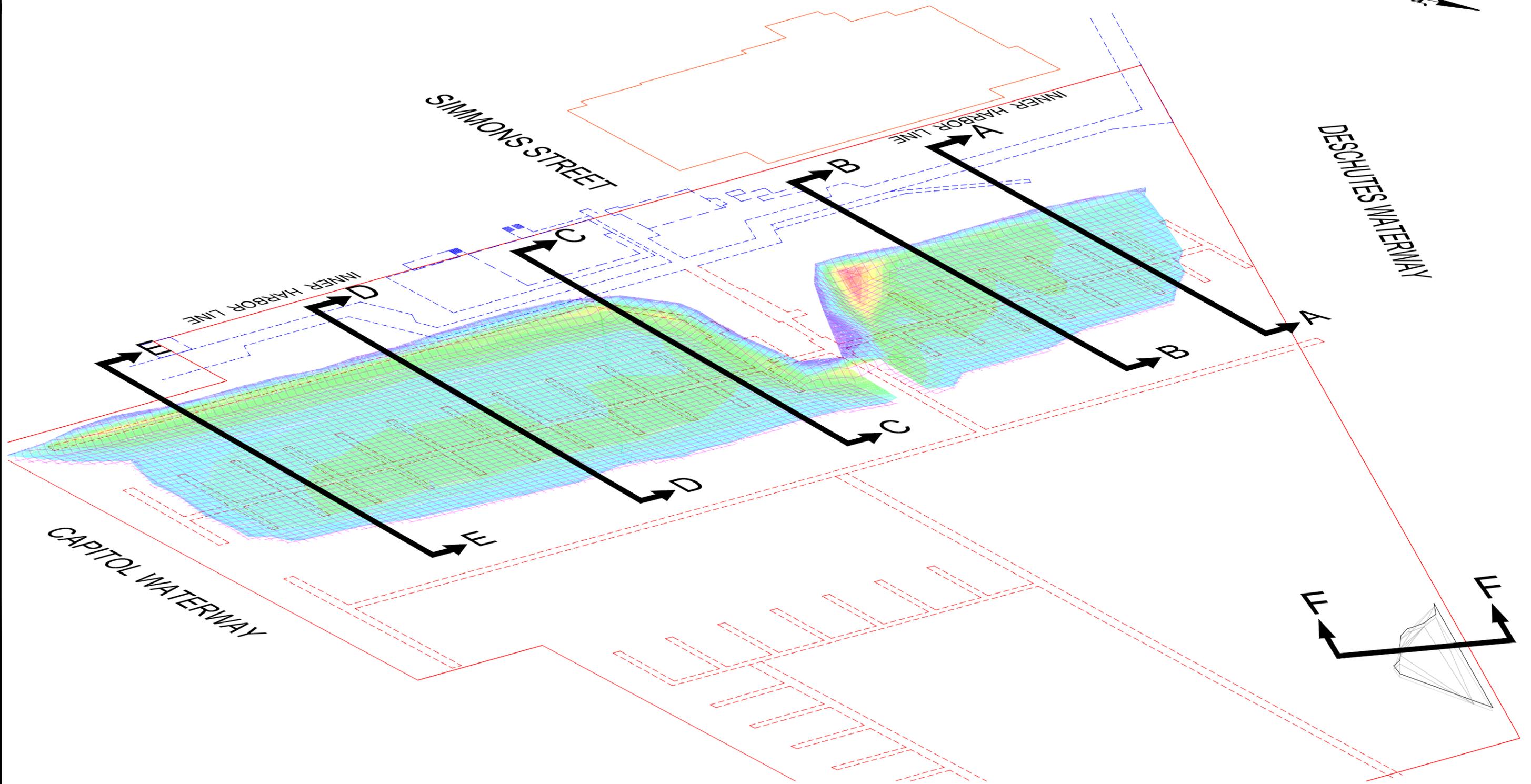
JOB NO.

10070

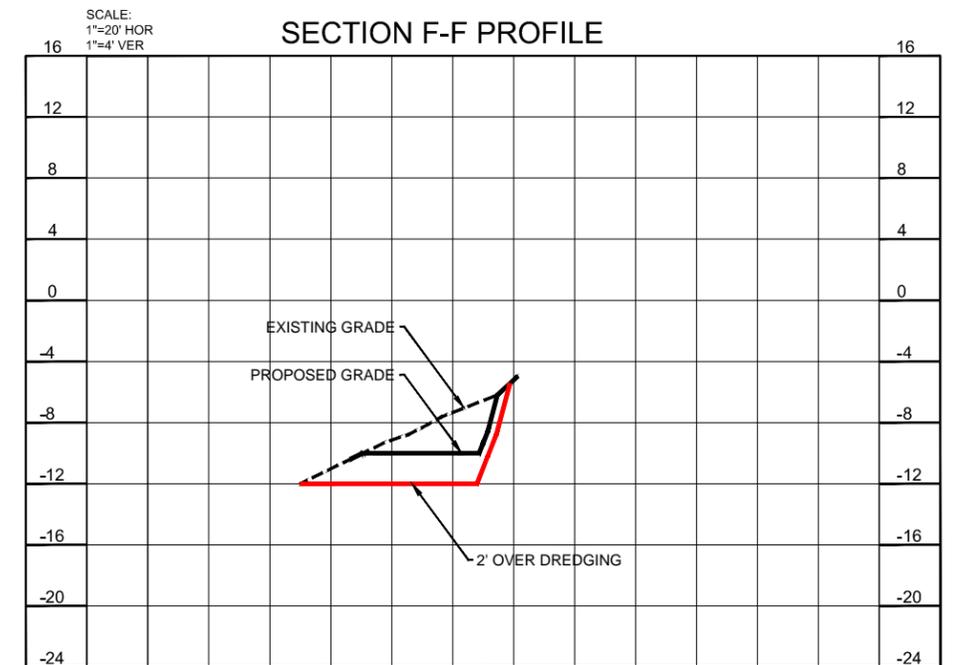
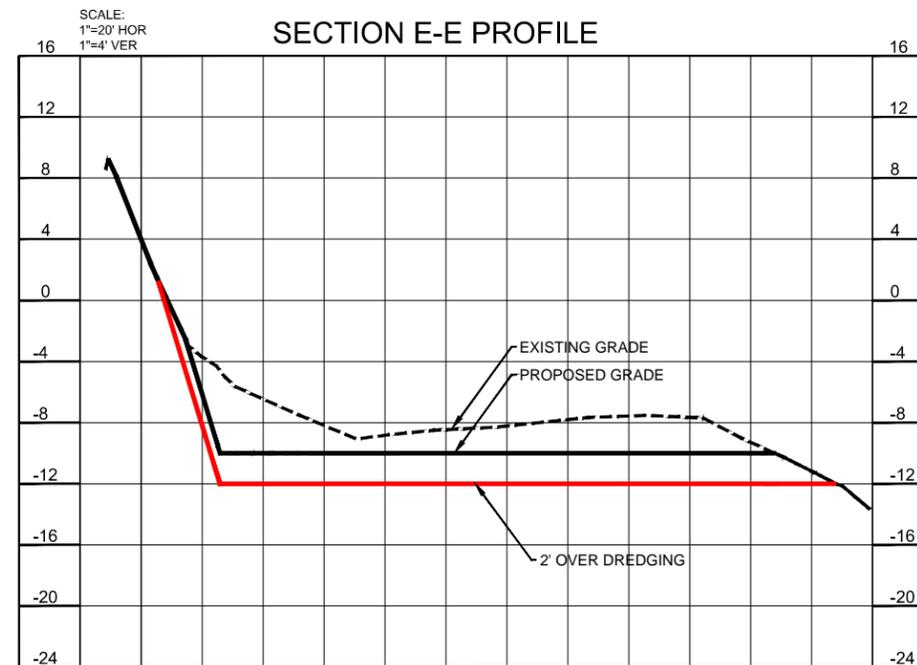
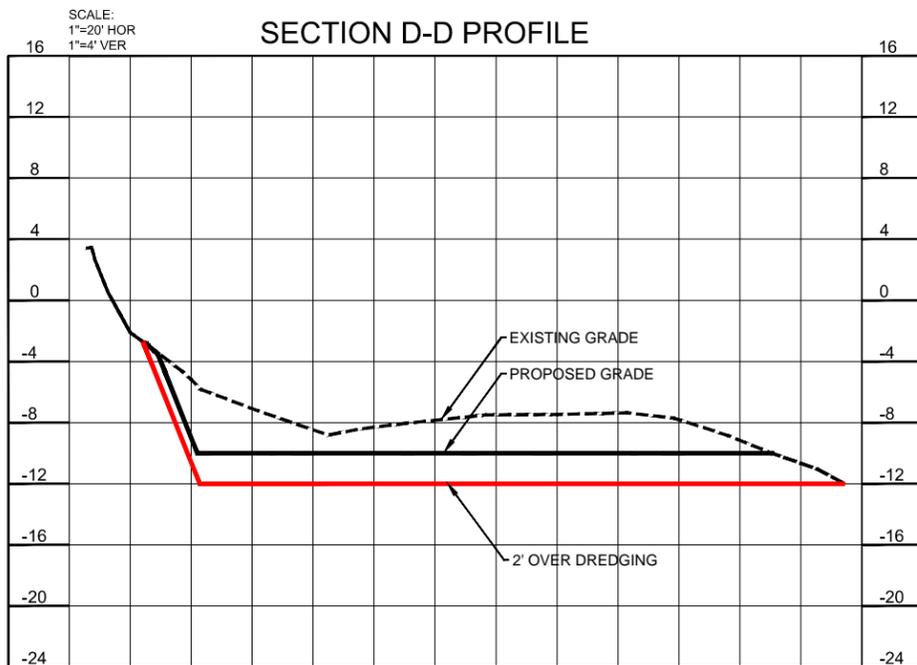
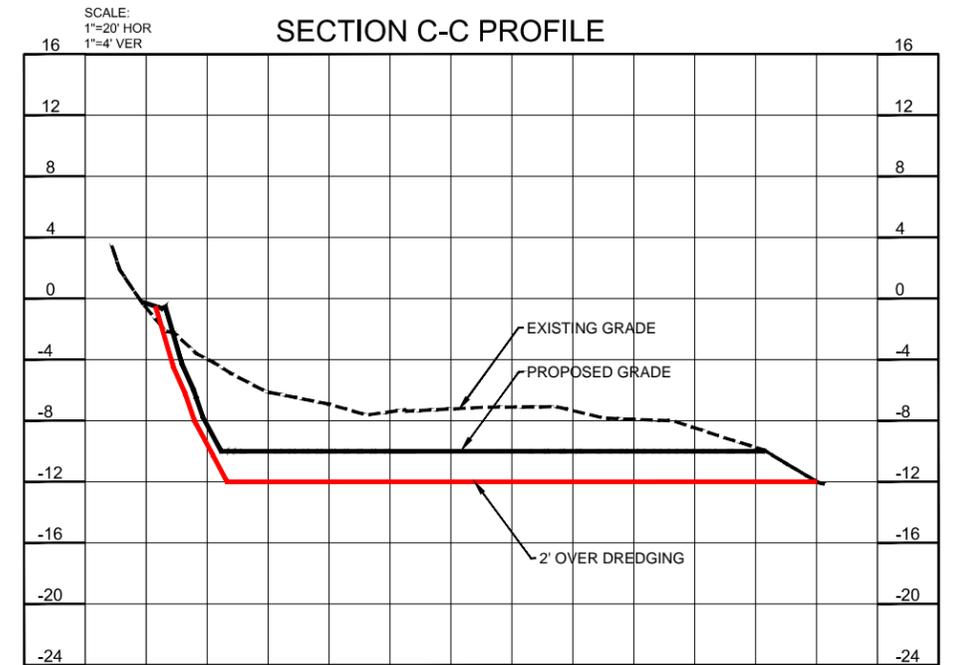
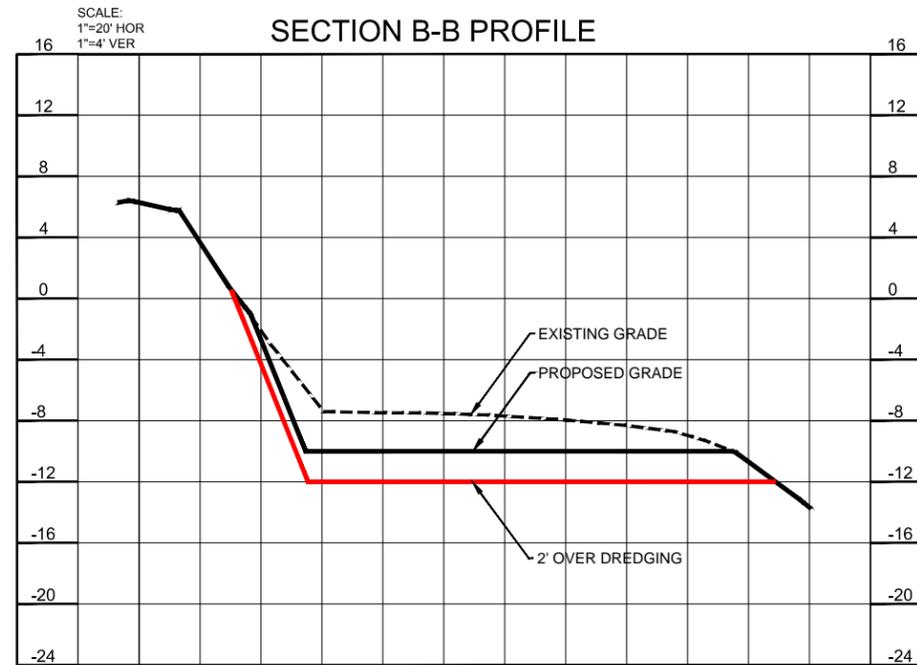
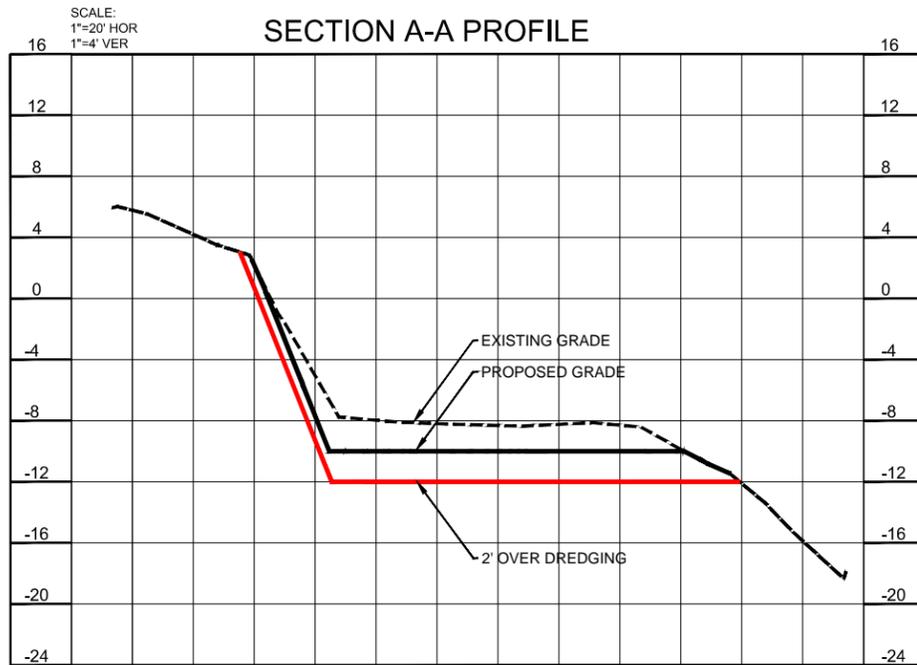
DATE

