2017 Sediment Quality Report
Cascade Pole Site
Olympia, Washington

November 21, 2017

Prepared for

Port of Olympia
915 Washington Street NE
Olympia, WA

LANDAU ASSOCIATES

130 2nd Avenue South
Edmonds, WA 98020
(425) 778-0907

2017 Sediment Quality
Cascade Pole Site
Olympia, Washington

This document was prepared by, or under the direct supervision of, the technical professionals noted below.

Document prepared by: Kenneth J. Reid, LEG
Senior Geologist

Document reviewed by: Christine B. Kimmel, LG
Project Manager

Document reviewed by: Lawrence D. Beard
Senior Principal

Date:	November 21, 2017
Project No.:	0021041.010
File path:	\\edmdata01\projects\021\041\R\Sed Qual Rpts\2017 Sed Qual\CPC 2017 Sed Qual Rpt.docx
Project Coordinator:	tam

LANDAU ASSOCIATES

This page intentionally left blank.

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

(All Appendices are on DVD)

LIST OF ABBREVIATIONS AND ACRONYMS

AET ..... Apparent Effects Threshold
ARI ..... Analytical Resources, Incorporated
CAP ..... Cleanup Action Plan
COPC ..... Chemical of Potential Concern
Ecology ..... Washington State Department of Ecology
HPAH ..... High Molecular Weight PAHs
GPS ..... Global Positioning System
LAI ..... Landau Associates, Inc.
LPAH ..... Low Molecular Weight PAHs
MBL ..... Multiple Benefits Line
MSS ..... Marine Sampling Systems, Inc.
PAH ..... Polycyclic Aromatic Hydrocarbons
pg/g ..... Picograms per Gram
Port ..... Port of Olympia
QA/QC ..... Quality Assurance/Quality Control
SMS ..... Sediment Management Standards
Site ..... Cascade Pole Company Wood Treatment

SOU ..... Sediments Operable Unit
TEQ ..... Toxicity Equivalency Quotient
TOC ..... Total Organic Carbon
WAC ..... Washington Administrative Code

1.0 INTRODUCTION

Landau Associates, Inc. (LAI) prepared this report to present the results of the 2017 performance sediment quality monitoring event conducted for the Port of Olympia (Port) at the Cascade Pole Site Sediments Operable Unit (SOU). Sediment sampling activities were conducted as part of the long-term compliance monitoring of the sediment cleanup area in Budd Inlet per Amendment No. 1 to the Agreed Order (No. DE 00TCPSR-753) between the Port and the Washington State Department of Ecology (Ecology).

1.1 Background

The former Cascade Pole Company wood treatment site (Site) is located on Budd Inlet, approximately one mile north of downtown Olympia, as shown on Figure 1. The Port owns the upland property where the Site is located, as well as adjacent upland parcels and some of the aquatic lands immediately adjacent to the upland Site. The Cascade Pole SOU includes the intertidal and subtidal sediments north and east of the Site. A detailed site history can be found in the Cascade Pole Remedial Investigation and the Cascade Pole Feasibility Study reports (LAI 1993a,b).

In April 2000, the Port entered into the Agreed Order with Ecology to remediate the Cascade Pole SOU. The Ecology-selected cleanup action included excavation of contaminated sediments, containment of the contaminated sediments in an upland cell, containment of shoreline soil and sediment within a sheetpile barrier, incorporation of institutional controls, shoreline improvements, and the establishment of a compliance monitoring program. In July 2004, the Agreed Order was amended to, among other actions, provide for long-term sediment monitoring every 5 years. This report presents the results of the 3rd round of long-term sediment compliance monitoring with the previous monitoring events conducted in 2007 and 2012.

1.1.1 Cleanup Action

Cleanup of contaminated sediments was implemented between 2000 and 2002. The interim cleanup action included excavation or dredging of contaminated sediments within the multiple benefits line (MBL), placement of clean granular backfill within the MBL to return the elevation to pre-excavation grade, and implementation of a compliance monitoring program. The location of the MBL line is shown on Figure 2. The Sediments Remedial Action Compliance Monitoring Plan (LAI 2001) includes specific details for implementing the overall compliance monitoring program, and addresses protection of human health and the environment during cleanup activities, performance of the remedial action in meeting sediment cleanup action levels established for the interim action, and confirmation of the long-term effectiveness of the cleanup action.

1.1.2 Previous Performance Monitoring

This section summarizes the results of previous post-construction sediment monitoring events, including the post-construction sediment compliance monitoring that was conducted in April 2002 and September 2003, and the first two rounds of long-term sediment compliance monitoring conducted in 2007 and 2012.

1.1.2.1 2002/2003 Post-Construction Sediment Monitoring Summary

The 2002/2003 post-construction sediment monitoring event was conducted in accordance with the procedures established in the Sediments Remedial Action Compliance Monitoring Plan. A total of 15 sediment cores were collected from the interior of the backfill layer that caps the dredged surface within the MBL (locations CP-01 through CP-015), and 5 surface grab samples (0 to 10 centimeters) were collected from outside of the MBL (locations CP-16 through CP-20). The results of the post-construction compliance monitoring in 2002 confirmed that the sediment removal and backfilling activities at the Site were successful in achieving the goals of the cleanup action plan (CAP; Ecology 2000) with a few isolated exceptions (LAI 2002). The concentrations of Constituents of Potential Concern (COPC) exceeded the project cleanup action levels at three locations (locations CP-06, CP-14, and CP-15) at the dredge interface. The dredge interface is located beneath the overlying backfill within the upper portion of the underlying sediment. Initial confirmation monitoring at these three locations demonstrated that COPCs were not present at concentrations of concern in the overlying backfill material. Additional confirmation monitoring was performed at these three locations in September 2003 and the results were consistent with the April 2002 results; therefore, the cleanup was determined to be successful in achieving the goals of the CAP (LAI 2003).