8/20/2012

OLYMPIA YACHT CLUB



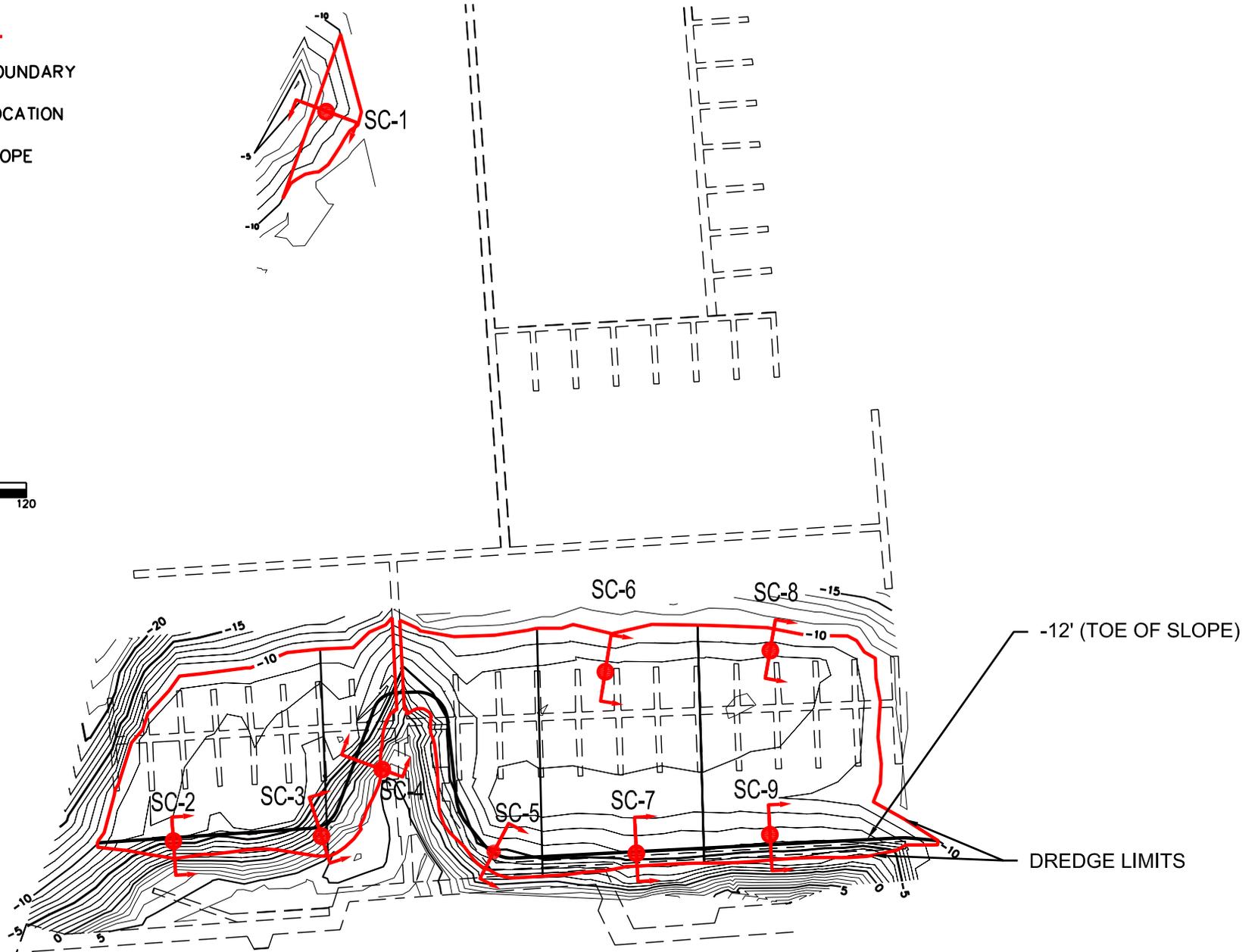
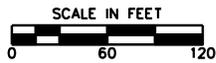
OLYMPIA YACHT CLUB



5016 Lacey Boulevard SE, Lacey, Washington 98503
(360) 491-3399 (800) 454-7545 Fax (360) 491-3857

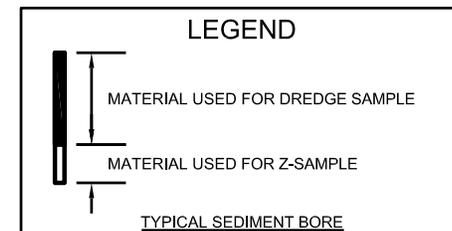
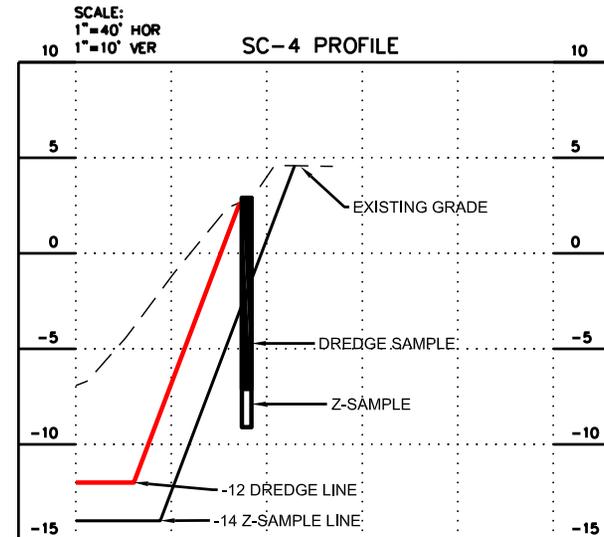
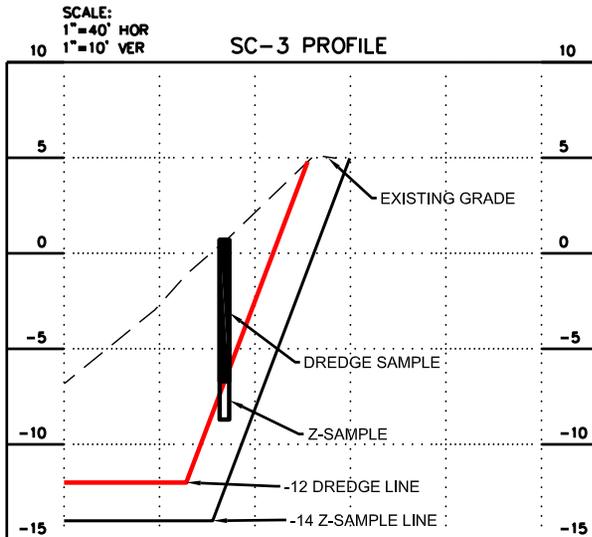
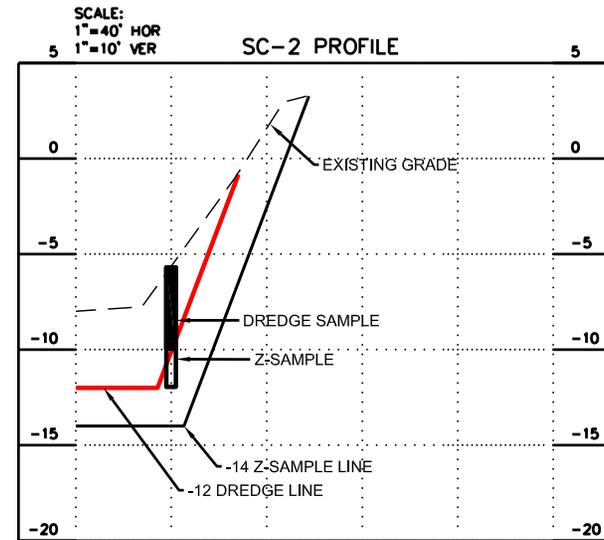
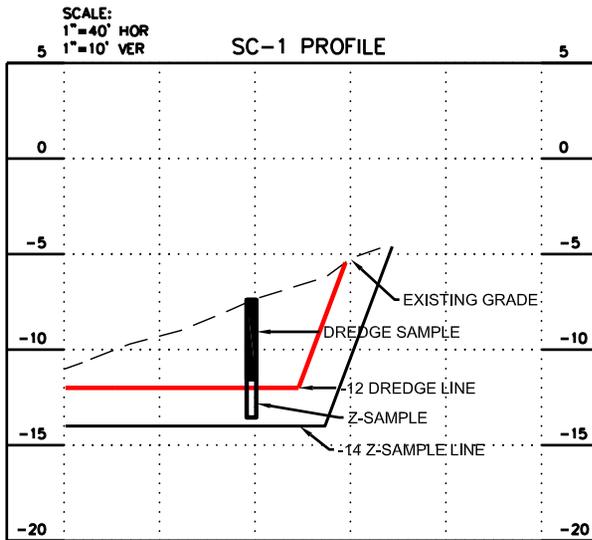
LEGEND:

- DREDGE BOUNDARY
- SAMPLE LOCATION
- TOE OF SLOPE



5016 Lacey Boulevard SE, Lacey, Washington 98503
(360) 491-3399 (800) 454-7545 Fax (360) 491-3857

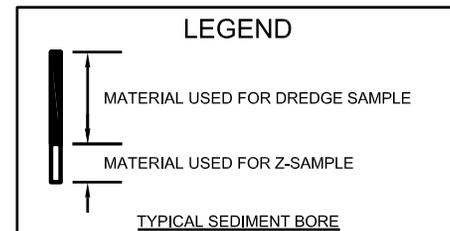
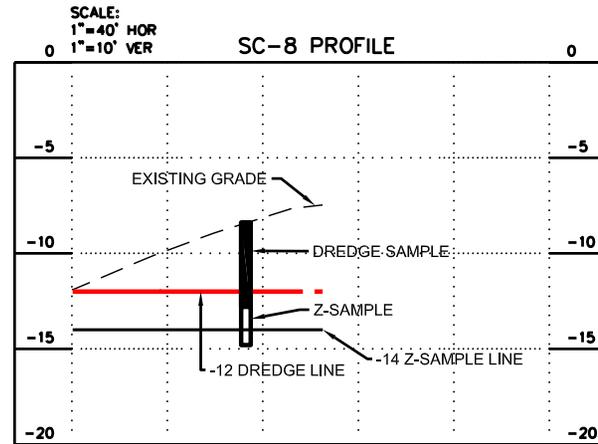
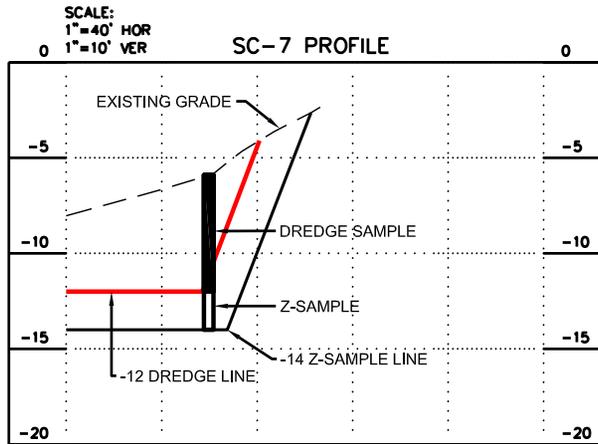
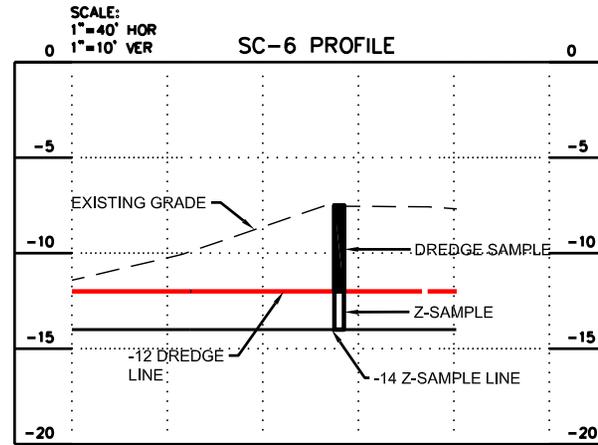
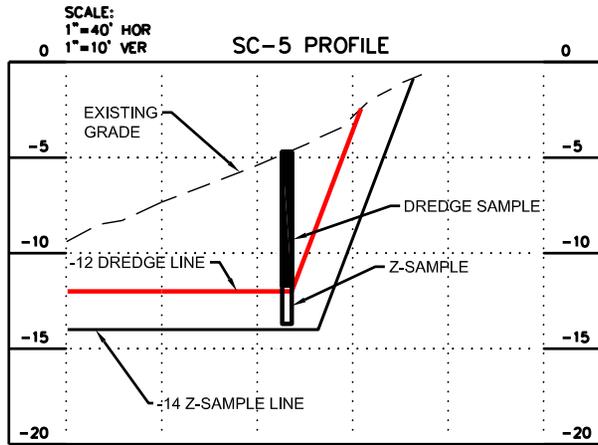
EXHIBIT 6A
PROFILE SITE PLAN
FOR SEDIMENT SAMPLES

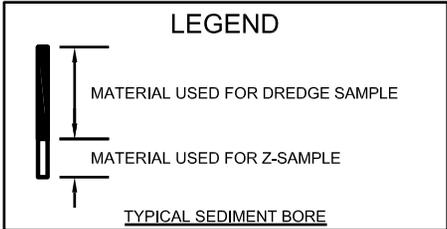
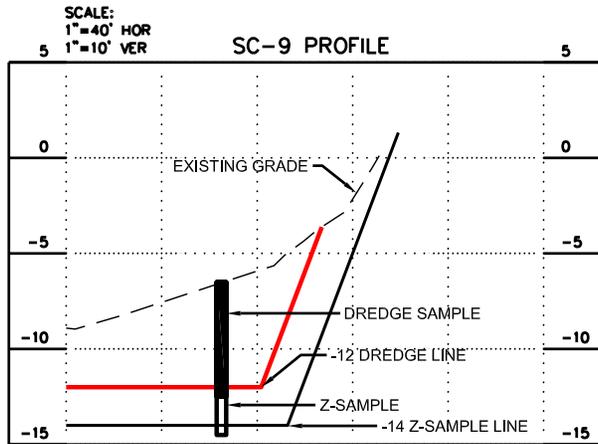