1.1.2.2 2007 Long-Term Sediment Monitoring Summary

In October 2007, LAI performed the first long-term sediment monitoring event (LAI 2008) stipulated under Amendment 1 to the Agreed Order. As in the 2002 sampling event, 15 sediment cores were collected from the interior of the backfill within the MBL and 5 surface grab samples were collected from outside of the MBL. Analytical results from all backfill samples from within the MBL, with the exception of CP-04, indicated COPCs concentrations were either detected at low-level concentrations below the project cleanup action levels or not detected above the respective laboratory reporting limits. The results from location CP-04 indicated acenapthene slightly above the project cleanup action level at the mudline; however, the concentration from a deeper sample within the backfill material was below the cleanup action level. Based on observations of sediment color, sediment odor, and the lower concentration in a deeper sample, the acenapthene concentration at CP-04 was interpreted as an isolated remnant within the upper portion of the backfill material. All samples collected outside of the MBL indicated COPCs concentrations were not detected at the laboratory reporting limit or were reported at low-level concentrations below the project cleanup action level.

In comparison to the initial 2002 data, the 2007 sediment quality monitoring report noted decreasing trends in polycyclic aromatic hydrocarbons (PAHs) concentrations at locations within the MBL and slight increasing trends in dioxin concentrations in the surface sediments outside of the MBL. Dioxin concentrations within the SOU were consistent with area-wide concentrations of dioxins in Budd Inlet analyzed by Ecology in 2007 (Ecology 2007) and were interpreted to be the result of transport and deposition of sediments from within the greater Budd Inlet area over the intervening 5 years.

1.1.2.3 2012 Long Term Sediment Monitoring Summary

The 2012 compliance monitoring event was conducted in general accordance with the Sampling and Analysis Addendum (LAI 2012), which complies with the Sediments Remedial Action Compliance Monitoring Plan. The surface sediment results from outside the MBL indicated a slight decreasing trend in dioxin concentrations compared to the 2007 and 2002 sample results. The results of the 2012 sediment compliance monitoring are generally consistent with previous compliance monitoring results and show that the sediment removal and backfilling activities at the Site were successful in achieving the goals of the sediment interim action CAP and that COPCs do not appear to be migrating from the dredge interface into the backfill. No constituents of concern exceeded the project cleanup action levels within the backfill.

1.2 Report Organization

The remainder of this report focuses on the most recent sediment sampling event, which was conducted in August 2017. This report is organized into the following sections: Sediment Monitoring Approach (Section 2.0), Monitoring Results (Section 3.0), Evaluation of Cleanup Effectiveness (Section 4.0), Use of This Report (Section 5.0), and References (Section 6.0).

2.0 SEDIMENT MONITORING APPROACH

Amendment 1 to the Agreed Order specified that the sampling locations, sampling protocols, and quality assurance/quality control (QA/QC) used for the 2002 sediment sampling event be applied to future 5-year performance monitoring events. The Sampling and Analysis Plan Addendum (LAI 2012; prepared prior to the 2012 event) was followed for the 2017 performance monitoring event. The third compliance monitoring event was conducted in August 2017 and consisted of the following scope of work:

- Collection of 15 sediment cores (CP-01 through CP-15; shown on Figure 2) from inside the MBL to evaluate the long-term effectiveness of the sediment cap. Exploration logs are presented in Appendix A.
- Collection of 5 surface sediment grab samples (CP-16 through CP-20; shown on Figure 2) from outside the MBL to evaluate whether surface sediment quality changed appreciably since the CAP was implemented. Surface sample logs are presented in Appendix A.
- Comparison of the analytical results to the project cleanup action levels identified in Attachment B to the Agreed Order (Cleanup Action Plan, Sediments Operable Unit; Ecology 2000).
- Comparison of analytical results to the previous sampling events to evaluate the continued effectiveness of the cleanup.

2.1 Sample Collection

Sampling coordinates were verified prior to collection using a Global Positioning System (GPS) unit provided by the subcontractor, Marine Sampling Systems, Inc. (MSS) of Port Orchard, Washington. Position coordinates and current mudline elevations are provided in Table 1.

2.1.1 Sediment Sampling Procedures

Sediment cores (locations CP-01 through CP-15) were collected using a vibracore pneumatic coring device with an aluminum core tube attached. Core lengths ranged from 3 to 7 feet long, depending on both the thickness of accumulated native sediments and the thickness of the backfill layer. Cores were capped and stored upright on ice. Sediment physical characteristics (i.e., lithology, color, odor, relative density, and consistency) were recorded by a qualified State of Washington Registered Geologist during core processing. Sediment cores were collected from the interior of the backfill layer that covers the dredged surface from the cleanup action. Interior backfill samples were collected from the interval soil between 1 and 1.5 feet above the bottom of the backfill. When the backfill thickness was less than 2 feet thick, the sample was taken from the middle of the backfill. Exploration logs for the sampling locations are included in Appendix A.

Sediment surface grab samples (locations CP-16 through CP-20) were collected using a decontaminated stainless-steel power grab sampler. Surface samples were collected from the top 10 centimeters (the biologically active zone) of sediment contained in the power-grab sampler. Samples were collected using a clean stainless-steel spoon and placed in a stainless-steel mixing bowl.

Both subsurface backfill sediment and surface sediment grab samples were collected from the target intervals and individually homogenized using a stainless-steel spoon and a stainless-steel bowl. Samples were homogenized in the mixing bowl until the sediment appeared uniform in color and texture. The homogenized sediment was placed in the laboratory-provided containers and stored in a cooler on ice under standard chain-of-custody procedures. All non-disposal sampling equipment was decontaminated between sampling intervals using a three-phase wash of alconox soap and tap water, followed by a tap water rinse, and then a distilled water wash.

2.2 Sample Analysis

Sediment samples were submitted to Analytical Resources, Inc. (ARI) for laboratory analyses. Samples from both the surface and subsurface backfill sediment material were analyzed for PAHs, dioxins, dibenzofurans, and total organic carbon (TOC). The raw data include PAH and dibenzofuran data on a dry weight basis, and the full list of dioxin congeners, rather than only the dioxin congeners used to calculate the toxicity equivalency quotient (TEQ). A copy of the laboratory report is included in Appendix B.

Upon receipt of the laboratory data, LAI performed a data quality evaluation of the analytical results. Based on the data quality evaluation, all of the data were determined to be acceptable as qualified. No data were rejected and the completeness of the data was 100 percent. A technical memorandum describing the data quality evaluation is also provided in Appendix B.

3.0 PERFORMANCE MONITORING RESULTS

The following sections provide a description of the subsurface conditions and the analytical results from the 2017 sampling event.

3.1 Sediment Physical Characteristics

Field logs for the sediment cores including sample location, sample date, sampler penetration depth, and sediment characteristics are provided in the Sediment Exploration Logs contained in Appendix A. Photographs of all cores and grab samples are on file with LAI.

Underlying native material was encountered at all subsurface coring locations; however, limited overlying sediment accumulation above the backfill layer was observed at a few locations. Backfill material thickness ranged from 0.9 to 2.7 feet, with the majority of locations possessing backfill layers over 2 feet thick. Native material generally consisted of dark grey, silty, fine sand to sandy silt with shell fragments or woody debris. Backfill material was generally brown to gray-brown, fine to coarse (or medium to coarse) sand with varying amounts of gravel.

All core locations had clear contact intervals with the underlying native material. Clear contact intervals between the backfill material and overlying sediment were observed at a majority of the locations; however, indications of shallow mixing were observed at CP-11 and CP-15. Marine worms, live clams, and minor vegetation in the sediment overlying the backfill layer were observed at some of the subsurface core locations.

3.2 Subsurface Backfill Sample Results

Analytical results for the sediment samples are presented in Table 2. Project cleanup action levels for PAHs are based on carbon normalized concentrations (the dry weight concentration divided by the fractional TOC concentration) and the project cleanup action levels for dioxins/furans are based on dry weight concentrations. The results for both PAHs and dioxins/furans COPC are all below the project cleanup action levels. The sediment management standards (SMS; Washington Administrative Code [WAC] 173-204) recommend that sediment data be evaluated using dry weight criteria in lieu of carbon normalized criteria when TOC content is below 0.5 percent, which is the case for all backfill samples. As a result, the dry weight analytical results were also evaluated against the Apparent Effects Threshold (AET) values, which are considered equivalent to the SMS sediment cleanup objective values for protection of benthic organisms, and are presented in Table 3. Analytical results from the interior subsurface backfill samples indicate that PAHs are all below the AETs as well as below the carbon-normalized project cleanup action levels.

Compared to the previous sediment monitoring events (2002, 2007, and 2012), current concentrations are well below the project cleanup action levels and show a decreasing concentration trend.

3.2.1 Surface Sediment Results

A total of five surface samples and one field duplicate were collected from outside the MBL during the 2017 compliance monitoring event. Surface sediment analytical results are summarized in Table 4.

The dioxins TEQ concentrations ranged from about 9.963 to 22.818 picogram per gram (pg/g), which are below project cleanup action level (80 pg/g). Dibenzofuran concentrations were also below the project cleanup action level.

The calculated low molecular weight PAH (LPAH) and high molecular weight PAH (HPAH) compounds were below both the project cleanup action level for all the surface sediment samples. In addition, all the individual PAH compound concentrations were below the project cleanup action level.

Compared to the previous sediment monitoring events (2002, 2007, and 2012), current surface sediment concentrations are well below the project cleanup action levels and show a general decreasing concentration trend. In addition, the number of detected individual PAH compounds was lower in 2017 than in 2012; Fluorene, phenanthrene, 2-methylnaphthalene, LPAH, and fluoranthene, which were above their respective project cleanup action levels values in 2012, were all below the project cleanup action levels in 2017.

4.0 EVALUATION OF CLEANUP EFFECTIVENESS

To evaluate the continued effectiveness of the cleanup within the SOU, Ecology requires that interior backfill material samples and surface sediment samples be collected on a 5-year interval. The 2017 sampling event is the fourth sampling event since the completion of the cleanup, and the third 5-year performance review event. The analytical results from the past sampling events are summarized in Appendix C, Tables C-1 through C-3.

The results of the 2017 sediment performance monitoring are generally consistent with previous compliance events and show that the sediment removal and backfilling activities at the Site were successful in achieving the goals of the sediment interim action CAP. COPC do not appear to be migrating from the dredge interface into the backfill. No COPC exceeded the project cleanup action levels within the backfill material or in surface sediment.

5.0 USE OF THIS REPORT

This report has been prepared for the exclusive use of the Port of Olympia. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of LAI. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by LAI, shall be at the user's sole risk. LAI warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

6.0 REFERENCES

Ecology. 2007. Budd Inlet Sediments Investigation Update. http://www.ecy.wa.gov/pubs/0709119.pdf. Washington State Department of Ecology. August 2007.

Ecology. 2000. Cleanup Action Plan, Cascade Pole Company Site, Sediment Operable Unit, Washington. Washington State Department of Ecology. March 8.

Landau Associates. 2013. Technical Memorandum to Mohsen Kourehdar, Washington State Department of Ecology, re: Sediment Quality Monitoring Results, 2012 Sediment Performance Monitoring, Cascade Pole Site, Olympia, Washington. Larry Beard and Christine Kimmel, Landau Associates. April 12.

LAI. 2012. Technical Memorandum: Sampling and Analysis Addendum, 2012 Sediment Performance Monitoring, Cascade Pole Site, Olympia, Washington. From Larry Beard and Christine Kimmel, to Mohsen Kourehdar, Washington State Department of Ecology. September 20.

LAI. 2008. 2007 Sediment Quality Monitoring Report, Cascade Pole Site, Olympia, Washington. Prepared for the Port of Olympia. March 11.