**SKILLINGS
CONNOLLY**

5016 Lacey Boulevard SE, Lacey, Washington 98503
(360) 491-3399 (800) 454-7545 Fax (360) 491-3857

EXHIBIT 6B
SEDIMENT SAMPLE
PROFILES



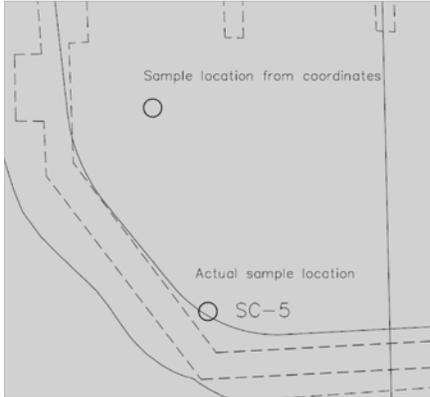


5016 Lacey Boulevard SE, Lacey, Washington 98503
(360) 491-3399 (800) 454-7545 Fax (360) 491-3857

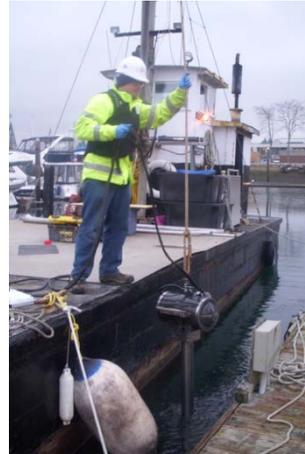
EXHIBIT 6D
SEDIMENT SAMPLE
PROFILES

Exhibit 7

Snapshot of SC-5 Location



Boring for sample SC-7

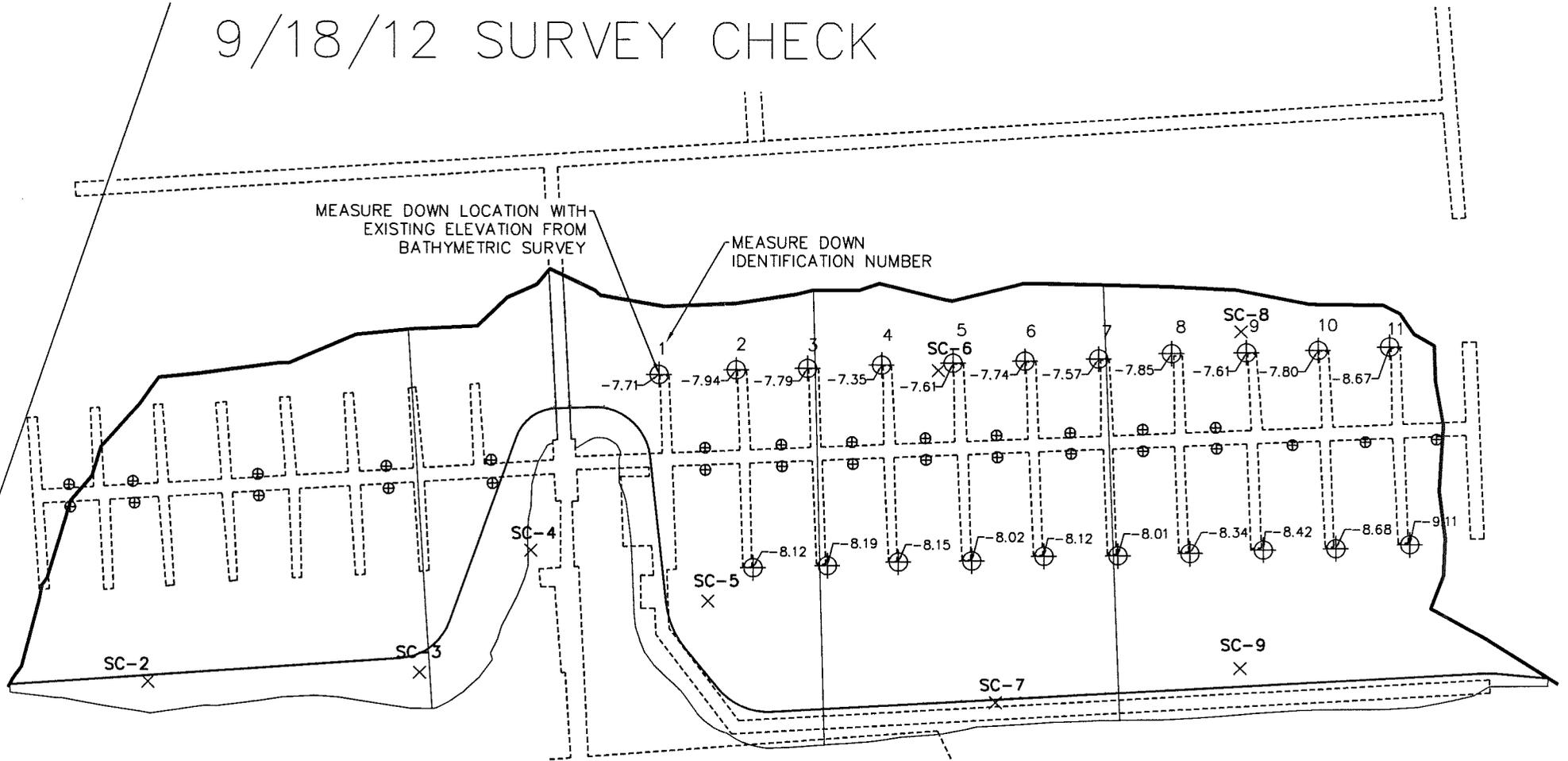


Boring for sample SC-5



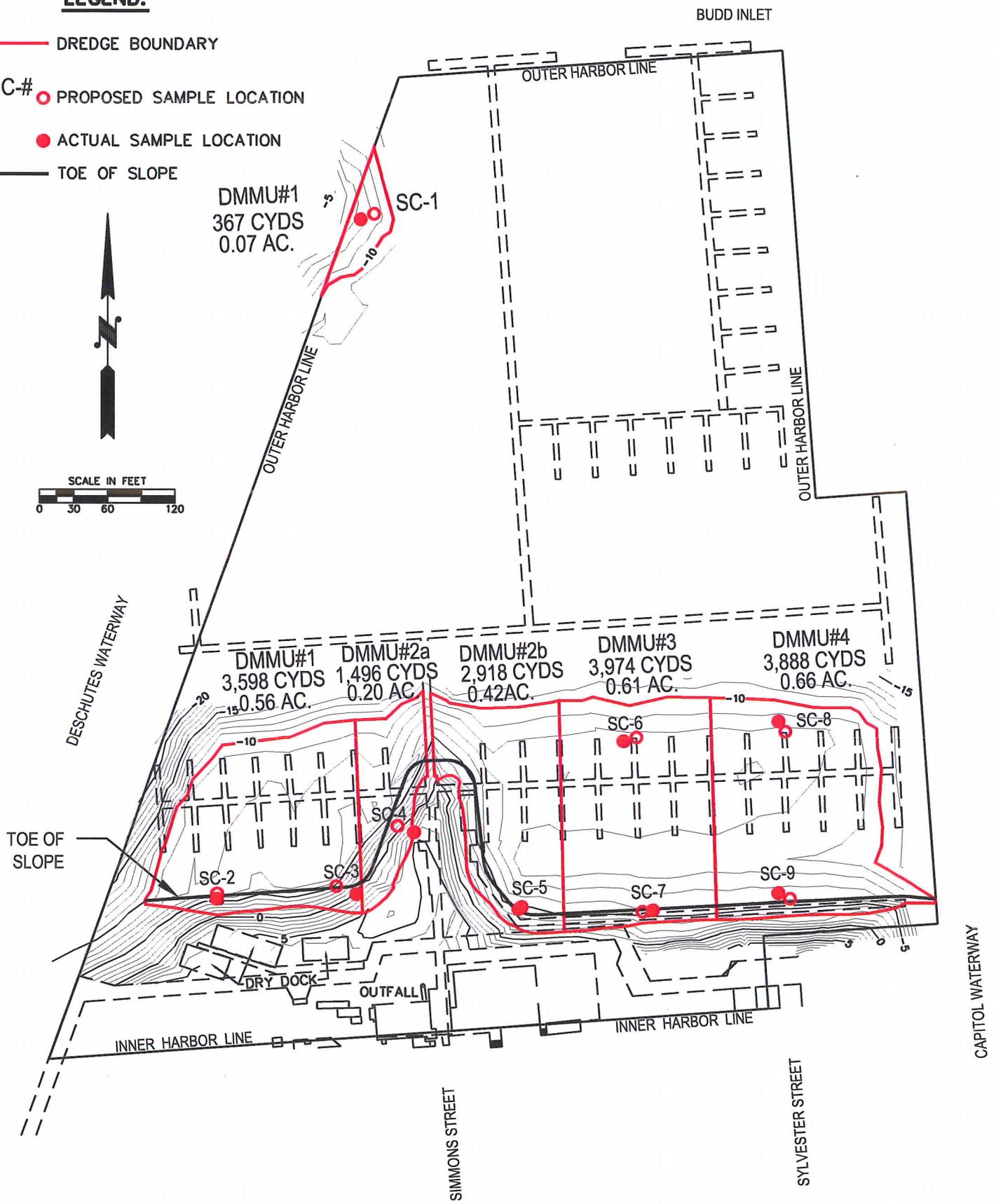
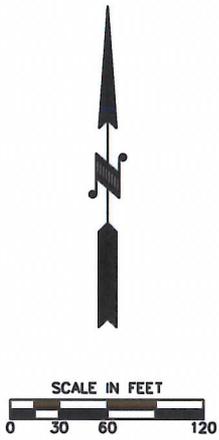
Exhibit 8

9/18/12 SURVEY CHECK



LEGEND:

- DREDGE BOUNDARY
- SC-# ● PROPOSED SAMPLE LOCATION
- ACTUAL SAMPLE LOCATION
- TOE OF SLOPE



DATE OF BATHYMETRIC SURVEY: 5/18/11



EXHIBIT 9
PROPOSED DMMU BOUNDARIES
OLYMPIA YACHT CLUB

JOB NO.	10070
DATE	8/20/2012

Table 2. DMMU Volumes and Number of Samples

Dredged Material Management Unit	Dredging Area (acres)	Dredging Volume* Including Overdredge Depth (cy)	Number of Field Samples	Number of Composites for Analysis
DMMU #1	0.63	3,965	3	1
DMMU #2	0.62	4,414	2	1
DMMU #3	0.61	3,974	2	1
DMMU #4	0.66	3,888	2	1
Total	2.52	16,241	9	4

*Volumes represent the current dredge design. They have been updated since the original SAP was submitted.

Table 3. Sampling Locations, Mudline Elevations and Sampling Depths

Sample ID	Latitude	Longitude	Mudline Elevation (ft, MLLW)	Sampling Depth (ft, MLLW)
SC-1	47.04730	122.90713	-7.4	-13.55
SC-2	47.04563	122.90756	-5.7	-11.95
SC-3	47.04565	122.90707	0.7	-8.7
SC-4	47.04581	122.90687	2.9	-9.1
SC-5	*47.04563	*122.90649	-4.7	-13.7
SC-6	47.04604	122.90614	-7.5	-14
SC-7	47.04563	122.90602	-5.9	-14
SC-8	47.04610	122.90559	-8.4	-14.8
SC-9	47.04568	122.90558	-6.5	-14.5

*Coordinates were revised to more closely match sample location. See discussion in Section 1.3.2 of Skillings-Connolly, 2012.

Appendix 1

Analytical Results

(from Skillings Connolly, 2012)

COC Summary Report
Sample ID: DU-1
Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT),
Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS		
DMMP Guideline Chemistry Value								SL?	BT?	ML?
Metals										
Antimony	0.0319	J		mg/kg	150	***	200			
Arsenic	3.39			mg/kg	57	507.1	700			
Cadmium	0.879			mg/kg	5.1	11.3	14			
Chromium	24.3			mg/kg	260	260	***			
Copper	19.9			mg/kg	390	1,027	1,300			
Lead	4.67			mg/kg	450	975	1,200			
Mercury	0.0783	J		mg/kg	0.41	1.5	2.3			
Selenium	ND		0.0127	mg/kg	***	3	***			
Silver	0.11			mg/kg	6.1	6.1	8.4			
Zinc	26.4	B		mg/kg	410	2,783	3,800			
Organometallic Compounds										
Tributyltin ion (interstitial water)	<0.005			µg/L	0.15	0.15	***			
Tributyltin ion (bulk)	XX			µg/Kg	73	73	***			
Organics										
PAHs										
Total LPAH	ND			µg/Kg	5,200	***	29,000			
Naphthalene	ND		7.97	µg/Kg	2,100	***	2,400			
Acenaphthylene	ND		10.4	µg/Kg	560	***	1,300			
Acenaphthene	ND		9.67	µg/Kg	500	***	2,000			
Fluorene	ND		7.13	µg/Kg	540	***	3,600			
Phenanthrene	ND		12.4	µg/Kg	1,500	***	21,000			
Anthracene	ND		17.3	µg/Kg	960	***	13,000			
2-Methylnaphthalene	ND		6.74	µg/Kg	670	***	1,900			
Total HPAH	91.4			µg/Kg	12,000	***	69,000			
Fluoranthene	34	J		µg/Kg	1,700	4,600	30,000			
Pyrene	36.6	J		µg/Kg	2,600	11,980	16,000			
Benz(a)anthracene	ND		42.3	µg/Kg	1,300	***	5,100			
Chrysene	20.8	J		µg/Kg	1,400	***	21,000			
Benzofluoranthenes (b, j, k)	ND		103	µg/Kg	3,200	***	9,900			
Benzo(a)pyrene	ND		18.5	µg/Kg	1,600	***	3,600			
Indeno(1,2,3-c,d)pyrene	ND		79	µg/Kg	600	***	4,400			
Dibenz(a,h)anthracene	ND		20.2	µg/Kg	230	***	1,900			
Benzo(g,h,i)perylene	ND		33	µg/Kg	670	***	3,200			
CHLORINATED HYDROCARBON										
1,4-Dichlorobenzene	ND		16.4	µg/Kg	110	***	120			
1,2-Dichlorobenzene	ND		24.1	µg/Kg	35	***	110			
1,2,4-Trichlorobenzene	ND		24	µg/Kg	31	***	64			
Hexachlorobenzene (HCB)	ND		33	µg/Kg	22	168	230			
PHTHALATES										
Dimethyl phthalate	ND		12	µg/Kg	71	***	1,400			
Diethyl phthalate	ND		6.09	µg/Kg	200	***	1,200			
Di-n-butyl phthalate	21.7	J		µg/Kg	1,400	***	5,100			
Butyl benzyl phthalate	28	J		µg/Kg	63	***	970			
Bis(2-ethylhexyl) phthalate	ND		17.2	µg/Kg	1,300	***	8,300			
Di-n-octyl phthalate	ND		9.44	µg/Kg	6,200	***	6,200			
PHENOLS										
Phenol	ND		33.3	µg/Kg	420	***	1,200			
2-Methylphenol	ND		70.6	µg/Kg	63	***	77			
4-Methylphenol	ND		5.53	µg/Kg	670	***	3,600			
2,4-Dimethylphenol	ND		29.8	µg/Kg	29	***	210			
Pentachlorophenol	ND		91.3	µg/Kg	400	504	690			
MISCELLANEOUS EXTRACTABLES										
Benzyl alcohol	45.4	J		µg/Kg	57	***	870			
Benzoic acid	ND		0.021	µg/Kg	650	***	760			
Dibenzofuran	ND		8.96	µg/Kg	540	***	1,700			
Hexachlorobutadiene	ND		14.9	µg/Kg	11	***	270			
N-Nitrosodiphenylamine	ND		7.43	µg/Kg	28	***	130			

COC Summary Report
 Sample ID: DU-1
 Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT), Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS		
DMMP Guideline Chemistry Value								SL?	BT?	ML?
PESTICIDES & PCBs										
4,4'-DDD	ND		0.357	µg/Kg	16	***	***			
4,4'-DDE	ND		0.207	µg/Kg	9	***	***			
4,4'-DDT	ND		0.321	µg/Kg	12	***	***			
sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT	ND		0.357	µg/Kg	***		50	69		
Aldrin	ND		0.0838	µg/Kg	9.5	***	***			
Total Chlordane (sum of cis-chlordane, trans-chlordane,)	ND		0.564	µg/Kg	2.8		37	***		
Dieldrin	ND		0.12	µg/Kg	1.9	***		1,700		
Heptachlor	ND		0.629	µg/Kg	1.5	***		270		
Total PCBs	ND		87.1	µg/Kg	130	38(mg/kg carbon)		3,100		
Dioxin	XX			pptr TEQ	4 (a)	***		10 (b)		
Ammonia	XX			mg/kg						
Sulfide	XX			mg/kg						
Total Solids		63.6		%	***	***	***			
Total Volatile Solids		3.51		%						
Total Organic Carbon		2.86		%-dry						
Grain Size Distributions										
>2,000 microns (gravel)		23.31		% Retained						
(c) 75 to 2,000 microns (sand)		73		% Retained						
(d) 34 to 75 microns (silt)		4.83		% Retained						
(e) <34 microns		0.11		% Retained						
<3.9 microns (clay)	XX			% Retained						

*Results are dry-weight corrected

- (a) maximum volume-weighted average concentration for entire dredging project
- (b) maximum DMMU concentration
- (c) Lab did not use a 62.5 micron sieve. The closest sieve size is 75 microns which is used to approximate grain size classification.
- (d) Lab did not use a 3.9 micron sieve. The smallest sieve size is 34 microns which is used to approximate the grain size classification.
- (e) 34 microns is the smallest sieve size used.

Qualifiers:

- B** Analyte detected in the associated Method Blank
- E** Value above quantitation range
- J** Analyte detected below quantitation limits
- D** Dilution was required
- H** Holding times for preparation or analysis exceeded
- S** Spike recovery outside accepted recovery limits

COC Summary Report
Sample ID: DU-2
Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT),
Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS			
								SL?	BT?	ML?	
DMMP Guideline Chemistry Value											
Metals											
Antimony	0.0291	J		mg/kg	150	***	200				
Arsenic	3.05			mg/kg	57	507.1	700				
Cadmium	0.75			mg/kg	5.1	11.3	14				
Chromium	22.5			mg/kg	260	260	***				
Copper	23.8			mg/kg	390	1,027	1,300				
Lead	4.3			mg/kg	450	975	1,200				
Mercury	0.0539	J		mg/kg	0.41	1.5	2.3				
Selenium	ND		0.0124	mg/kg	***	3	***				
Silver	0.0788			mg/kg	6.1	6.1	8.4				
Zinc	32	B		mg/kg	410	2,783	3,800				
Organometallic Compounds											
Tributyltin ion (interstitial water)	0.009			µg/L	0.15	0.15	***				
Tributyltin ion (bulk)	XX			µg/Kg	73	73	***				
Organics											
PAHs											
Total LPAH	50.9			µg/Kg	5,200	***	29,000				
Naphthalene	ND		7.87	µg/Kg	2,100	***	2,400				
Acenaphthylene	ND		10.3	µg/Kg	560	***	1,300				
Acenaphthene	ND		9.54	µg/Kg	500	***	2,000				
Fluorene	ND		7.04	µg/Kg	540	***	3,600				
Phenanthrene	50.9	J		µg/Kg	1,500	***	21,000				
Anthracene	ND		17.1	µg/Kg	960	***	13,000				
2-Methylnaphthalene	ND		6.65	µg/Kg	670	***	1,900				
Total HPAH	1512.3			µg/Kg	12,000	***	69,000				
Fluoranthene	560			µg/Kg	1,700	4,600	30,000				
Pyrene	422			µg/Kg	2,600	11,980	16,000				
Benz(a)anthracene	134			µg/Kg	1,300	***	5,100				
Chrysene	127	J		µg/Kg	1,400	***	21,000				
Benzo(a)fluoranthenes (b, j, k)	179.8	J		µg/Kg	3,200	***	9,900				
Benzo(a)pyrene	56.2	J		µg/Kg	1,600	***	3,600				
Indeno(1,2,3-c,d)pyrene	ND		78	µg/Kg	600	***	4,400				
Dibenz(a,h)anthracene	ND		20	µg/Kg	230	***	1,900				
Benzo(g,h,i)perylene	33.3	J		µg/Kg	670	***	3,200				
CHLORINATED HYDROCARBON											
1,4-Dichlorobenzene	ND		16.2	µg/Kg	110	***	120				
1,2-Dichlorobenzene	ND		23.7	µg/Kg	35	***	110				
1,2,4-Trichlorobenzene	ND		23.6	µg/Kg	31	***	64				
Hexachlorobenzene (HCB)	ND		32.6	µg/Kg	22	168	230				
PHTHALATES											
Dimethyl phthalate	ND		11.9	µg/Kg	71	***	1,400				
Diethyl phthalate	ND		6.02	µg/Kg	200	***	1,200				
Di-n-butyl phthalate	25.9	J		µg/Kg	1,400	***	5,100				
Butyl benzyl phthalate	27.1	J		µg/Kg	63	***	970				
Bis(2-ethylhexyl) phthalate	30.1	J		µg/Kg	1,300	***	8,300				
Di-n-octyl phthalate	ND		9.32	µg/Kg	6,200	***	6,200				
PHENOLS											
Phenol	ND		32.9	µg/Kg	420	***	1,200				
2-Methylphenol	ND		69.7	µg/Kg	63	***	77				
4-Methylphenol	ND		5.46	µg/Kg	670	***	3,600				
2,4-Dimethylphenol	ND		29.4	µg/Kg	29	***	210				
Pentachlorophenol	ND		90.2	µg/Kg	400	504	690				
MISCELLANEOUS EXTRACTABLES											
Benzyl alcohol	ND		17.5	µg/Kg	57	***	870				
Benzoic acid	ND		0.0207	µg/Kg	650	***	760				
Dibenzofuran	ND		8.84	µg/Kg	540	***	1,700				
Hexachlorobutadiene	ND		14.7	µg/Kg	11	***	270				
N-Nitrosodiphenylamine	ND		7.33	µg/Kg	28	***	130				

COC Summary Report
 Sample ID: DU-2
 Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT), Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS		
DMMP Guideline Chemistry Value								SL?	BT?	ML?
PESTICIDES & PCBs										
4,4'-DDD	ND		0.363	µg/Kg	16	***	***			
4,4'-DDE	ND		0.211	µg/Kg	9	***	***			
4,4'-DDT	1.0	J	0.327	µg/Kg	12	***	***			
sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT	1.0	J		µg/Kg	***		50	69		
Aldrin	ND		0.0854	µg/Kg	9.5	***	***			
Total Chlordane (sum of cis-chlordane, trans-chlordane,)	ND		0.575	µg/Kg	2.8		37	***		
Dieldrin	ND		0.122	µg/Kg	1.9	***	1,700			
Heptachlor	ND		0.641	µg/Kg	1.5	***	270			
Total PCBs	ND		88.7	µg/Kg	130	38(mg/kg carbon)	3,100			
Dioxin	XX			pptr TEQ	4 (a)	***	10 (b)			
Ammonia	XX									
Sulfide	XX									
Total Solids	61.8			%	***	***	***			
Total Volatile Solids	3.51			%						
Total Organic Carbon	3.21			%-dry						
Grain Size Distributions										
>2,000 microns (gravel)	29.69			% Retained						
(c) 75 to 2,000 microns (sand)	67.52			% Retained						
(d) 34 to 75 microns (silt)	3.33			% Retained						
(e) <34 microns	0.2			% Retained						
<3.9 microns (clay)	XX			% Retained						

*Results are dry-weight corrected

- (a) maximum volume-weighted average concentration for entire dredging project
- (b) maximum DMMU concentration
- (c) Lab did not use a 62.5 micron sieve. The closest sieve size is 75 microns which is used to approximate grain size classification.
- (d) Lab did not use a 3.9 micron sieve. The smallest sieve size is 34 microns which is used to approximate the grain size classification.
- (e) 34 microns is the smallest sieve size used.

Qualifiers:

- B** Analyte detected in the associated Method Blank
- E** Value above quantitation range
- J** Analyte detected below quantitation limits
- D** Dilution was required
- H** Holding times for preparation or analysis exceeded
- S** Spike recovery outside accepted recovery limits

COC Summary Report
Sample ID: DU-3
Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT),
Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS			
								SL?	BT?	ML?	
DMMP Guideline Chemistry Value											
Metals											
Antimony	0.0553	J		mg/kg	150	***	200				
Arsenic	3.55			mg/kg	57	507.1	700				
Cadmium	0.446			mg/kg	5.1	11.3	14				
Chromium	23.5			mg/kg	260	260	***				
Copper	27.4			mg/kg	390	1,027	1,300				
Lead	6.71			mg/kg	450	975	1,200				
Mercury	0.505			mg/kg	0.41	1.5	2.3	YES	NO	NO	
Selenium	ND		0.0118	mg/kg	***	3	***				
Silver	0.158			mg/kg	6.1	6.1	8.4				
Zinc	40.4	B		mg/kg	410	2,783	3,800				
Organometallic Compounds											
Tributyltin ion (interstitial water)	0.013			µg/L	0.15	0.15	***				
Tributyltin ion (bulk)	XX			µg/Kg	73	73	***				
Organics											
PAHs											
Total LPAH	101.6			µg/Kg	5,200	***	29,000				
Naphthalene	14.7	J		µg/Kg	2,100	***	2,400				
Acenaphthylene	ND		9.45	µg/Kg	560	***	1,300				
Acenaphthene	19.9	J		µg/Kg	500	***	2,000				
Fluorene	16.3	J		µg/Kg	540	***	3,600				
Phenanthrene	50.7	J		µg/Kg	1,500	***	21,000				
Anthracene	ND		15.7	µg/Kg	960	***	13,000				
2-Methylnaphthalene	ND		6.1	µg/Kg	670	***	1,900				
Total HPAH	339			µg/Kg	12,000	***	69,000				
Fluoranthene	90.5	J		µg/Kg	1,700	4,600	30,000				
Pyrene	141	J		µg/Kg	2,600	11,980	16,000				
Benz(a)anthracene	ND		38.2	µg/Kg	1,300	***	5,100				
Chrysene	44.3	J		µg/Kg	1,400	***	21,000				
Benzo(a)fluoranthene (b, j, k)	33.1	J		µg/Kg	3,200	***	9,900				
Benzo(a)pyrene	30.1	J		µg/Kg	1,600	***	3,600				
Indeno(1,2,3-c,d)pyrene	ND		71.4	µg/Kg	600	***	4,400				
Dibenz(a,h)anthracene	ND		18.3	µg/Kg	230	***	1,900				
Benzo(g,h,i)perylene	ND		29.9	µg/Kg	670	***	3,200				
CHLORINATED HYDROCARBON											
1,4-Dichlorobenzene	ND		14.8	µg/Kg	110	***	120				
1,2-Dichlorobenzene	ND		21.8	µg/Kg	35	***	110				
1,2,4-Trichlorobenzene	ND		21.7	µg/Kg	31	***	64				
Hexachlorobenzene (HCB)	ND		29.9	µg/Kg	22	168	230				
PHTHALATES											
Dimethyl phthalate	ND		10.9	µg/Kg	71	***	1,400				
Diethyl phthalate	ND		5.51	µg/Kg	200	***	1,200				
Di-n-butyl phthalate	94.9	J		µg/Kg	1,400	***	5,100				
Butyl benzyl phthalate	ND		9.62	µg/Kg	63	***	970				
Bis(2-ethylhexyl) phthalate	34.9	J		µg/Kg	1,300	***	8,300				
Di-n-octyl phthalate	ND		8.54	µg/Kg	6,200	***	6,200				
PHENOLS											
Phenol	ND		30.1	µg/Kg	420	***	1,200				
2-Methylphenol	ND		63.8	µg/Kg	63	***	77				
4-Methylphenol	ND		5	µg/Kg	670	***	3,600				
2,4-Dimethylphenol	ND		27	µg/Kg	29	***	210				
Pentachlorophenol	ND		82.6	µg/Kg	400	504	690				
MISCELLANEOUS EXTRACTABLES											
Benzyl alcohol	ND		16.0	µg/Kg	57	***	870				
Benzoic acid	ND		0.019	µg/Kg	650	***	760				
Dibenzofuran	ND		8.1	µg/Kg	540	***	1,700				
Hexachlorobutadiene	ND		13.5	µg/Kg	11	***	270				
N-Nitrosodiphenylamine	ND		6.72	µg/Kg	28	***	130				

COC Summary Report
 Sample ID: DU-3
 Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT), Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS			
								SL?	BT?	ML?	
DMMP Guideline Chemistry Value											
PESTICIDES & PCBs											
4,4'-DDD	ND		0.371	µg/Kg	16	***	***				
4,4'-DDE	0.34	J		µg/Kg	9	***	***				
4,4'-DDT	1.43	J		µg/Kg	12	***	***				
sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT	1.77	J		µg/Kg	***		50	69			
Aldrin	ND		0.0872	µg/Kg	9.5	***	***				
Total Chlordane (sum of cis-chlordane, trans-chlordane,)	ND		0.587	µg/Kg	2.8		37	***			
Dieldrin	ND		0.125	µg/Kg	1.9	***		1,700			
Heptachlor	ND		0.655	µg/Kg	1.5	***		270			
Total PCBs	ND		90.6	µg/Kg	130	38(mg/kg carbon)		3,100			
Dioxin	XX			pptr TEQ	4 (a)	***		10 (b)			
Ammonia	XX										
Sulfide	XX										
Total Solids	69.1			%	***	***	***				
Total Volatile Solids	2.47			%							
Total Organic Carbon	1.57			%-dry							
Grain Size Distributions											
>2,000 microns (gravel)	5.18			% Retained							
(c) 75 to 2,000 microns (sand)	90.17			% Retained							
(d) 34 to 75 microns (silt)	3.88			% Retained							
(e) <34 microns	0.11			% Retained							
<3.9 microns (clay)	XX			% Retained							

*Results are dry-weight corrected

(a) maximum volume-weighted average concentration for entire dredging project

(b) maximum DMMU concentration

(c) Lab did not use a 62.5 micron sieve. The closest sieve size is 75 microns which is used to approximate grain size classification.

(d) Lab did not use a 3.9 micron sieve. The smallest seive size is 34 microns which is used to approximate the grain size classification.

(e) 34 microns is the smallest sieve size used.

Qualifiers:

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- D Dilution was required
- H Holding times for preparation or analysis exceeded
- S Spike recovery outside accepted recovery limits

COC Summary Report
Sample ID: DU-4
Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT),
Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS		
DMMP Guideline Chemistry Value								SL?	BT?	ML?
Metals										
Antimony	0.0428	J		mg/kg	150	***	200			
Arsenic	3.3			mg/kg	57	507.1	700			
Cadmium	0.523			mg/kg	5.1	11.3	14			
Chromium	22.4			mg/kg	260	260	***			
Copper	21.9			mg/kg	390	1,027	1,300			
Lead	8.42			mg/kg	450	975	1,200			
Mercury	0.0812	J		mg/kg	0.41	1.5	2.3			
Selenium	ND		0.0117	mg/kg	***	3	***			
Silver	0.129			mg/kg	6.1	6.1	8.4			
Zinc	39.8	B		mg/kg	410	2,783	3,800			
Organometallic Compounds										
Tributyltin ion (interstitial water)	0.018			µg/L	0.15	0.15	***			
Tributyltin ion (bulk)	XX			µg/Kg	73	73	***			
Organics										
PAHs										
Total LPAH	119.8			µg/Kg	5,200	***	29,000			
Naphthalene	ND		7.37	µg/Kg	2,100	***	2,400			
Acenaphthylene	ND		9.66	µg/Kg	560	***	1,300			
Acenaphthene	ND		8.94	µg/Kg	500	***	2,000			
Fluorene	ND		6.6	µg/Kg	540	***	3,600			
Phenanthrene	96.9	J		µg/Kg	1,500	***	21,000			
Anthracene	22.9	J		µg/Kg	960	***	13,000			
2-Methylnaphthalene	ND		6.24	µg/Kg	670	***	1,900			
Total HPAH	593.5			µg/Kg	12,000	***	69,000			
Fluoranthene	155			µg/Kg	1,700	4,600	30,000			
Pyrene	248			µg/Kg	2,600	11,980	16,000			
Benz(a)anthracene	59	J		µg/Kg	1,300	***	5,100			
Chrysene	55.1	J		µg/Kg	1,400	***	21,000			
Benzo(a)fluoranthene (b, j, k)	31.2	J		µg/Kg	3,200	***	9,900			
Benzo(a)pyrene	45.2	J		µg/Kg	1,600	***	3,600			
Indeno(1,2,3-c,d)pyrene	ND		73.1	µg/Kg	600	***	4,400			
Dibenz(a,h)anthracene	ND		18.7	µg/Kg	230	***	1,900			
Benzo(g,h,i)perylene	ND		30.6	µg/Kg	670	***	3,200			
CHLORINATED HYDROCARBON										
1,4-Dichlorobenzene	ND		15.2	µg/Kg	110	***	120			
1,2-Dichlorobenzene	ND		22.3	µg/Kg	35	***	110			
1,2,4-Trichlorobenzene	ND		22.2	µg/Kg	31	***	64			
Hexachlorobenzene (HCB)	ND		30.6	µg/Kg	22	168	230			
PHTHALATES										
Dimethyl phthalate	ND		11.1	µg/Kg	71	***	1,400			
Diethyl phthalate	ND		5.64	µg/Kg	200	***	1,200			
Di-n-butyl phthalate	19.8	J		µg/Kg	1,400	***	5,100			
Butyl benzyl phthalate	20.1	J		µg/Kg	63	***	970			
Bis(2-ethylhexyl) phthalate	30.4	J		µg/Kg	1,300	***	8,300			
Di-n-octyl phthalate	ND		8.73	µg/Kg	6,200	***	6,200			
PHENOLS										
Phenol	ND		30.8	µg/Kg	420	***	1,200			
2-Methylphenol	ND		65.3	µg/Kg	63	***	77			
4-Methylphenol	ND		5.12	µg/Kg	670	***	3,600			
2,4-Dimethylphenol	ND		27.6	µg/Kg	29	***	210			
Pentachlorophenol	ND		84.5	µg/Kg	400	504	690			
MISCELLANEOUS EXTRACTABLES										
Benzyl alcohol	ND		16.4	µg/Kg	57	***	870			
Benzoic acid	ND		0.0194	µg/Kg	650	***	760			
Dibenzofuran	ND		8.29	µg/Kg	540	***	1,700			
Hexachlorobutadiene	ND		13.8	µg/Kg	11	***	270			
N-Nitrosodiphenylamine	ND		6.87	µg/Kg	28	***	130			

COC Summary Report
 Sample ID: DU-4
 Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT), Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS		
								SL?	BT?	ML?
DMMP Guideline Chemistry Value										
PESTICIDES & PCBs										
4,4'-DDD	ND		0.324	µg/Kg	16	***	***			
4,4'-DDE	ND		0.188	µg/Kg	9	***	***			
4,4'-DDT	1.1	J		µg/Kg	12	***	***			
sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT	1.1	J		µg/Kg	***		50	69		
Aldrin	0.36	J		µg/Kg	9.5	***	***			
Total Chlordane (sum of cis-chlordane, trans-chlordane,)	ND		0.512	µg/Kg	2.8		37	***		
Dieldrin	ND		0.109	µg/Kg	1.9	***		1,700		
Heptachlor	0.8	J		µg/Kg	1.5	***		270		
Total PCBs	ND		79.1	µg/Kg	130	38(mg/kg carbon)		3,100		
Dioxin	XX			pptr TEQ	4 (a)	***		10 (b)		
Ammonia	XX									
Sulfide	XX									
Total Solids	68.2			%	***	***	***			
Total Volatile Solids	2.44			%						
Total Organic Carbon	1.26			%-dry						
Grain Size Distributions										
>2,000 microns (gravel)	7.24			% Retained						
(c) 75 to 2,000 microns (sand)	87.46			% Retained						
(d) 34 to 75 microns (silt)	4.43			% Retained						
(e) <34 microns	0.27			% Retained						
<3.9 microns (clay)	XX			% Retained						

*Results are dry-weight corrected

- (a) maximum volume-weighted average concentration for entire dredging project
- (b) maximum DMMU concentration
- (c) Lab did not use a 62.5 micron sieve. The closest sieve size is 75 microns which is used to approximate grain size classification.
- (d) Lab did not use a 3.9 micron sieve. The smallest sieve size is 34 microns which is used to approximate the grain size classification.
- (e) 34 microns is the smallest sieve size used.

Qualifiers:

- B** Analyte detected in the associated Method Blank
- E** Value above quantitation range
- J** Analyte detected below quantitation limits
- D** Dilution was required
- H** Holding times for preparation or analysis exceeded
- S** Spike recovery outside accepted recovery limits

COC Summary Report
Sample ID: SC-1
Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT),
Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS		
DMMP Guideline Chemistry Value								SL?	BT?	ML?
Metals										
Antimony	XX			mg/kg	150	***	200			
Arsenic	XX			mg/kg	57	507.1	700			
Cadmium	XX			mg/kg	5.1	11.3	14			
Chromium	XX			mg/kg	260	260	***			
Copper	XX			mg/kg	390	1,027	1,300			
Lead	XX			mg/kg	450	975	1,200			
Mercury	XX			mg/kg	0.41	1.5	2.3			
Selenium	XX			mg/kg	***	3	***			
Silver	XX			mg/kg	6.1	6.1	8.4			
Zinc	XX			mg/kg	410	2,783	3,800			
Organometallic Compounds										
Tributyltin ion (interstitial water)	XX			µg/L	0.15	0.15	***			
Tributyltin ion (bulk)	XX			µg/Kg	73	73	***			
Organics										
PAHs										
Total LPAH	XX			µg/Kg	5,200	***	29,000			
Naphthalene	XX			µg/Kg	2,100	***	2,400			
Acenaphthylene	XX			µg/Kg	560	***	1,300			
Acenaphthene	XX			µg/Kg	500	***	2,000			
Fluorene	XX			µg/Kg	540	***	3,600			
Phenanthrene	XX			µg/Kg	1,500	***	21,000			
Anthracene	XX			µg/Kg	960	***	13,000			
2-Methylnaphthalene	XX			µg/Kg	670	***	1,900			
Total HPAH	XX			µg/Kg	12,000	***	69,000			
Fluoranthene	XX			µg/Kg	1,700	4,600	30,000			
Pyrene	XX			µg/Kg	2,600	11,980	16,000			
Benz(a)anthracene	XX			µg/Kg	1,300	***	5,100			
Chrysene	XX			µg/Kg	1,400	***	21,000			
Benzo(a)fluoranthene (b, j, k)	XX			µg/Kg	3,200	***	9,900			
Benzo(a)pyrene	XX			µg/Kg	1,600	***	3,600			
Indeno(1,2,3-c,d)pyrene	XX			µg/Kg	600	***	4,400			
Dibenz(a,h)anthracene	XX			µg/Kg	230	***	1,900			
Benzo(g,h,i)perylene	XX			µg/Kg	670	***	3,200			
CHLORINATED HYDROCARBON										
1,4-Dichlorobenzene	XX			µg/Kg	110	***	120			
1,2-Dichlorobenzene	XX			µg/Kg	35	***	110			
1,2,4-Trichlorobenzene	XX			µg/Kg	31	***	64			
Hexachlorobenzene (HCB)	XX			µg/Kg	22	168	230			
PHTHALATES										
Dimethyl phthalate	XX			µg/Kg	71	***	1,400			
Diethyl phthalate	XX			µg/Kg	200	***	1,200			
Di-n-butyl phthalate	XX			µg/Kg	1,400	***	5,100			
Butyl benzyl phthalate	XX			µg/Kg	63	***	970			
Bis(2-ethylhexyl) phthalate	XX			µg/Kg	1,300	***	8,300			
Di-n-octyl phthalate	XX			µg/Kg	6,200	***	6,200			
PHENOLS										
Phenol	XX			µg/Kg	420	***	1,200			
2-Methylphenol	XX			µg/Kg	63	***	77			
4-Methylphenol	XX			µg/Kg	670	***	3,600			
2,4-Dimethylphenol	XX			µg/Kg	29	***	210			
Pentachlorophenol	XX			µg/Kg	400	504	690			
MISCELLANEOUS EXTRACTABLES										
Benzyl alcohol	XX			µg/Kg	57	***	870			
Benzoic acid	XX			µg/Kg	650	***	760			
Dibenzofuran	XX			µg/Kg	540	***	1,700			
Hexachlorobutadiene	XX			µg/Kg	11	***	270			
N-Nitrosodiphenylamine	XX			µg/Kg	28	***	130			

COC Summary Report
 Sample ID: SC-1
 Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT), Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS			
								SL?	BT?	ML?	
DMMP Guideline Chemistry Value											
PESTICIDES & PCBs											
4,4'-DDD	XX			µg/Kg	16	***	***				
4,4'-DDE	XX			µg/Kg	9	***	***				
4,4'-DDT	XX			µg/Kg	12	***	***				
sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT	XX			µg/Kg	***		50	69			
Aldrin	XX			µg/Kg	9.5	***	***				
Total Chlordane (sum of cis-chlordane, trans-chlordane,)	XX			µg/Kg	2.8		37	***			
Dieldrin	XX			µg/Kg	1.9	***		1,700			
Heptachlor	XX			µg/Kg	1.5	***		270			
Total PCBs	XX			µg/Kg	130	38(mg/kg carbon)		3,100			
Dioxin		9.62		pptr TEQ	4 (a)	***		10 (b)			
Ammonia		95.5	D	mg/kg							
Sulfide		1.69		mg/kg							
Total Solids		60		%	***	***	***				
Total Volatile Solids	XX			%							
Total Organic Carbon	XX			%-dry							
Grain Size Distributions											
>2,000 microns (gravel)	XX			% Retained							
(c) 75 to 2,000 microns (sand)	XX			% Retained							
(d) 34 to 75 microns (silt)	XX			% Retained							
(e) <34 microns	XX			% Retained							
<3.9 microns (clay)	XX			% Retained							

*Results are dry-weight corrected

(a) maximum volume-weighted average concentration for entire dredging project

(b) maximum DMMU concentration

(c) Lab did not use a 62.5 micron sieve. The closest sieve size is 75 microns which is used to approximate grain size classification.