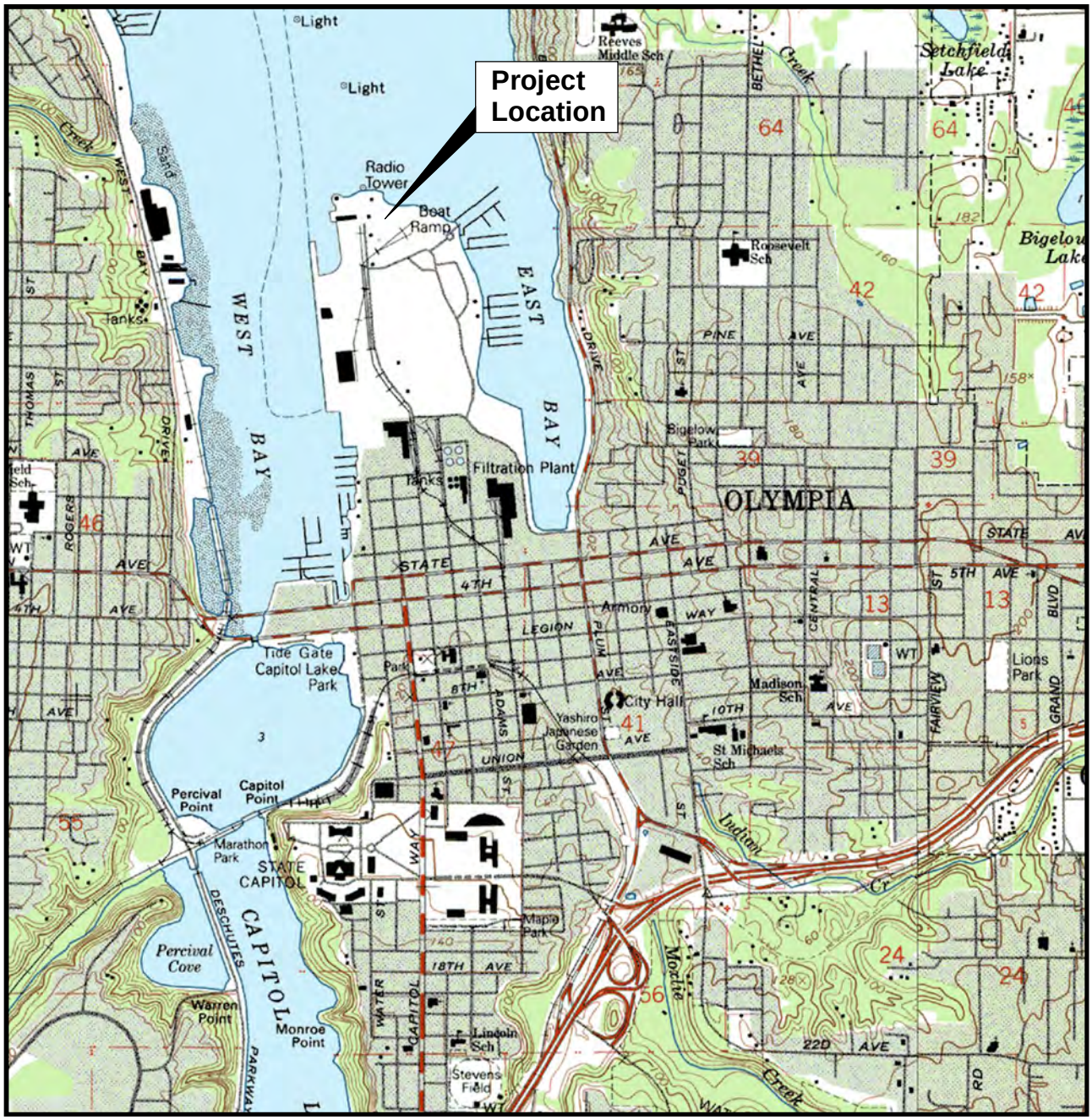
LAI. 2003. Post-Construction Sediment Conformational Monitoring Report, Cascade Pole Site, Olympia, Washington. Prepared for the Port of Olympia. October 24.

LAI. 2002. Post-Construction Sediment Compliance Monitoring, Cascade Pole Site, Olympia, Washington. Prepared for the Port of Olympia. December 18.

LAI. 2001. Compliance Monitoring Plan, Sediments Remedial Action, Cascade Pole Site, Olympia, Washington. Prepared for the Port of Olympia. April 5.

LAI. 1993a. Remedial Investigation Report, Sediments Operable Unit, Cascade Pole Site, Port of Olympia, Washington. January 22.