(d) Lab did not use a 3.9 micron sieve. The smallest seive size is 34 microns which is used to approximate the grain size classification.

(e) 34 microns is the smallest sieve size used.

Qualifiers:

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

D Dilution was required

H Holding times for preparation or analysis exceeded

S Spike recovery outside accepted recovery limits

COC Summary Report
Sample ID: SC-2
Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT),
Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS			
								SL?	BT?	ML?	
DMMP Guideline Chemistry Value											
Metals											
Antimony	XX			mg/kg	150	***	200				
Arsenic	XX			mg/kg	57	507.1	700				
Cadmium	XX			mg/kg	5.1	11.3	14				
Chromium	XX			mg/kg	260	260	***				
Copper	XX			mg/kg	390	1,027	1,300				
Lead	XX			mg/kg	450	975	1,200				
Mercury	XX			mg/kg	0.41	1.5	2.3				
Selenium	XX			mg/kg	***	3	***				
Silver	XX			mg/kg	6.1	6.1	8.4				
Zinc	XX			mg/kg	410	2,783	3,800				
Organometallic Compounds											
Tributyltin ion (interstitial water)	XX			µg/L	0.15	0.15	***				
Tributyltin ion (bulk)	XX			µg/Kg	73	73	***				
Organics											
PAHs											
Total LPAH	XX			µg/Kg	5,200	***	29,000				
Naphthalene	XX			µg/Kg	2,100	***	2,400				
Acenaphthylene	XX			µg/Kg	560	***	1,300				
Acenaphthene	XX			µg/Kg	500	***	2,000				
Fluorene	XX			µg/Kg	540	***	3,600				
Phenanthrene	XX			µg/Kg	1,500	***	21,000				
Anthracene	XX			µg/Kg	960	***	13,000				
2-Methylnaphthalene	XX			µg/Kg	670	***	1,900				
Total HPAH	XX			µg/Kg	12,000	***	69,000				
Fluoranthene	XX			µg/Kg	1,700	4,600	30,000				
Pyrene	XX			µg/Kg	2,600	11,980	16,000				
Benz(a)anthracene	XX			µg/Kg	1,300	***	5,100				
Chrysene	XX			µg/Kg	1,400	***	21,000				
Benzo(a)fluoranthenes (b, j, k)	XX			µg/Kg	3,200	***	9,900				
Benzo(a)pyrene	XX			µg/Kg	1,600	***	3,600				
Indeno(1,2,3-c,d)pyrene	XX			µg/Kg	600	***	4,400				
Dibenz(a,h)anthracene	XX			µg/Kg	230	***	1,900				
Benzo(g,h,i)perylene	XX			µg/Kg	670	***	3,200				
CHLORINATED HYDROCARBON											
1,4-Dichlorobenzene	XX			µg/Kg	110	***	120				
1,2-Dichlorobenzene	XX			µg/Kg	35	***	110				
1,2,4-Trichlorobenzene	XX			µg/Kg	31	***	64				
Hexachlorobenzene (HCB)	XX			µg/Kg	22	168	230				
PHTHALATES											
Dimethyl phthalate	XX			µg/Kg	71	***	1,400				
Diethyl phthalate	XX			µg/Kg	200	***	1,200				
Di-n-butyl phthalate	XX			µg/Kg	1,400	***	5,100				
Butyl benzyl phthalate	XX			µg/Kg	63	***	970				
Bis(2-ethylhexyl) phthalate	XX			µg/Kg	1,300	***	8,300				
Di-n-octyl phthalate	XX			µg/Kg	6,200	***	6,200				
PHENOLS											
Phenol	XX			µg/Kg	420	***	1,200				
2-Methylphenol	XX			µg/Kg	63	***	77				
4-Methylphenol	XX			µg/Kg	670	***	3,600				
2,4-Dimethylphenol	XX			µg/Kg	29	***	210				
Pentachlorophenol	XX			µg/Kg	400	504	690				
MISCELLANEOUS EXTRACTABLES											
Benzyl alcohol	XX			µg/Kg	57	***	870				
Benzoic acid	XX			µg/Kg	650	***	760				
Dibenzofuran	XX			µg/Kg	540	***	1,700				
Hexachlorobutadiene	XX			µg/Kg	11	***	270				
N-Nitrosodiphenylamine	XX			µg/Kg	28	***	130				

COC Summary Report
 Sample ID: SC-2
 Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT), Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS			
								SL?	BT?	ML?	
DMMP Guideline Chemistry Value											
PESTICIDES & PCBs											
4,4'-DDD	XX			µg/Kg	16	***	***				
4,4'-DDE	XX			µg/Kg	9	***	***				
4,4'-DDT	XX			µg/Kg	12	***	***				
sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT	XX			µg/Kg	***		50	69			
Aldrin	XX			µg/Kg	9.5	***	***				
Total Chlordane (sum of cis-chlordane, trans-chlordane,)	XX			µg/Kg	2.8		37	***			
Dieldrin	XX			µg/Kg	1.9	***		1,700			
Heptachlor	XX			µg/Kg	1.5	***		270			
Total PCBs	XX			µg/Kg	130	38(mg/kg carbon)		3,100			
Dioxin	1.86			pptr TEQ	4 (a)	***		10 (b)			
Ammonia	12.9	D		mg/kg							
Sulfide	2.22			mg/kg							
Total Solids	67.6			%	***	***	***				
Total Volatile Solids	XX			%							
Total Organic Carbon	XX			%-dry							
Grain Size Distributions											
>2,000 microns (gravel)	XX			% Retained							
(c) 75 to 2,000 microns (sand)	XX			% Retained							
(d) 34 to 75 microns (silt)	XX			% Retained							
(e) <34 microns	XX			% Retained							
<3.9 microns (clay)	XX			% Retained							

*Results are dry-weight corrected

(a) maximum volume-weighted average concentration for entire dredging project

(b) maximum DMMU concentration

(c) Lab did not use a 62.5 micron sieve. The closest sieve size is 75 microns which is used to approximate grain size classification.

(d) Lab did not use a 3.9 micron sieve. The smallest seive size is 34 microns which is used to approximate the grain size classification.

(e) 34 microns is the smallest sieve size used.

Qualifiers:

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- D Dilution was required
- H Holding times for preparation or analysis exceeded
- S Spike recovery outside accepted recovery limits

COC Summary Report
Sample ID: SC-3
Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT),
Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS		
DMMP Guideline Chemistry Value								SL?	BT?	ML?
Metals										
Antimony	XX			mg/kg	150	***	200			
Arsenic	XX			mg/kg	57	507.1	700			
Cadmium	XX			mg/kg	5.1	11.3	14			
Chromium	XX			mg/kg	260	260	***			
Copper	XX			mg/kg	390	1,027	1,300			
Lead	XX			mg/kg	450	975	1,200			
Mercury	XX			mg/kg	0.41	1.5	2.3			
Selenium	XX			mg/kg	***	3	***			
Silver	XX			mg/kg	6.1	6.1	8.4			
Zinc	XX			mg/kg	410	2,783	3,800			
Organometallic Compounds										
Tributyltin ion (interstitial water)	XX			µg/L	0.15	0.15	***			
Tributyltin ion (bulk)	XX			µg/Kg	73	73	***			
Organics										
PAHs										
Total LPAH	XX			µg/Kg	5,200	***	29,000			
Naphthalene	XX			µg/Kg	2,100	***	2,400			
Acenaphthylene	XX			µg/Kg	560	***	1,300			
Acenaphthene	XX			µg/Kg	500	***	2,000			
Fluorene	XX			µg/Kg	540	***	3,600			
Phenanthrene	XX			µg/Kg	1,500	***	21,000			
Anthracene	XX			µg/Kg	960	***	13,000			
2-Methylnaphthalene	XX			µg/Kg	670	***	1,900			
Total HPAH	XX			µg/Kg	12,000	***	69,000			
Fluoranthene	XX			µg/Kg	1,700	4,600	30,000			
Pyrene	XX			µg/Kg	2,600	11,980	16,000			
Benz(a)anthracene	XX			µg/Kg	1,300	***	5,100			
Chrysene	XX			µg/Kg	1,400	***	21,000			
Benzo(a)fluoranthene (b, j, k)	XX			µg/Kg	3,200	***	9,900			
Benzo(a)pyrene	XX			µg/Kg	1,600	***	3,600			
Indeno(1,2,3-c,d)pyrene	XX			µg/Kg	600	***	4,400			
Dibenz(a,h)anthracene	XX			µg/Kg	230	***	1,900			
Benzo(g,h,i)perylene	XX			µg/Kg	670	***	3,200			
CHLORINATED HYDROCARBON										
1,4-Dichlorobenzene	XX			µg/Kg	110	***	120			
1,2-Dichlorobenzene	XX			µg/Kg	35	***	110			
1,2,4-Trichlorobenzene	XX			µg/Kg	31	***	64			
Hexachlorobenzene (HCB)	XX			µg/Kg	22	168	230			
PHTHALATES										
Dimethyl phthalate	XX			µg/Kg	71	***	1,400			
Diethyl phthalate	XX			µg/L	200	***	1,200			
Di-n-butyl phthalate	XX			µg/L	1,400	***	5,100			
Butyl benzyl phthalate	XX			µg/L	63	***	970			
Bis(2-ethylhexyl) phthalate	XX			µg/L	1,300	***	8,300			
Di-n-octyl phthalate	XX			µg/L	6,200	***	6,200			
PHENOLS										
Phenol	XX			µg/Kg	420	***	1,200			
2-Methylphenol	XX			µg/Kg	63	***	77			
4-Methylphenol	XX			µg/Kg	670	***	3,600			
2,4-Dimethylphenol	XX			µg/Kg	29	***	210			
Pentachlorophenol	XX			µg/Kg	400	504	690			
MISCELLANEOUS EXTRACTABLES										
Benzyl alcohol	XX			µg/Kg	57	***	870			
Benzoic acid	XX			µg/Kg	650	***	760			
Dibenzofuran	XX			µg/Kg	540	***	1,700			
Hexachlorobutadiene	XX			µg/Kg	11	***	270			
N-Nitrosodiphenylamine	XX			µg/Kg	28	***	130			

COC Summary Report
 Sample ID: SC-3
 Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT), Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS		
								SL?	BT?	ML?
DMMP Guideline Chemistry Value										
PESTICIDES & PCBs										
4,4'-DDD	XX			µg/Kg	16	***	***			
4,4'-DDE	XX			µg/Kg	9	***	***			
4,4'-DDT	XX			µg/Kg	12	***	***			
sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT	XX			µg/Kg	***		50	69		
Aldrin	XX			µg/Kg	9.5	***	***			
Total Chlordane (sum of cis-chlordane, trans-chlordane,)	XX			µg/Kg	2.8		37	***		
Dieldrin	XX			µg/Kg	1.9	***		1,700		
Heptachlor	XX			µg/Kg	1.5	***		270		
Total PCBs	XX			µg/Kg	130	38(mg/kg carbon)		3,100		
Dioxin		0.25		pptr TEQ	4 (a)	***		10 (b)		
Ammonia		32.5	D	mg/kg						
Sulfide		0.753		mg/kg						
Total Solids		67.6		%	***	***	***			
Total Volatile Solids	XX			%						
Total Organic Carbon	XX			%-dry						
Grain Size Distributions										
>2,000 microns (gravel)	XX			% Retained						
(c) 75 to 2,000 microns (sand)	XX			% Retained						
(d) 34 to 75 microns (silt)	XX			% Retained						
(e) <34 microns	XX			% Retained						
<3.9 microns (clay)	XX			% Retained						

*Results are dry-weight corrected

(a) maximum volume-weighted average concentration for entire dredging project

(b) maximum DMMU concentration

(c) Lab did not use a 62.5 micron sieve. The closest sieve size is 75 microns which is used to approximate grain size classification.

(d) Lab did not use a 3.9 micron sieve. The smallest sieve size is 34 microns which is used to approximate the grain size classification.

(e) 34 microns is the smallest sieve size used.

Qualifiers:

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

D Dilution was required

H Holding times for preparation or analysis exceeded

S Spike recovery outside accepted recovery limits

COC Summary Report
Sample ID: SC-4
Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT),
Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS			
								SL?	BT?	ML?	
DMMP Guideline Chemistry Value											
Metals											
Antimony	XX			mg/kg	150	***	200				
Arsenic	XX			mg/kg	57	507.1	700				
Cadmium	XX			mg/kg	5.1	11.3	14				
Chromium	XX			mg/kg	260	260	***				
Copper	XX			mg/kg	390	1,027	1,300				
Lead	XX			mg/kg	450	975	1,200				
Mercury	XX			mg/kg	0.41	1.5	2.3				
Selenium	XX			mg/kg	***	3	***				
Silver	XX			mg/kg	6.1	6.1	8.4				
Zinc	XX			mg/kg	410	2,783	3,800				
Organometallic Compounds											
Tributyltin ion (interstitial water)	XX			µg/L	0.15	0.15	***				
Tributyltin ion (bulk)	XX			µg/Kg	73	73	***				
Organics											
PAHs											
Total LPAH	XX			µg/Kg	5,200	***	29,000				
Naphthalene	XX			µg/Kg	2,100	***	2,400				
Acenaphthylene	XX			µg/Kg	560	***	1,300				
Acenaphthene	XX			µg/Kg	500	***	2,000				
Fluorene	XX			µg/Kg	540	***	3,600				
Phenanthrene	XX			µg/Kg	1,500	***	21,000				
Anthracene	XX			µg/Kg	960	***	13,000				
2-Methylnaphthalene	XX			µg/Kg	670	***	1,900				
Total HPAH	XX			µg/Kg	12,000	***	69,000				
Fluoranthene	XX			µg/Kg	1,700	4,600	30,000				
Pyrene	XX			µg/Kg	2,600	11,980	16,000				
Benz(a)anthracene	XX			µg/Kg	1,300	***	5,100				
Chrysene	XX			µg/Kg	1,400	***	21,000				
Benzo(a)fluoranthene (b, j, k)	XX			µg/Kg	3,200	***	9,900				
Benzo(a)pyrene	XX			µg/Kg	1,600	***	3,600				
Indeno(1,2,3-c,d)pyrene	XX			µg/Kg	600	***	4,400				
Dibenz(a,h)anthracene	XX			µg/Kg	230	***	1,900				
Benzo(g,h,i)perylene	XX			µg/Kg	670	***	3,200				
CHLORINATED HYDROCARBON											
1,4-Dichlorobenzene	XX			µg/Kg	110	***	120				
1,2-Dichlorobenzene	XX			µg/Kg	35	***	110				
1,2,4-Trichlorobenzene	XX			µg/Kg	31	***	64				
Hexachlorobenzene (HCB)	XX			µg/Kg	22	168	230				
PHTHALATES											
Dimethyl phthalate	XX			µg/Kg	71	***	1,400				
Diethyl phthalate	XX			µg/Kg	200	***	1,200				
Di-n-butyl phthalate	XX			µg/Kg	1,400	***	5,100				
Butyl benzyl phthalate	XX			µg/Kg	63	***	970				
Bis(2-ethylhexyl) phthalate	XX			µg/Kg	1,300	***	8,300				
Di-n-octyl phthalate	XX			µg/Kg	6,200	***	6,200				
PHENOLS											
Phenol	XX			µg/Kg	420	***	1,200				
2-Methylphenol	XX			µg/Kg	63	***	77				
4-Methylphenol	XX			µg/Kg	670	***	3,600				
2,4-Dimethylphenol	XX			µg/Kg	29	***	210				
Pentachlorophenol	XX			µg/Kg	400	504	690				
MISCELLANEOUS EXTRACTABLES											
Benzyl alcohol	XX			µg/Kg	57	***	870				
Benzoic acid	XX			µg/Kg	650	***	760				
Dibenzofuran	XX			µg/Kg	540	***	1,700				
Hexachlorobutadiene	XX			µg/Kg	11	***	270				
N-Nitrosodiphenylamine	XX			µg/Kg	28	***	130				

COC Summary Report
 Sample ID: SC-4
 Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT), Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS		
								SL?	BT?	ML?
DMMP Guideline Chemistry Value										
PESTICIDES & PCBs										
4,4'-DDD	XX			µg/Kg	16	***	***			
4,4'-DDE	XX			µg/Kg	9	***	***			
4,4'-DDT	XX			µg/Kg	12	***	***			
sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT	XX			µg/Kg	***		50	69		
Aldrin	XX			µg/Kg	9.5	***	***			
Total Chlordane (sum of cis-chlordane, trans-chlordane,)	XX			µg/Kg	2.8		37	***		
Dieldrin	XX			µg/Kg	1.9	***		1,700		
Heptachlor	XX			µg/Kg	1.5	***		270		
Total PCBs	XX			µg/Kg	130	38(mg/kg carbon)		3,100		
Dioxin		0.23		pptr TEQ	4 (a)	***		10 (b)		
Ammonia		28	D	mg/kg						
Sulfide	ND			0.68 mg/kg						
Total Solids		65.1		%	***	***	***			
Total Volatile Solids	XX			%						
Total Organic Carbon	XX			%-dry						
Grain Size Distributions										
>2,000 microns (gravel)	XX			% Retained						
(c) 75 to 2,000 microns (sand)	XX			% Retained						
(d) 34 to 75 microns (silt)	XX			% Retained						
(e) <34 microns	XX			% Retained						
<3.9 microns (clay)	XX			% Retained						

*Results are dry-weight corrected

(a) maximum volume-weighted average concentration for entire dredging project

(b) maximum DMMU concentration

(c) Lab did not use a 62.5 micron sieve. The closest sieve size is 75 microns which is used to approximate grain size classification.

(d) Lab did not use a 3.9 micron sieve. The smallest sieve size is 34 microns which is used to approximate the grain size classification.

(e) 34 microns is the smallest sieve size used.

Qualifiers:

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

D Dilution was required

H Holding times for preparation or analysis exceeded

S Spike recovery outside accepted recovery limits

COC Summary Report
Sample ID: SC-5
Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT),
Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS		
DMMP Guideline Chemistry Value								SL?	BT?	ML?
Metals										
Antimony	XX			mg/kg	150	***	200			
Arsenic	XX			mg/kg	57	507.1	700			
Cadmium	XX			mg/kg	5.1	11.3	14			
Chromium	XX			mg/kg	260	260	***			
Copper	XX			mg/kg	390	1,027	1,300			
Lead	XX			mg/kg	450	975	1,200			
Mercury	XX			mg/kg	0.41	1.5	2.3			
Selenium	XX			mg/kg	***	3	***			
Silver	XX			mg/kg	6.1	6.1	8.4			
Zinc	XX			mg/kg	410	2,783	3,800			
Organometallic Compounds										
Tributyltin ion (interstitial water)	XX			µg/L	0.15	0.15	***			
Tributyltin ion (bulk)	XX			µg/Kg	73	73	***			
Organics										
PAHs										
Total LPAH	XX			µg/L	5,200	***	29,000			
Naphthalene	XX			µg/L	2,100	***	2,400			
Acenaphthylene	XX			µg/L	560	***	1,300			
Acenaphthene	XX			µg/L	500	***	2,000			
Fluorene	XX			µg/L	540	***	3,600			
Phenanthrene	XX			µg/L	1,500	***	21,000			
Anthracene	XX			µg/L	960	***	13,000			
2-Methylnaphthalene	XX			µg/L	670	***	1,900			
Total HPAH	XX			µg/L	12,000	***	69,000			
Fluoranthene	XX			µg/L	1,700	4,600	30,000			
Pyrene	XX			µg/L	2,600	11,980	16,000			
Benz(a)anthracene	XX			µg/L	1,300	***	5,100			
Chrysene	XX			µg/L	1,400	***	21,000			
Benzo(a)fluoranthenes (b, j, k)	XX			µg/L	3,200	***	9,900			
Benzo(a)pyrene	XX			µg/L	1,600	***	3,600			
Indeno(1,2,3-c,d)pyrene	XX			µg/L	600	***	4,400			
Dibenz(a,h)anthracene	XX			µg/L	230	***	1,900			
Benzo(g,h,i)perylene	XX			µg/L	670	***	3,200			
CHLORINATED HYDROCARBON										
1,4-Dichlorobenzene	XX			µg/L	110	***	120			
1,2-Dichlorobenzene	XX			µg/L	35	***	110			
1,2,4-Trichlorobenzene	XX			µg/L	31	***	64			
Hexachlorobenzene (HCB)	XX			µg/L	22	168	230			
PHTHALATES										
Dimethyl phthalate	XX			µg/L	71	***	1,400			
Diethyl phthalate	XX			µg/L	200	***	1,200			
Di-n-butyl phthalate	XX			µg/L	1,400	***	5,100			
Butyl benzyl phthalate	XX			µg/L	63	***	970			
Bis(2-ethylhexyl) phthalate	XX			µg/L	1,300	***	8,300			
Di-n-octyl phthalate	XX			µg/L	6,200	***	6,200			
PHENOLS										
Phenol	XX			µg/L	420	***	1,200			
2-Methylphenol	XX			µg/L	63	***	77			
4-Methylphenol	XX			µg/L	670	***	3,600			
2,4-Dimethylphenol	XX			µg/L	29	***	210			
Pentachlorophenol	XX			µg/L	400	504	690			
MISCELLANEOUS EXTRACTABLES										
Benzyl alcohol	XX			µg/L	57	***	870			
Benzoic acid	XX			µg/L	650	***	760			
Dibenzofuran	XX			µg/L	540	***	1,700			
Hexachlorobutadiene	XX			µg/L	11	***	270			
N-Nitrosodiphenylamine	XX			µg/L	28	***	130			

COC Summary Report
 Sample ID: SC-5
 Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT), Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS		
								SL?	BT?	ML?
DMMP Guideline Chemistry Value										
PESTICIDES & PCBs										
4,4'-DDD	XX			µg/L	16	***	***			
4,4'-DDE	XX			µg/L	9	***	***			
4,4'-DDT	XX			µg/L	12	***	***			
sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT	XX			µg/L	***		50	69		
Aldrin	XX			µg/L	9.5	***	***			
Total Chlordane (sum of cis-chlordane, trans-chlordane,)	XX			µg/L	2.8		37	***		
Dieldrin	XX			µg/L	1.9	***		1,700		
Heptachlor	XX			µg/L	1.5	***		270		
Total PCBs	XX			µg/L	130	38(mg/kg carbon)		3,100		
Dioxin	14.82			pptr TEQ	4 (a)	***		10 (b)		YES
Ammonia	43.6	D		mg/kg						
Sulfide	3.56			mg/kg						
Total Solids	69			%	***	***	***			
Total Volatile Solids	XX			%						
Total Organic Carbon	XX			%-dry						
Grain Size Distributions										
>2,000 microns (gravel)	XX			% Retained						
(c) 75 to 2,000 microns (sand)	XX			% Retained						
(d) 34 to 75 microns (silt)	XX			% Retained						
(e) <34 microns	XX			% Retained						
<3.9 microns (clay)	XX			% Retained						

*Results are dry-weight corrected

- (a) maximum volume-weighted average concentration for entire dredging project
- (b) maximum DMMU concentration
- (c) Lab did not use a 62.5 micron sieve. The closest sieve size is 75 microns which is used to approximate grain size classification.
- (d) Lab did not use a 3.9 micron sieve. The smallest seive size is 34 microns which is used to approximate the grain size classification.
- (e) 34 microns is the smallest sieve size used.

Qualifiers:

- B** Analyte detected in the associated Method Blank
- E** Value above quantitation range
- J** Analyte detected below quantitation limits
- D** Dilution was required
- H** Holding times for preparation or analysis exceeded
- S** Spike recovery outside accepted recovery limits

COC Summary Report
Sample ID: SC-6
Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT),
Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS		
DMMP Guideline Chemistry Value								SL?	BT?	ML?
Metals										
Antimony	XX			mg/kg	150	***	200			
Arsenic	XX			mg/kg	57	507.1	700			
Cadmium	XX			mg/kg	5.1	11.3	14			
Chromium	XX			mg/kg	260	260	***			
Copper	XX			mg/kg	390	1,027	1,300			
Lead	XX			mg/kg	450	975	1,200			
Mercury	XX			mg/kg	0.41	1.5	2.3			
Selenium	XX			mg/kg	***	3	***			
Silver	XX			mg/kg	6.1	6.1	8.4			
Zinc	XX			mg/kg	410	2,783	3,800			
Organometallic Compounds										
Tributyltin ion (interstitial water)	XX			µg/L	0.15	0.15	***			
Tributyltin ion (bulk)	XX			µg/Kg	73	73	***			
Organics										
PAHs										
Total LPAH	XX			µg/L	5,200	***	29,000			
Naphthalene	XX			µg/L	2,100	***	2,400			
Acenaphthylene	XX			µg/L	560	***	1,300			
Acenaphthene	XX			µg/L	500	***	2,000			
Fluorene	XX			µg/L	540	***	3,600			
Phenanthrene	XX			µg/L	1,500	***	21,000			
Anthracene	XX			µg/L	960	***	13,000			
2-Methylnaphthalene	XX			µg/L	670	***	1,900			
Total HPAH	XX			µg/L	12,000	***	69,000			
Fluoranthene	XX			µg/L	1,700	4,600	30,000			
Pyrene	XX			µg/L	2,600	11,980	16,000			
Benz(a)anthracene	XX			µg/L	1,300	***	5,100			
Chrysene	XX			µg/L	1,400	***	21,000			
Benzo(a)fluoranthenes (b, j, k)	XX			µg/L	3,200	***	9,900			
Benzo(a)pyrene	XX			µg/L	1,600	***	3,600			
Indeno(1,2,3-c,d)pyrene	XX			µg/L	600	***	4,400			
Dibenz(a,h)anthracene	XX			µg/L	230	***	1,900			
Benzo(g,h,i)perylene	XX			µg/L	670	***	3,200			
CHLORINATED HYDROCARBON										
1,4-Dichlorobenzene	XX			µg/L	110	***	120			
1,2-Dichlorobenzene	XX			µg/L	35	***	110			
1,2,4-Trichlorobenzene	XX			µg/L	31	***	64			
Hexachlorobenzene (HCB)				µg/L	22	168	230			
PHTHALATES										
Dimethyl phthalate	XX			µg/L	71	***	1,400			
Diethyl phthalate	XX			µg/L	200	***	1,200			
Di-n-butyl phthalate	XX			µg/L	1,400	***	5,100			
Butyl benzyl phthalate	XX			µg/L	63	***	970			
Bis(2-ethylhexyl) phthalate	XX			µg/L	1,300	***	8,300			
Di-n-octyl phthalate	XX			µg/L	6,200	***	6,200			
PHENOLS										
Phenol	XX			µg/L	420	***	1,200			
2-Methylphenol	XX			µg/L	63	***	77			
4-Methylphenol	XX			µg/L	670	***	3,600			
2,4-Dimethylphenol	XX			µg/L	29	***	210			
Pentachlorophenol	XX			µg/L	400	504	690			
MISCELLANEOUS EXTRACTABLES										
Benzyl alcohol	XX			µg/L	57	***	870			
Benzoic acid	XX			µg/L	650	***	760			
Dibenzofuran	XX			µg/L	540	***	1,700			
Hexachlorobutadiene	XX			µg/L	11	***	270			
N-Nitrosodiphenylamine	XX			µg/L	28	***	130			

COC Summary Report
 Sample ID: SC-6
 Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT), Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS		
								SL?	BT?	ML?
DMMP Guideline Chemistry Value										
PESTICIDES & PCBs										
4,4'-DDD	XX			µg/L	16	***	***			
4,4'-DDE	XX			µg/L	9	***	***			
4,4'-DDT	XX			µg/L	12	***	***			
sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT	XX			µg/L	***		50	69		
Aldrin	XX			µg/L	9.5	***	***			
Total Chlordane (sum of cis-chlordane, trans-chlordane,)	XX			µg/L	2.8		37	***		
Dieldrin	XX			µg/L	1.9	***		1,700		
Heptachlor	XX			µg/L	1.5	***		270		
Total PCBs	XX			µg/L	130	38(mg/kg carbon)		3,100		
Dioxin		3.44		pptr TEQ	4 (a)	***		10 (b)		
Ammonia		5.39		mg/kg						
Sulfide	ND		0.623	mg/kg						
Total Solids		80.2		%	***	***	***			
Total Volatile Solids	XX			%						
Total Organic Carbon	XX			%-dry						
Grain Size Distributions										
>2,000 microns (gravel)	XX			% Retained						
(c) 75 to 2,000 microns (sand)	XX			% Retained						
(d) 34 to 75 microns (silt)	XX			% Retained						
(e) <34 microns	XX			% Retained						
<3.9 microns (clay)	XX			% Retained						

*Results are dry-weight corrected

(a) maximum volume-weighted average concentration for entire dredging project

(b) maximum DMMU concentration

(c) Lab did not use a 62.5 micron sieve. The closest sieve size is 75 microns which is used to approximate grain size classification.

(d) Lab did not use a 3.9 micron sieve. The smallest sieve size is 34 microns which is used to approximate the grain size classification.

(e) 34 microns is the smallest sieve size used.

Qualifiers:

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

D Dilution was required

H Holding times for preparation or analysis exceeded

S Spike recovery outside accepted recovery limits

COC Summary Report
Sample ID: SC-7
Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT),
Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS			
								SL?	BT?	ML?	
DMMP Guideline Chemistry Value											
Metals											
Antimony	XX			mg/kg	150	***	200				
Arsenic	XX			mg/kg	57	507.1	700				
Cadmium	XX			mg/kg	5.1	11.3	14				
Chromium	XX			mg/kg	260	260	***				
Copper	XX			mg/kg	390	1,027	1,300				
Lead	XX			mg/kg	450	975	1,200				
Mercury	XX			mg/kg	0.41	1.5	2.3				
Selenium	XX			mg/kg	***	3	***				
Silver	XX			mg/kg	6.1	6.1	8.4				
Zinc	XX			mg/kg	410	2,783	3,800				
Organometallic Compounds											
Tributyltin ion (interstitial water)	XX			µg/L	0.15	0.15	***				
Tributyltin ion (bulk)	XX			µg/Kg	73	73	***				
Organics											
PAHs											
Total LPAH	XX			µg/L	5,200	***	29,000				
Naphthalene	XX			µg/L	2,100	***	2,400				
Acenaphthylene	XX			µg/L	560	***	1,300				
Acenaphthene	XX			µg/L	500	***	2,000				
Fluorene	XX			µg/L	540	***	3,600				
Phenanthrene	XX			µg/L	1,500	***	21,000				
Anthracene	XX			µg/L	960	***	13,000				
2-Methylnaphthalene	XX			µg/L	670	***	1,900				
Total HPAH	XX			µg/L	12,000	***	69,000				
Fluoranthene	XX			µg/L	1,700	4,600	30,000				
Pyrene	XX			µg/L	2,600	11,980	16,000				
Benz(a)anthracene	XX			µg/L	1,300	***	5,100				
Chrysene	XX			µg/L	1,400	***	21,000				
Benzo(a)fluoranthene (b, j, k)	XX			µg/L	3,200	***	9,900				
Benzo(a)pyrene	XX			µg/L	1,600	***	3,600				
Indeno(1,2,3-c,d)pyrene	XX			µg/L	600	***	4,400				
Dibenz(a,h)anthracene	XX			µg/L	230	***	1,900				
Benzo(g,h,i)perylene	XX			µg/L	670	***	3,200				
CHLORINATED HYDROCARBON											
1,4-Dichlorobenzene	XX			µg/L	110	***	120				
1,2-Dichlorobenzene	XX			µg/L	35	***	110				
1,2,4-Trichlorobenzene	XX			µg/L	31	***	64				
Hexachlorobenzene (HCB)	XX			µg/L	22	168	230				
PHTHALATES											
Dimethyl phthalate	XX			µg/L	71	***	1,400				
Diethyl phthalate	XX			µg/L	200	***	1,200				
Di-n-butyl phthalate	XX			µg/L	1,400	***	5,100				
Butyl benzyl phthalate	X			µg/L	63	***	970				
Bis(2-ethylhexyl) phthalate	XX			µg/L	1,300	***	8,300				
Di-n-octyl phthalate	XX			µg/L	6,200	***	6,200				
PHENOLS											
Phenol	XX			µg/L	420	***	1,200				
2-Methylphenol	XX			µg/L	63	***	77				
4-Methylphenol	XX			µg/L	670	***	3,600				
2,4-Dimethylphenol	XX			µg/L	29	***	210				
Pentachlorophenol	XX			µg/L	400	504	690				
MISCELLANEOUS EXTRACTABLES											
Benzyl alcohol	XX			µg/L	57	***	870				
Benzoic acid	XX			µg/L	650	***	760				
Dibenzofuran	XX			µg/L	540	***	1,700				
Hexachlorobutadiene	XX			µg/L	11	***	270				
N-Nitrosodiphenylamine	XX			µg/L	28	***	130				

COC Summary Report
 Sample ID: SC-7
 Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT), Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS		
DMMP Guideline Chemistry Value								SL?	BT?	ML?
PESTICIDES & PCBs										
4,4'-DDD	XX			µg/L	16	***	***			
4,4'-DDE	XX			µg/L	9	***	***			
4,4'-DDT	XX			µg/L	12	***	***			
sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT	XX			µg/L	***		50	69		
Aldrin	XX			µg/L	9.5	***	***			
Total Chlordane (sum of cis-chlordane, trans-chlordane,)	XX			µg/L	2.8		37	***		
Dieldrin	XX			µg/L	1.9	***		1,700		
Heptachlor	XX			µg/L	1.5	***		270		
Total PCBs	XX			µg/L	130	38(mg/kg carbon)		3,100		
Dioxin	10.86			pptr TEQ	4 (a)	***		10 (b)		YES
Ammonia	35.9	D		mg/kg						
Sulfide	1.43			mg/kg						
Total Solids	61			%	***	***	***			
Total Volatile Solids	XX			%						
Total Organic Carbon	XX			%-dry						
Grain Size Distributions										
>2,000 microns (gravel)	XX			% Retained						
(c) 75 to 2,000 microns (sand)	XX			% Retained						
(d) 34 to 75 microns (silt)	XX			% Retained						
(e) <34 microns	XX			% Retained						
<3.9 microns (clay)	XX			% Retained						

*Results are dry-weight corrected

- (a) maximum volume-weighted average concentration for entire dredging project
- (b) maximum DMMU concentration
- (c) Lab did not use a 62.5 micron sieve. The closest sieve size is 75 microns which is used to approximate grain size classification.
- (d) Lab did not use a 3.9 micron sieve. The smallest seive size is 34 microns which is used to approximate the grain size classification.
- (e) 34 microns is the smallest sieve size used.