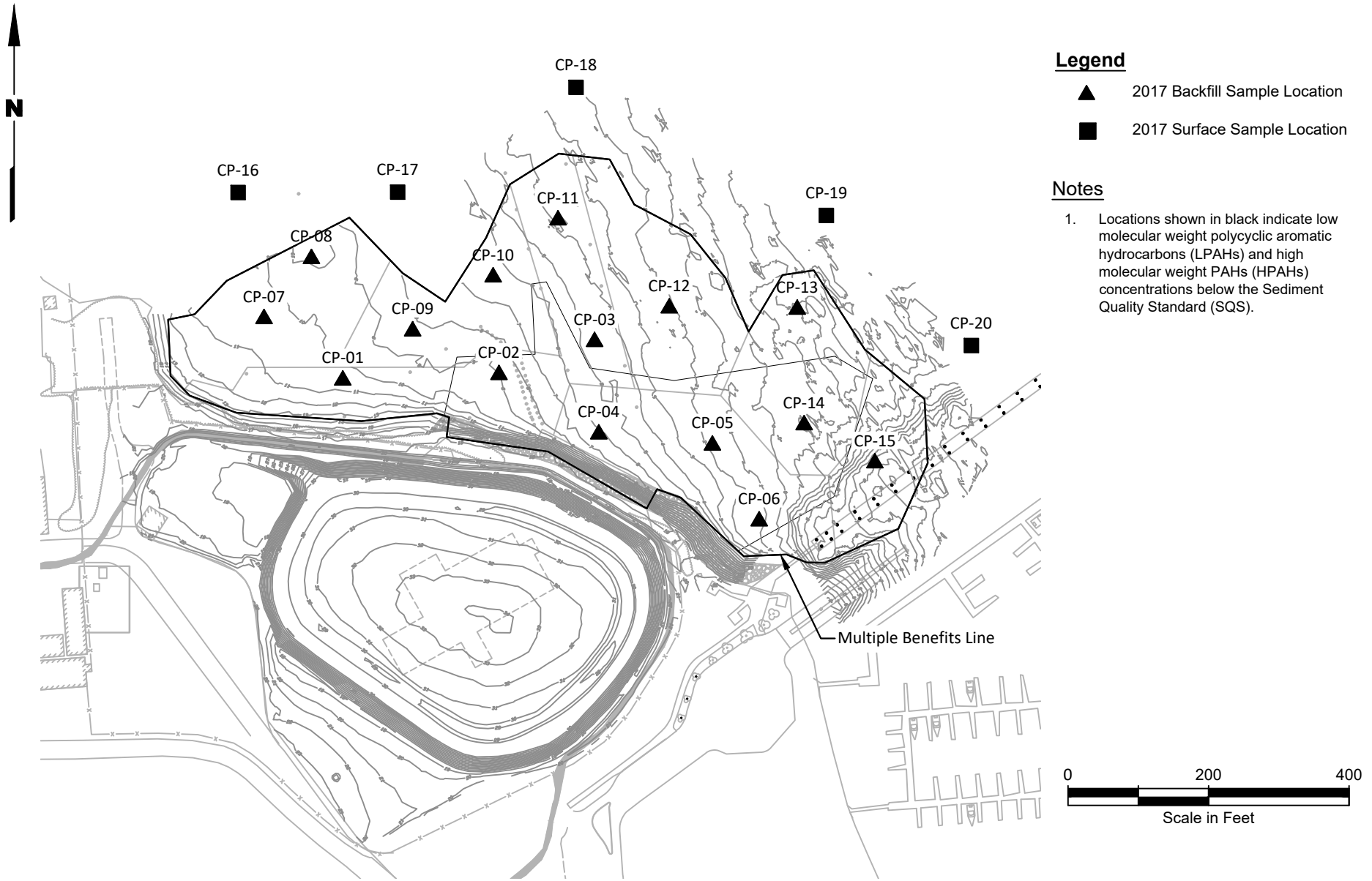
LAI. 1993b. Feasibility Study, Sediments Operable Unit, Cascade Pole Site, Port of Olympia, Washington. October 18.



Port of Olympia/SAP Tech Memo | V:\021\032\DS\SAP Tech Memo\Fig1.cdr (A) 9/25/2007

LANDAU ASSOCIATES

Cascade Pole Site Olympia, Washington	**Vicinity Map**	Figure 1



Source: Bathymetric Contours based on Survey by Magedorn, Inc. on September 13, 2002

LANDAU ASSOCIATES

Cascade Pole Site Olympia, Washington	**2017 Sediment Sampling Locations**	Figure 2

Table 1
2017 Sample Locations Coordinates
Cascade Pole Site
Port of Olympia, Washington

Sample Location	Mudline Elevation (MLLW) (a)	Northing (b)	Easting (b)
Subsurface Sediment Samples			
CP-01	9.8	638209	1041877
CP-02	7.6	638216	1042099
CP-03	3.5	638263	1042235
CP-04	4.6	638132	1042241
CP-05	0.1	638116	1042398
CP-06	0.9	638005	1042467
CP-07	9.5	638300	1041765
CP-08	10.4	638381	1041832
CP-09	7.1	638279	1041976
CP-10	6.8	638355	1042091
CP-11	3.9	638436	1042183
CP-12	1.3	638311	1042341
CP-13	-2.2	638309	1042523
CP-14	-3.0	638141	1042533
CP-15	-8.7	638091	1042634
Surface Sediment Samples			
CP-16	7.5	638476	1041728
CP-17	6.0	638476	1041955
CP-18	0.7	638625	1042209
CP-19	-4.4	638443	1042565
CP-20	-6.4	638258	1042771

Abbreviations and Acronyms:
MLLW = mean lower low water

Notes:
(a) Approximate elevation calculated from water depth and tide level datum.
(b) Washington State Plane South Zone NAD 83, survey feet.

Table 2
2017 Summary of Sediment Results (OC normalized)
Cascade Pole Site
Port of Olympia, Washington

Analyte	SMS Criteria		Sample Location, Lab Sample Identification, and Sample Date													
	Sediment Quality Standard (a)	Project-Specific Cleanup Screening Level (CSL) (b)	CP-01-M 17H0270-15 8/22/2017	CP-02-M 17H0270-12 8/22/2017	CP-03-M 17H0270-10 8/22/2017	CP-04-M 17H0270-11 8/22/2017	CP-05-M 17H0270-04 8/22/2017	CP-06-M 17H0270-14 8/22/2017	CP-07-M 17H0270-13 8/22/2017	CP-08-M 17H0270-03 8/22/2017	CP-09-M 17H0270-05 8/22/2017	CP-10-M 17H0270-02 8/22/2017	CP-11-M 17H0270-07 8/22/2017	CP-12-M 17H0270-06 8/22/2017	CP-13-M 17H0270-09 8/22/2017	CP-14-M 17H0270-08 8/22/2017	CP-15-M 17H0270-01 8/22/2017
Dioxins (pg/g TEQ dry weight; EPA 8290A)	---	80	**0.224**	**0.018**	**0.027**	**0.024**	ND	**0.070**	**0.180**	**0.887**	**1.725**	**0.052**	**0.094**	**0.537**	**0.062**	**0.050**	**0.014**
Polycyclic Aromatic Hydrocarbons (mg/kg OC; EPA 8270D-SIM)																	
Naphthalene	99	170	4.0 U	7.0 U	12.2 U	**10.3**	9.4 U	7.0 U	8.1 U	7.7 U	**9.0**	6.2 U	7.0 U	5.5 U	16.2 U	9.9 U	2.6 U
Acenaphthylene	66	66	4.0 U	7.0 U	12.2 U	6.1 U	9.4 U	7.0 U	8.1 U	7.7 U	5.1 U	6.2 U	7.0 U	5.5 U	16.2 U	9.9 U	2.6 U
Acenaphthene	16	57	4.0 U	7.0 U	12.2 U	6.1 U	9.4 U	7.0 U	8.1 U	7.7 U	5.1 U	6.2 U	7.0 U	5.5 U	16.2 U	9.9 U	2.6 U
Fluorene	23	79	4.0 U	7.0 U	12.2 U	6.1 U	9.4 U	7.0 U	8.1 U	7.7 U	5.1 U	6.2 U	7.0 U	5.5 U	16.2 U	9.9 U	2.6 U
Phenanthrene	100	480	4.0 U	7.0 U	12.2 U	**6.7**	9.4 U	7.0 U	8.1 U	7.7 U	**7.7**	6.2 U	7.0 U	5.5 U	16.2 U	9.9 U	2.6 U
Anthracene	220	1,200	4.0 U	7.0 U	12.2 U	6.1 U	9.4 U	7.0 U	8.1 U	7.7 U	5.1 U	6.2 U	7.0 U	5.5 U	16.2 U	9.9 U	2.6 U
2-Methylnaphthalene	38	64	4.0 U	7.0 U	12.2 U	6.1 U	9.4 U	7.0 U	8.1 U	7.7 U	5.1 U	6.2 U	7.0 U	5.5 U	16.2 U	9.9 U	2.6 U
LPAH (c,d)	370	780	4.0 U	7.0 U	12.2 U	**17.0**	9.4 U	7.0 U	8.1 U	7.7 U	**16.7**	6.2 U	7.0 U	5.5 U	16.2 U	9.9 U	2.6 U
Fluoranthene	160	1,200	4.0 U	7.0 U	12.2 U	6.1 U	9.4 U	7.0 U	8.1 U	**10.4**	**13.8**	6.2 U	7.0 U	5.5 U	16.2 U	9.9 U	2.6 U
Pyrene	1,000	1,400	4.0 U	7.0 U	12.2 U	6.1 U	9.4 U	7.0 U	8.1 U	**9.1**	**13.9**	6.2 U	7.0 U	5.5 U	16.2 U	9.9 U	2.6 U
Benzo(a)anthracene	110	270	4.0 U	7.0 U	12.2 U	6.1 U	9.4 U	7.0 U	8.1 U	7.7 U	5.1 U	6.2 U	7.0 U	5.5 U	16.2 U	9.9 U	2.6 U
Chrysene	110	460	4.0 U	7.0 U	12.2 U	6.1 U	9.4 U	7.0 U	8.1 U	7.7 U	**7.3**	6.2 U	7.0 U	5.5 U	16.2 U	9.9 U	2.6 U
Total Benzofluoranthenes	230	450	7.9 U	14.0 U	24.4 U	12.2 U	18.7 U	14.0 U	16.2 U	15.3 U	10.2 U	12.3 U	14.0 U	11.0 U	32.4 U	19.7 U	5.1 U
Benzo(a)pyrene	99	210	4.0 U	7.0 U	12.2 U	6.1 U	9.4 U	7.0 U	8.1 U	7.7 U	5.1 U	6.2 U	7.0 U	5.5 U	16.2 U	9.9 U	2.6 U
Indeno(1,2,3-cd)pyrene	34	88	4.0 U	7.0 U	12.2 U	6.1 U	9.4 U	7.0 U	8.1 U	7.7 U	5.1 U	6.2 U	7.0 U	5.5 U	16.2 U	9.9 U	2.6 U
Dibenz(a,h)anthracene	12	33	4.0 U	7.0 U	12.2 U	6.1 U	9.4 U	7.0 U	8.1 U	7.7 U	5.1 U	6.2 U	7.0 U	5.5 U	16.2 U	9.9 U	2.6 U
Benzo(g,h,i)perylene	31	78	4.0 U	7.0 U	12.2 U	6.1 U	9.4 U	7.0 U	8.1 U	7.7 U	5.1 U	6.2 U	7.0 U	5.5 U	16.2 U	9.9 U	2.6 U
HPAH (c,e,f)	960	5,300	4.0 U	7.0 U	12.2 U	6.1 U	9.4 U	7.0 U	8.1 U	**19.5**	**35.0**	6.2 U	7.0 U	5.5 U	16.2 U	9.9 U	2.6 U
Semivolatiles (mg/kg OC; EPA 8270D-SIM)																	
Dibenzofuran	15	80	4.0 U	7.0 U	12.2 U	6.1 U	9.4 U	7.0 U	8.1 U	7.7 U	5.1 U	6.2 U	7.0 U	5.5 U	16.2 U	9.9 U	2.6 U
Conventionals (%)																	
Total Organic Carbon (SW9060M)	10 (g)	10 (g)	0.12	0.07	0.04	0.08	0.05	0.07	0.06	0.06	0.09	0.08	0.07	0.09	0.03	0.05	0.19 J
Total Solids (SM2540B)	---	---	95.37	90.3	91.01	94.55	95.46	87.98	91.34	91.85	90.36	91.48	86.5	87.87	91.9	90.48	94.6

Notes:
U = Indicates the compound was not detected at the reported concentration.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
Bold = Detected compound.