Qualifiers:

- B** Analyte detected in the associated Method Blank
- E** Value above quantitation range
- J** Analyte detected below quantitation limits
- D** Dilution was required
- H** Holding times for preparation or analysis exceeded
- S** Spike recovery outside accepted recovery limits

COC Summary Report
Sample ID: SC-8
Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT),
Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS		
								SL?	BT?	ML?
DMMP Guideline Chemistry Value										
Metals										
Antimony	XX			mg/kg	150	***	200			
Arsenic	XX			mg/kg	57	507.1	700			
Cadmium	XX			mg/kg	5.1	11.3	14			
Chromium	XX			mg/kg	260	260	***			
Copper	XX			mg/kg	390	1,027	1,300			
Lead	XX			mg/kg	450	975	1,200			
Mercury	XX			mg/kg	0.41	1.5	2.3			
Selenium	XX			mg/kg	***	3	***			
Silver	XX			mg/kg	6.1	6.1	8.4			
Zinc	XX			mg/kg	410	2,783	3,800			
Organometallic Compounds										
Tributyltin ion (interstitial water)	XX			µg/L	0.15	0.15	***			
Tributyltin ion (bulk)	XX			µg/Kg	73	73	***			
Organics										
PAHs										
Total LPAH	XX			µg/L	5,200	***	29,000			
Naphthalene	XX			µg/L	2,100	***	2,400			
Acenaphthylene	XX			µg/L	560	***	1,300			
Acenaphthene	XX			µg/L	500	***	2,000			
Fluorene	XX			µg/L	540	***	3,600			
Phenanthrene	XX			µg/L	1,500	***	21,000			
Anthracene	XX			µg/L	960	***	13,000			
2-Methylnaphthalene	XX			µg/L	670	***	1,900			
Total HPAH	XX			µg/L	12,000	***	69,000			
Fluoranthene	XX			µg/L	1,700	4,600	30,000			
Pyrene	XX			µg/L	2,600	11,980	16,000			
Benz(a)anthracene	XX			µg/L	1,300	***	5,100			
Chrysene	XX			µg/L	1,400	***	21,000			
Benzo(a)fluoranthene (b, j, k)	XX			µg/L	3,200	***	9,900			
Benzo(a)pyrene	XX			µg/L	1,600	***	3,600			
Indeno(1,2,3-c,d)pyrene	XX			µg/L	600	***	4,400			
Dibenz(a,h)anthracene	XX			µg/L	230	***	1,900			
Benzo(g,h,i)perylene	XX			µg/L	670	***	3,200			
CHLORINATED HYDROCARBON										
1,4-Dichlorobenzene	XX			µg/L	110	***	120			
1,2-Dichlorobenzene	XX			µg/L	35	***	110			
1,2,4-Trichlorobenzene	XX			µg/L	31	***	64			
Hexachlorobenzene (HCB)	XX			µg/L	22	168	230			
PHTHALATES										
Dimethyl phthalate	XX			µg/L	71	***	1,400			
Diethyl phthalate	XX			µg/L	200	***	1,200			
Di-n-butyl phthalate	XX			µg/L	1,400	***	5,100			
Butyl benzyl phthalate	XX			µg/L	63	***	970			
Bis(2-ethylhexyl) phthalate	XX			µg/L	1,300	***	8,300			
Di-n-octyl phthalate	XX			µg/L	6,200	***	6,200			
PHENOLS										
Phenol	XX			µg/L	420	***	1,200			
2-Methylphenol	XX			µg/L	63	***	77			
4-Methylphenol	XX			µg/L	670	***	3,600			
2,4-Dimethylphenol	XX			µg/L	29	***	210			
Pentachlorophenol	XX			µg/L	400	504	690			
MISCELLANEOUS EXTRACTABLES										
Benzyl alcohol	XX			µg/L	57	***	870			
Benzoic acid	XX			µg/L	650	***	760			
Dibenzofuran	XX			µg/L	540	***	1,700			
Hexachlorobutadiene	XX			µg/L	11	***	270			
N-Nitrosodiphenylamine				µg/L	28	***	130			

COC Summary Report
 Sample ID: SC-8
 Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT), Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS		
								SL?	BT?	ML?
DMMP Guideline Chemistry Value										
PESTICIDES & PCBs										
4,4'-DDD	XX			µg/L	16	***	***			
4,4'-DDE	XX			µg/L	9	***	***			
4,4'-DDT	XX			µg/L	12	***	***			
sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT	XX			µg/L	***	50	69			
Aldrin	XX			µg/L	9.5	***	***			
Total Chlordane (sum of cis-chlordane, trans-chlordane,)	XX			µg/L	2.8	37	***			
Dieldrin	XX			µg/L	1.9	***	1,700			
Heptachlor	XX			µg/L	1.5	***	270			
Total PCBs	XX			µg/L	130	38(mg/kg carbon)	3,100			
Dioxin	5.75			pptr TEQ	4 (a)	***	10 (b)			
Ammonia	7.23	D		mg/kg						
Sulfide	1.33			mg/kg						
Total Solids	74.7			%	***	***	***			
Total Volatile Solids	XX			%						
Total Organic Carbon	XX			%-dry						
Grain Size Distributions										
>2,000 microns (gravel)	XX			% Retained						
(c) 75 to 2,000 microns (sand)	XX			% Retained						
(d) 34 to 75 microns (silt)	XX			% Retained						
(e) <34 microns	XX			% Retained						
<3.9 microns (clay)	XX			% Retained						

*Results are dry-weight corrected

(a) maximum volume-weighted average concentration for entire dredging project

(b) maximum DMMU concentration

(c) Lab did not use a 62.5 micron sieve. The closest sieve size is 75 microns which is used to approximate grain size classification.

(d) Lab did not use a 3.9 micron sieve. The smallest sieve size is 34 microns which is used to approximate the grain size classification.

(e) 34 microns is the smallest sieve size used.

Qualifiers:

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

D Dilution was required

H Holding times for preparation or analysis exceeded

S Spike recovery outside accepted recovery limits

COC Summary Report
Sample ID: SC-9
Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT),
Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS		
								SL?	BT?	ML?
DMMP Guideline Chemistry Value										
Metals										
Antimony	XX			mg/kg	150	***	200			
Arsenic	XX			mg/kg	57	507.1	700			
Cadmium	XX			mg/kg	5.1	11.3	14			
Chromium	XX			mg/kg	260	260	***			
Copper	XX			mg/kg	390	1,027	1,300			
Lead	XX			mg/kg	450	975	1,200			
Mercury	XX			mg/kg	0.41	1.5	2.3			
Selenium	XX			mg/kg	***	3	***			
Silver	XX			mg/kg	6.1	6.1	8.4			
Zinc	XX			mg/kg	410	2,783	3,800			
Organometallic Compounds										
Tributyltin ion (interstitial water)	XX			µg/L	0.15	0.15	***			
Tributyltin ion (bulk)	XX			µg/Kg	73	73	***			
Organics										
PAHs										
Total LPAH	XX			µg/L	5,200	***	29,000			
Naphthalene	XX			µg/L	2,100	***	2,400			
Acenaphthylene	XX			µg/L	560	***	1,300			
Acenaphthene	XX			µg/L	500	***	2,000			
Fluorene	XX			µg/L	540	***	3,600			
Phenanthrene	XX			µg/L	1,500	***	21,000			
Anthracene	XX			µg/L	960	***	13,000			
2-Methylnaphthalene	XX			µg/L	670	***	1,900			
Total HPAH	XX			µg/L	12,000	***	69,000			
Fluoranthene	XX			µg/L	1,700	4,600	30,000			
Pyrene	XX			µg/L	2,600	11,980	16,000			
Benz(a)anthracene	XX			µg/L	1,300	***	5,100			
Chrysene	XX			µg/L	1,400	***	21,000			
Benzo(a)fluoranthenes (b, j, k)	XX			µg/L	3,200	***	9,900			
Benzo(a)pyrene	XX			µg/L	1,600	***	3,600			
Indeno(1,2,3-c,d)pyrene	XX			µg/L	600	***	4,400			
Dibenz(a,h)anthracene	XX			µg/L	230	***	1,900			
Benzo(g,h,i)perylene	XX			µg/L	670	***	3,200			
CHLORINATED HYDROCARBON										
1,4-Dichlorobenzene	XX			µg/L	110	***	120			
1,2-Dichlorobenzene	XX			µg/L	35	***	110			
1,2,4-Trichlorobenzene	XX			µg/L	31	***	64			
Hexachlorobenzene (HCB)	XX			µg/L	22	168	230			
PHTHALATES										
Dimethyl phthalate	XX			µg/L	71	***	1,400			
Diethyl phthalate	XX			µg/L	200	***	1,200			
Di-n-butyl phthalate	XX			µg/L	1,400	***	5,100			
Butyl benzyl phthalate	XX			µg/L	63	***	970			
Bis(2-ethylhexyl) phthalate	XX			µg/L	1,300	***	8,300			
Di-n-octyl phthalate	XX			µg/L	6,200	***	6,200			
PHENOLS										
Phenol	XX			µg/L	420	***	1,200			
2-Methylphenol	XX			µg/L	63	***	77			
4-Methylphenol	XX			µg/L	670	***	3,600			
2,4-Dimethylphenol	XX			µg/L	29	***	210			
Pentachlorophenol	XX			µg/L	400	504	690			
MISCELLANEOUS EXTRACTABLES										
Benzyl alcohol	XX			µg/L	57	***	870			
Benzoic acid	XX			µg/L	650	***	760			
Dibenzofuran	XX			µg/L	540	***	1,700			
Hexachlorobutadiene	XX			µg/L	11	***	270			
N-Nitrosodiphenylamine	XX			µg/L	28	***	130			

COC Summary Report
 Sample ID: SC-9
 Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT), Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS			
								SL?	BT?	ML?	
DMMP Guideline Chemistry Value											
PESTICIDES & PCBs											
4,4'-DDD	XX			µg/L	16	***	***				
4,4'-DDE	XX			µg/L	9	***	***				
4,4'-DDT	XX			µg/L	12	***	***				
sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT	XX			µg/L	***		50	69			
Aldrin	XX			µg/L	9.5	***	***				
Total Chlordane (sum of cis-chlordane, trans-chlordane,)	XX			µg/L	2.8		37	***			
Dieldrin	XX			µg/L	1.9	***		1,700			
Heptachlor	XX			µg/L	1.5	***		270			
Total PCBs	XX			µg/L	130	38(mg/kg carbon)		3,100			
Dioxin		5.81		pptr TEQ	4 (a)	***		10 (b)			
Ammonia		28.9	D	mg/kg							
Sulfide		1.71		mg/kg							
Total Solids		69.9		%	***	***	***				
Total Volatile Solids	XX			%							
Total Organic Carbon	XX			%-dry							
Grain Size Distributions											
>2,000 microns (gravel)	XX			% Retained							
(c) 75 to 2,000 microns (sand)	XX			% Retained							
(d) 34 to 75 microns (silt)	XX			% Retained							
(e) <34 microns	XX			% Retained							
<3.9 microns (clay)	XX			% Retained							

*Results are dry-weight corrected

(a) maximum volume-weighted average concentration for entire dredging project

(b) maximum DMMU concentration

(c) Lab did not use a 62.5 micron sieve. The closest sieve size is 75 microns which is used to approximate grain size classification.

(d) Lab did not use a 3.9 micron sieve. The smallest sieve size is 34 microns which is used to approximate the grain size classification.

(e) 34 microns is the smallest sieve size used.

Qualifiers:

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- D Dilution was required
- H Holding times for preparation or analysis exceeded
- S Spike recovery outside accepted recovery limits

COC Summary Report
Sample ID: Z-Layer Composite
Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT),
Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS		
DMMP Guideline Chemistry Value								SL?	BT?	ML?
Metals										
Antimony	XX			mg/kg	150	***	200			
Arsenic	XX			mg/kg	57	507.1	700			
Cadmium	XX			mg/kg	5.1	11.3	14			
Chromium	XX			mg/kg	260	260	***			
Copper	XX			mg/kg	390	1,027	1,300			
Lead	XX			mg/kg	450	975	1,200			
Mercury	XX			mg/kg	0.41	1.5	2.3			
Selenium	XX			mg/kg	***	3	***			
Silver	XX			mg/kg	6.1	6.1	8.4			
Zinc	XX			mg/kg	410	2,783	3,800			
Organometallic Compounds										
Tributyltin ion (interstitial water)	XX			µg/L	0.15	0.15	***			
Tributyltin ion (bulk)	XX			µg/Kg	73	73	***			
Organics										
PAHs										
Total LPAH	XX			µg/L	5,200	***	29,000			
Naphthalene	XX			µg/L	2,100	***	2,400			
Acenaphthylene	XX			µg/L	560	***	1,300			
Acenaphthene	XX			µg/L	500	***	2,000			
Fluorene	XX			µg/L	540	***	3,600			
Phenanthrene	XX			µg/L	1,500	***	21,000			
Anthracene	XX			µg/L	960	***	13,000			
2-Methylnaphthalene	XX			µg/L	670	***	1,900			
Total HPAH	XX			µg/L	12,000	***	69,000			
Fluoranthene	XX			µg/L	1,700	4,600	30,000			
Pyrene	XX			µg/L	2,600	11,980	16,000			
Benz(a)anthracene	XX			µg/L	1,300	***	5,100			
Chrysene	XX			µg/L	1,400	***	21,000			
Benzofluoranthenes (b, j, k)	XX			µg/L	3,200	***	9,900			
Benzo(a)pyrene	XX			µg/L	1,600	***	3,600			
Indeno(1,2,3-c,d)pyrene	XX			µg/L	600	***	4,400			
Dibenz(a,h)anthracene	XX			µg/L	230	***	1,900			
Benzo(g,h,i)perylene	XX			µg/L	670	***	3,200			
CHLORINATED HYDROCARBON										
1,4-Dichlorobenzene	XX			µg/L	110	***	120			
1,2-Dichlorobenzene	XX			µg/L	35	***	110			
1,2,4-Trichlorobenzene	XX			µg/L	31	***	64			
Hexachlorobenzene (HCB)	XX			µg/L	22	168	230			
PHTHALATES										
Dimethyl phthalate	XX			µg/L	71	***	1,400			
Diethyl phthalate	XX			µg/L	200	***	1,200			
Di-n-butyl phthalate	XX			µg/L	1,400	***	5,100			
Butyl benzyl phthalate	XX			µg/L	63	***	970			
Bis(2-ethylhexyl) phthalate	XX			µg/L	1,300	***	8,300			
Di-n-octyl phthalate	XX			µg/L	6,200	***	6,200			
PHENOLS										
Phenol	XX			µg/L	420	***	1,200			
2-Methylphenol	XX			µg/L	63	***	77			
4-Methylphenol	XX			µg/L	670	***	3,600			
2,4-Dimethylphenol	XX			µg/L	29	***	210			
Pentachlorophenol	XX			µg/L	400	504	690			
MISCELLANEOUS EXTRACTABLES										
Benzyl alcohol	XX			µg/L	57	***	870			
Benzoic acid	XX			µg/L	650	***	760			
Dibenzofuran	XX			µg/L	540	***	1,700			
Hexachlorobutadiene	XX			µg/L	11	***	270			
N-Nitrosodiphenylamine	XX			µg/L	28	***	130			

COC Summary Report
 Sample ID: Z-Layer Composite
 Project: 10070 Olympia Yacht Club

Not Detected (ND), No Test performed (XX), Method Detection Level (MDL), Screening Level (SL), Bioaccumulation Trigger (BT), Maximum Contaminant Level (ML), Lab Qualifier (Q)

CHEMICAL OF CONCERN	RESULTS*	Q	MDL	UNITS	SL	BT	ML	EXCEEDS		
								SL?	BT?	ML?
DMMP Guideline Chemistry Value										
PESTICIDES & PCBs										
4,4'-DDD	XX			µg/L	16	***	***			
4,4'-DDE	XX			µg/L	9	***	***			
4,4'-DDT	XX			µg/L	12	***	***			
sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT	XX			µg/L	***		50	69		
Aldrin	XX			µg/L	9.5	***	***			
Total Chlordane (sum of cis-chlordane, trans-chlordane,)	XX			µg/L	2.8		37	***		
Dieldrin	XX			µg/L	1.9	***		1,700		
Heptachlor	XX			µg/L	1.5	***		270		
Total PCBs	XX			µg/L	130	38(mg/kg carbon)		3,100		
Dioxin		0.14		pptr TEQ	4 (a)	***		10 (b)		
Ammonia	XX			mg/kg						
Sulfide	XX			mg/kg						
Total Solids		77		%	***	***	***			
Total Volatile Solids	XX			%						
Total Organic Carbon	XX			%-dry						
Grain Size Distributions										
>2,000 microns (gravel)	XX			% Retained						
(c) 75 to 2,000 microns (sand)	XX			% Retained						
(d) 34 to 75 microns (silt)	XX			% Retained						
(e) <34 microns	XX			% Retained						
<3.9 microns (clay)	XX			% Retained						

*Results are dry-weight corrected

(a) maximum volume-weighted average concentration for entire dredging project

(b) maximum DMMU concentration

(c) Lab did not use a 62.5 micron sieve. The closest sieve size is 75 microns which is used to approximate grain size classification.