Abbreviations and Acronyms:
EPA = US Environmnetal Protection Agency
HPAH = high molecular weight polcyclic aromatic hydrocarbon
LPAH = low molecular weight polcyclic aromatic hydrocarbon
mg/kg = milligram per kilogram
OC = carbon normalized
pg/g = picogram per gram
SIM = selected ion monitoring

(a) SMS Sediment Quality Standard; adopted in 1995 (Chapter 173-204 WAC), updated in 2017 by SCUM II (draft).
(b) SMS Cleanup Screening Level (Chapter 173-204 WAC); adopted in 2001 per the Compliance Monitoring Plan.
(c) Where chemical criteria in this table represent the sum of individual compounds or isomers, the following methods shall be applied:
  (i) Where chemical analyses identify an undetected value for every individual compound/isomer, then the single highest detection limit shall represent the sum of the respective compounds/isomers.
  (ii) Where chemical analyses detect one or more individual compounds/isomers, only the detected concentrations will be added to represent the group sum.
(d) The LPAH criterion represents the sum of the following "low molecular weight polynuclear aromatic hydrocarbon" compounds: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, and anthracene. The LPAH criterion is not the sum of the criteria values for the individual LPAH compounds listed.
(e) The total benzofluoranthenes criterion represents the sum of the concentrations of the "B," "J," and "K" isomers.
(f) The HPAH criterion represents the sum of the following "high molecular weight polynuclear aromatic hydrocarbon" compounds: fluoranthene, pyrene, benzo(a)anthracene, chrysene, total benzofluoranthenes, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene. The HPAH criterion is not the sum of the criteria values for the individual HPAH compounds as listed.
(g) DMMP clarification paper and SMS technical information memorandum: Management of Wood Waste Under Dredged Material Management Program and the SMS Cleanup Program.

Table 3
2017 Summary of Sediment Results (Dry Weight)
Cascade Pole Site
Port of Olympia, Washington