(d) Lab did not use a 3.9 micron sieve. The smallest sieve size is 34 microns which is used to approximate the grain size classification.

(e) 34 microns is the smallest sieve size used.

Qualifiers:

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

D Dilution was required

H Holding times for preparation or analysis exceeded

S Spike recovery outside accepted recovery limits

Appendix 2

Dioxin TEQ Calculations

(from Skillings Connolly, 2012)

TEQ calculations for Olympia Yacht Club -
 by David Fox, P.E. Dredged Material Management Office

Sample SC-1

Congener	TEF	Result		TEQ U = 1/2 DL	TEQ U = 0
2,3,7,8-TCDF	0.1	2.08		0.208	0.208
2,3,7,8-TCDD	1	0.585	U	0.2925	0
1,2,3,7,8-PeCDF	0.03	1.76	J	0.0528	0.0528
2,3,4,7,8-PeCDF	0.3	2.13		0.639	0.639
1,2,3,7,8-PeCDD	1	2.32	J	2.32	2.32
1,2,3,4,7,8-HxCDF	0.1	7.12		0.712	0.712
1,2,3,6,7,8-HxCDF	0.1	3.41		0.341	0.341
2,3,4,6,7,8-HxCDF	0.1	2.34	J	0.234	0.234
1,2,3,7,8,9-HxCDF	0.1	1.49	J	0.149	0.149
1,2,3,4,7,8-HxCDD	0.1	1.84	J	0.184	0.184
1,2,3,6,7,8-HxCDD	0.1	9.57		0.957	0.957
1,2,3,7,8,9-HxCDD	0.1	4.21		0.421	0.421
1,2,3,4,6,7,8-HpCDF	0.01	98.8		0.988	0.988
1,2,3,4,7,8,9-HpCDF	0.01	3.16		0.0316	0.0316
1,2,3,4,6,7,8-HpCDD	0.01	174	J	1.74	1.74
OCDF	0.0003	104		0.0312	0.0312
OCDD	0.0003	1050	J	0.315	0.315
total:				9.62	9.32

Sample SC-2

Congener	TEF	Result		TEQ U = 1/2 DL	TEQ U = 0
2,3,7,8-TCDF	0.1	0.214	J	0.0214	0.0214
2,3,7,8-TCDD	1	0.0514	U	0.0257	0
1,2,3,7,8-PeCDF	0.03	0.164	BJ	0.00492	0.00492
2,3,4,7,8-PeCDF	0.3	0.208	BJ	0.0624	0.0624
1,2,3,7,8-PeCDD	1	0.235	U	0.1175	0
1,2,3,4,7,8-HxCDF	0.1	0.673	J	0.0673	0.0673
1,2,3,6,7,8-HxCDF	0.1	0.394	J	0.0394	0.0394
2,3,4,6,7,8-HxCDF	0.1	0.506	J	0.0506	0.0506
1,2,3,7,8,9-HxCDF	0.1	0.148	U	0.0074	0
1,2,3,4,7,8-HxCDD	0.1	0.413	J	0.0413	0.0413
1,2,3,6,7,8-HxCDD	0.1	2.15		0.215	0.215
1,2,3,7,8,9-HxCDD	0.1	0.995	J	0.0995	0.0995
1,2,3,4,6,7,8-HpCDF	0.01	10.7		0.107	0.107
1,2,3,4,7,8,9-HpCDF	0.01	0.682	J	0.00682	0.00682
1,2,3,4,6,7,8-HpCDD	0.01	71.8	J	0.718	0.718
OCDF	0.0003	31.7		0.00951	0.00951
OCDD	0.0003	900	J	0.27	0.27
total:				1.86	1.71

Sample SC-3

Congener	TEF	Result		TEQ	TEQ
				U = 1/2 DL	U = 0
2,3,7,8-TCDF	0.1	0.0105	U	0.000525	0
2,3,7,8-TCDD	1	0.0209	U	0.01045	0
1,2,3,7,8-PeCDF	0.03	0.0314	U	0.000471	0
2,3,4,7,8-PeCDF	0.3	0.0589	U	0.008835	0
1,2,3,7,8-PeCDD	1	0.0707	U	0.03535	0
1,2,3,4,7,8-HxCDF	0.1	0.0824	BJ	0.00824	0.00824
1,2,3,6,7,8-HxCDF	0.1	0.0726	BJ	0.00726	0.00726
2,3,4,6,7,8-HxCDF	0.1	0.0648	U	0.00324	0
1,2,3,7,8,9-HxCDF	0.1	0.0118	U	0.00059	0
1,2,3,4,7,8-HxCDD	0.1	0.0824	BJ	0.00824	0.00824
1,2,3,6,7,8-HxCDD	0.1	0.228	U	0.0114	0
1,2,3,7,8,9-HxCDD	0.1	0.186	BJ	0.0186	0.0186
1,2,3,4,6,7,8-HpCDF	0.01	1.64	J	0.0164	0.0164
1,2,3,4,7,8,9-HpCDF	0.01	0.0182	U	0.000091	0
1,2,3,4,6,7,8-HpCDD	0.01	8.42	J	0.0842	0.0842
OCDF	0.0003	3.52	J	0.001056	0.001056
OCDD	0.0003	131	J	0.0393	0.0393
total:				0.25	0.18

Sample SC-4

Congener	TEF	Result		TEQ	TEQ
				U = 1/2 DL	U = 0
2,3,7,8-TCDF	0.1	0.0516	U	0.00258	0
2,3,7,8-TCDD	1	0.0417	U	0.02085	0
1,2,3,7,8-PeCDF	0.03	0.0229	U	0.0003435	0
2,3,4,7,8-PeCDF	0.3	0.0536	U	0.00804	0
1,2,3,7,8-PeCDD	1	0.0933	J	0.0933	0.0933
1,2,3,4,7,8-HxCDF	0.1	0.0675	BJ	0.00675	0.00675
1,2,3,6,7,8-HxCDF	0.1	0.0714	BJ	0.00714	0.00714
2,3,4,6,7,8-HxCDF	0.1	0.0125	U	0.000625	0
1,2,3,7,8,9-HxCDF	0.1	0.0117	U	0.000585	0
1,2,3,4,7,8-HxCDD	0.1	0.0352	U	0.00176	0
1,2,3,6,7,8-HxCDD	0.1	0.188	U	0.0094	0
1,2,3,7,8,9-HxCDD	0.1	0.185	U	0.00925	0
1,2,3,4,6,7,8-HpCDF	0.01	0.925	J	0.00925	0.00925
1,2,3,4,7,8,9-HpCDF	0.01	0.0317	U	0.0001585	0
1,2,3,4,6,7,8-HpCDD	0.01	4.65	J	0.0465	0.0465
OCDF	0.0003	1.79	J	0.000537	0.000537
OCDD	0.0003	52.6	J	0.01578	0.01578
total:				0.23	0.18

Sample SC-5

Congener	TEF	Result		TEQ U = 1/2 DL	TEQ U = 0
2,3,7,8-TCDF	0.1	0.519	U	0.02595	0
2,3,7,8-TCDD	1	0.182	U	0.091	0
1,2,3,7,8-PeCDF	0.03	0.735	J	0.02205	0.02205
2,3,4,7,8-PeCDF	0.3	0.746	J	0.2238	0.2238
1,2,3,7,8-PeCDD	1	1.25	J	1.25	1.25
1,2,3,4,7,8-HxCDF	0.1	3.41		0.341	0.341
1,2,3,6,7,8-HxCDF	0.1	1.58	J	0.158	0.158
2,3,4,6,7,8-HxCDF	0.1	1.46	J	0.146	0.146
1,2,3,7,8,9-HxCDF	0.1	1.12	J	0.112	0.112
1,2,3,4,7,8-HxCDD	0.1	2.36		0.236	0.236
1,2,3,6,7,8-HxCDD	0.1	14.5		1.45	1.45
1,2,3,7,8,9-HxCDD	0.1	5.48		0.548	0.548
1,2,3,4,6,7,8-HpCDF	0.01	52.7		0.527	0.527
1,2,3,4,7,8,9-HpCDF	0.01	4.89		0.0489	0.0489
1,2,3,4,6,7,8-HpCDD	0.01	661	J	6.61	6.61
OCDF	0.0003	276		0.0828	0.0828
OCDD	0.0003	9830	J	2.949	2.949
total:				14.82	14.70

Sample SC-6

Congener	TEF	Result		TEQ	TEQ
				U = 1/2 DL	U = 0
2,3,7,8-TCDF	0.1	0.356	J	0.0356	0.0356
2,3,7,8-TCDD	1	0.293	U	0.1465	0
1,2,3,7,8-PeCDF	0.03	0.376	U	0.00564	0
2,3,4,7,8-PeCDF	0.3	0.402	J	0.1206	0.1206
1,2,3,7,8-PeCDD	1	0.513	J	0.513	0.513
1,2,3,4,7,8-HxCDF	0.1	1.92	J	0.192	0.192
1,2,3,6,7,8-HxCDF	0.1	0.81	J	0.081	0.081
2,3,4,6,7,8-HxCDF	0.1	1.3	J	0.13	0.13
1,2,3,7,8,9-HxCDF	0.1	0.426	U	0.0213	0
1,2,3,4,7,8-HxCDD	0.1	0.663	J	0.0663	0.0663
1,2,3,6,7,8-HxCDD	0.1	3.71		0.371	0.371
1,2,3,7,8,9-HxCDD	0.1	1.67	J	0.167	0.167
1,2,3,4,6,7,8-HpCDF	0.01	34.8		0.348	0.348
1,2,3,4,7,8,9-HpCDF	0.01	1.44	J	0.0144	0.0144
1,2,3,4,6,7,8-HpCDD	0.01	93	J	0.93	0.93
OCDF	0.0003	55.7		0.01671	0.01671
OCDD	0.0003	930	J	0.279	0.279
total:				3.44	3.26

Sample SC-7

Congener	TEF	Result		TEQ	TEQ
				U = 1/2 DL	U = 0
2,3,7,8-TCDF	0.1	0.804	U	0.0402	0
2,3,7,8-TCDD	1	0.228	U	0.114	0
1,2,3,7,8-PeCDF	0.03	0.655	J	0.01965	0.01965
2,3,4,7,8-PeCDF	0.3	0.914	J	0.2742	0.2742
1,2,3,7,8-PeCDD	1	1.46	J	1.46	1.46
1,2,3,4,7,8-HxCDF	0.1	3.43		0.343	0.343
1,2,3,6,7,8-HxCDF	0.1	1.84	J	0.184	0.184
2,3,4,6,7,8-HxCDF	0.1	1.31	J	0.131	0.131
1,2,3,7,8,9-HxCDF	0.1	0.876	J	0.0876	0.0876
1,2,3,4,7,8-HxCDD	0.1	1.99	J	0.199	0.199
1,2,3,6,7,8-HxCDD	0.1	12.5		1.25	1.25
1,2,3,7,8,9-HxCDD	0.1	4.55		0.455	0.455
1,2,3,4,6,7,8-HpCDF	0.01	70.4		0.704	0.704
1,2,3,4,7,8,9-HpCDF	0.01	3.75		0.0375	0.0375
1,2,3,4,6,7,8-HpCDD	0.01	407	J	4.07	4.07
OCDF	0.0003	352		0.1056	0.1056
OCDD	0.0003	4610	J	1.383	1.383
total:				10.86	10.70

Sample SC-8

Congener	TEF	Result		TEQ U = 1/2 DL	TEQ U = 0
2,3,7,8-TCDF	0.1	0.527	J	0.0527	0.0527
2,3,7,8-TCDD	1	0.125	U	0.0625	0
1,2,3,7,8-PeCDF	0.03	0.69	J	0.0207	0.0207
2,3,4,7,8-PeCDF	0.3	0.822	J	0.2466	0.2466
1,2,3,7,8-PeCDD	1	0.839	J	0.839	0.839
1,2,3,4,7,8-HxCDF	0.1	3.35		0.335	0.335
1,2,3,6,7,8-HxCDF	0.1	1.33	J	0.133	0.133
2,3,4,6,7,8-HxCDF	0.1	0.675	J	0.0675	0.0675
1,2,3,7,8,9-HxCDF	0.1	0.963	J	0.0963	0.0963
1,2,3,4,7,8-HxCDD	0.1	0.933	J	0.0933	0.0933
1,2,3,6,7,8-HxCDD	0.1	5.89		0.589	0.589
1,2,3,7,8,9-HxCDD	0.1	2.29		0.229	0.229
1,2,3,4,6,7,8-HpCDF	0.01	34.3		0.343	0.343
1,2,3,4,7,8,9-HpCDF	0.01	1.71	J	0.0171	0.0171
1,2,3,4,6,7,8-HpCDD	0.01	204	J	2.04	2.04
OCDF	0.0003	57.2		0.01716	0.01716
OCDD	0.0003	1910	J	0.573	0.573
total:				5.75	5.69

Sample SC-9

Congener	TEF	Result		TEQ U = 1/2 DL	TEQ U = 0
2,3,7,8-TCDF	0.1	0.5	J	0.05	0.05
2,3,7,8-TCDD	1	0.188	U	0.094	0
1,2,3,7,8-PeCDF	0.03	0.428	U	0.00642	0
2,3,4,7,8-PeCDF	0.3	0.467	J	0.1401	0.1401
1,2,3,7,8-PeCDD	1	0.812	J	0.812	0.812
1,2,3,4,7,8-HxCDF	0.1	2.06		0.206	0.206
1,2,3,6,7,8-HxCDF	0.1	1.09	J	0.109	0.109
2,3,4,6,7,8-HxCDF	0.1	0.615	U	0.03075	0
1,2,3,7,8,9-HxCDF	0.1	0.408	U	0.0204	0
1,2,3,4,7,8-HxCDD	0.1	1.22	J	0.122	0.122
1,2,3,6,7,8-HxCDD	0.1	7.33		0.733	0.733
1,2,3,7,8,9-HxCDD	0.1	3.2		0.32	0.32
1,2,3,4,6,7,8-HpCDF	0.01	33.2		0.332	0.332
1,2,3,4,7,8,9-HpCDF	0.01	1.91	J	0.0191	0.0191
1,2,3,4,6,7,8-HpCDD	0.01	209	J	2.09	2.09
OCDF	0.0003	97		0.0291	0.0291
OCDD	0.0003	2320	J	0.696	0.696
total:				5.81	5.66

Sample Z-Layer

Congener	TEF	Result		TEQ U = 1/2 DL	TEQ U = 0
2,3,7,8-TCDF	0.1	0.107	U	0.00535	0
2,3,7,8-TCDD	1	0.0436	U	0.0218	0
1,2,3,7,8-PeCDF	0.03	0.107	U	0.001605	0
2,3,4,7,8-PeCDF	0.3	0.107	U	0.01605	0
1,2,3,7,8-PeCDD	1	0.0892	U	0.0446	0
1,2,3,4,7,8-HxCDF	0.1	0.0555	BJ	0.00555	0.00555
1,2,3,6,7,8-HxCDF	0.1	0.0515	U	0.002575	0
2,3,4,6,7,8-HxCDF	0.1	0.012	J	0.0012	0.0012
1,2,3,7,8,9-HxCDF	0.1	0.0126	U	0.00063	0
1,2,3,4,7,8-HxCDD	0.1	0.0136	U	0.00068	0
1,2,3,6,7,8-HxCDD	0.1	0.117	U	0.00585	0
1,2,3,7,8,9-HxCDD	0.1	0.103	U	0.00515	0
1,2,3,4,6,7,8-HpCDF	0.01	0.547	U	0.002735	0
1,2,3,4,7,8,9-HpCDF	0.01	0.0093	U	0.0000465	0
1,2,3,4,6,7,8-HpCDD	0.01	2.04	J	0.0204	0.0204
OCDF	0.0003	0.684	BJ	0.0002052	0.0002052
OCDD	0.0003	17.4	J	0.00522	0.00522
total:				0.14	0.03