Analyte	Marine Sediment Apparent Effects Threshold (AET) SCO	AET CSL	Sample Location, Laboratory Sample Identification, and Sample Date														Surface Sediment Samples					
																	Dup of CP-18-S					
			CP-01-M 17H0270-15 8/22/2017	CP-02-M 17H0270-12 8/22/2017	CP-03-M 17H0270-10 8/22/2017	CP-04-M 17H0270-11 8/22/2017	CP-05-M 17H0270-04 8/22/2017	CP-06-M 17H0270-14 8/22/2017	CP-07-M 17H0270-13 8/22/2017	CP-08-M 17H0270-03 8/22/2017	CP-09-M 17H0270-05 8/22/2017	CP-10-M 17H0270-02 8/22/2017	CP-11-M 17H0270-07 8/22/2017	CP-12-M 17H0270-06 8/22/2017	CP-13-M 17H0270-09 8/22/2017	CP-14-M 17H0270-08 8/22/2017	CP-15-M 17H0270-01 8/22/2017	CP-16-S 17H0211-01 8/16/2017	CP-17-S 17H0211-02 8/16/2017	CP-18-S 17H0211-03 8/16/2017	CP-Dup1-S 17H0211-06 8/16/2017	CP-19-S 17H0211-04 8/16/2017	CP-20-S 17H0211-05 8/16/2017
PAHs + Dibenzofuran (µg/kg dry wt; EPA SW8270D-SIM)																						
Naphthalene	2,100	2,100	4.76 U	4.91 U	4.88 U	**8.25**	4.68 U	4.9 U	4.86 U	4.59 U	**8.07**	4.92 U	4.91 U	4.93 U	4.85 U	4.93 U	4.88 U	149	1150	471	542	527	528
2-Methylnaphthalene	670	670	4.76 U	4.91 U	4.88 U	4.87 U	4.68 U	4.9 U	4.86 U	4.59 U	4.59 U	4.92 U	4.91 U	4.93 U	4.85 U	4.93 U	4.88 U	26.8	134	91.9	86.7	70.9	108
Acenaphthylene	1,300	1,300	4.76 U	4.91 U	4.88 U	4.87 U	4.68 U	4.9 U	4.86 U	4.59 U	4.59 U	4.92 U	4.91 U	4.93 U	4.85 U	4.93 U	4.88 U	10.8	20.3	17.5	16.8	31.2	39.7
Acenaphthene	500	500	4.76 U	4.91 U	4.88 U	4.87 U	4.68 U	4.9 U	4.86 U	4.59 U	4.59 U	4.92 U	4.91 U	4.93 U	4.85 U	4.93 U	4.88 U	22.1	204	104	98.4	105	89.8
Dibenzofuran	540	540	4.76 U	4.91 U	4.88 U	4.87 U	4.68 U	4.9 U	4.86 U	4.59 U	4.59 U	4.92 U	4.91 U	4.93 U	4.85 U	4.93 U	4.88 U	21.8	160	68.4	54.1	91	67.9
Fluorene	540	540	4.76 U	4.91 U	4.88 U	4.87 U	4.68 U	4.9 U	4.86 U	4.59 U	4.59 U	4.92 U	4.91 U	4.93 U	4.85 U	4.93 U	4.88 U	22.3	188	69	60.4	78.7	61.3
Phenanthrene	1,500	1,500	4.76 U	4.91 U	4.88 U	**5.37**	4.68 U	4.9 U	4.86 U	4.59 U	6.97	4.92 U	4.91 U	4.93 U	4.85 U	4.93 U	4.88 U	72.8	405	154	156	219	215
Anthracene	960	960	4.76 U	4.91 U	4.88 U	4.87 U	4.68 U	4.9 U	4.86 U	4.59 U	4.59 U	4.92 U	4.91 U	4.93 U	4.85 U	4.93 U	4.88 U	42.8	203	78.2	76.6	149	104
Fluoranthene	1,700	2,500	4.76 U	4.91 U	4.88 U	4.87 U	4.68 U	4.9 U	4.86 U	**6.26**	**12.4**	4.92 U	4.91 U	4.93 U	4.85 U	4.93 U	4.88 U	117	545	205	215	251	351
Pyrene	2,600	3,300	4.76 U	4.91 U	4.88 U	4.87 U	4.68 U	4.9 U	4.86 U	**5.44**	**12.5**	4.92 U	4.91 U	4.93 U	4.85 U	4.93 U	4.88 U	130	702	281	299	417	461
Benzo(a)anthracene	1,300	1,600	4.76 U	4.91 U	4.88 U	4.87 U	4.68 U	4.9 U	4.86 U	4.59 U	4.59 U	4.92 U	4.91 U	4.93 U	4.85 U	4.93 U	4.88 U	54	137	46.7	58.4	320	108
Chrysene	1,400	2,800	4.76 U	4.91 U	4.88 U	4.87 U	4.68 U	4.9 U	4.86 U	4.59 U	**6.60**	4.92 U	4.91 U	4.93 U	4.85 U	4.93 U	4.88 U	86	246	49.4	69.6	467	129
Benzo(a)pyrene	1,600	1,600	4.76 U	4.91 U	4.88 U	4.87 U	4.68 U	4.9 U	4.86 U	4.59 U	4.59 U	4.92 U	4.91 U	4.93 U	4.85 U	4.93 U	4.88 U	38.8	112	42.7	48.6	279	136
Indeno(1,2,3-cd)pyrene	600	690	4.76 U	4.91 U	4.88 U	4.87 U	4.68 U	4.9 U	4.86 U	4.59 U	4.59 U	4.92 U	4.91 U	4.93 U	4.85 U	4.93 U	4.88 U	23.2	50.9	21.8	27.2	121	66.2
Dibenz(a,h)anthracene	230	230	4.76 U	4.91 U	4.88 U	4.87 U	4.68 U	4.9 U	4.86 U	4.59 U	4.59 U	4.92 U	4.91 U	4.93 U	4.85 U	4.93 U	4.88 U	8.88	16.5	5.14	9.78 U	39.5	22.9
Benzo(g,h,i)perylene	670	720	4.76 U	4.91 U	4.88 U	4.87 U	4.68 U	4.9 U	4.86 U	4.59 U	4.59 U	4.92 U	4.91 U	4.93 U	4.85 U	4.93 U	4.88 U	27.7	60.2	33.5	34.1	125	68.3
1-Methylnaphthalene	--	--	4.76 U	4.91 U	4.88 U	4.87 U	4.68 U	4.9 U	4.86 U	4.59 U	4.59 U	4.92 U	4.91 U	4.93 U	4.85 U	4.93 U	4.88 U	17.5	120	60.5	59.8	54.7	64.5
Total Benzofluoranthenes	3,200	3,600	9.52 U	9.83 U	9.77 U	9.73 U	9.35 U	9.81 U	9.71 U	9.19 U	9.19 U	9.84 U	9.83 U	9.86 U	9.71 U	9.86 U	9.77 U	83.2	251	96.3	114	576	312
LPAH (a, b)	5,200	5,200	4.76 U	4.91 U	4.88 U	**13.62**	4.68 U	4.9 U	4.86 U	4.59 U	**15.04**	4.92 U	4.91 U	4.93 U	4.85 U	4.93 U	4.88 U						
HPAH (a, c, d)	12,000	17,000	4.76 U	4.91 U	4.88 U	4.87 U	4.68 U	4.9 U	4.86 U	**11.7**	**31.50**	4.92 U	4.91 U	4.93 U	4.85 U	4.93 U	4.88 U	AET criteria intended for samples with TOC <0.5% or >3.5%; surface sediment samples meet this TOC criteria (recommend hiding these columns if using table in report)					
Conventionals (%)																							
Total Organic Carbon (SW9060M; Plumb 1981)	--	--	**0.12**	**0.07**	**0.04**	**0.08**	**0.05**	**0.07**	**0.06**	**0.06**	**0.09**	**0.08**	**0.07**	**0.09**	**0.03**	**0.05**	**0.19 J**	0.62 J	1.03	2.04 J	0.8 J	2.5	2.26
Total Solids (SM2540B)	--	--	**95.37**	**90.3**	**91.01**	**94.55**	**95.46**	**87.98**	**91.34**	**91.85**	**90.36**	**91.48**	**86.5**	**87.87**	**91.9**	**90.48**	**94.6**	65.85	68.86	64.6	65.42	46.11	43.49
Dioxins/Furans (pg/g dry wt; EPA 8290A)																							
2,3,7,8-TCDF	--	--	0.02 U	0.01 U	0.02 U	0.01 U	0.03 U	0.01 U	0.01 U	0.03 U	0.2 U	0.02 U	0.02 U	0.03 U	0.02 U	0.02 U	0.03 U	1.11	1.52	1.86	2.12	2.6	2.27
Total TCDF	--	--	1.00 U	**0.06**	0.99 U	**0.05**	0.99 U	0.98 U	**0.14**	**0.21**	**2.98**	**0.05**	**0.14**	**0.32**	**0.1**	**0.06**	**0.05**	24.1	29.8	31.9	36.4	46.5	39.8
2,3,7,8-TCDD	--	--	0.02 U	0.03 U	0.02 U	0.02 U	0.04 U	0.02 U	0.02 U	0.04 U	0.03 U	0.03 U	0.02 U	0.03 U	0.03 U	0.02 U	0.04 U	0.47 U	0.52 U	0.56 U	0.56 J	0.81 U	0.69 U
Total TCDD	--	--	**0.51**	**0.57**	**0.72**	**0.4**	**0.47**	**0.52**	**0.68**	**1.27**	**1.68**	**0.46**	**0.48**	**1.29**	**0.63**	**0.79**	**0.64**	20.9	20.2	25.8 J	59.6 J	47.7	26.8
1,2,3,7,8-PeCDF	--	--	0.03 U	0.02 U	0.05 U	0.04 U	0.03 U	0.02 U	0.06 U	0.04 U	**0.23 J**	0.02 U	**0.06 J**	0.04 U	0.03 U	0.07 U	0.02 U	1.3	1.55	1.6	2.09	2.45	1.81
2,3,4,7,8-PeCDF	--	--	0.03 U	0.02 U	0.03 U	0.02 U	0.03 U	0.02 U	0.02 U	0.13 U	**0.23 J**	0.03 U	**0.04 J**	0.03 U	0.03 U	0.03 U	0.03 U	1.59	1.89	1.79	2.36	2.4	1.98
Total PeCDF	--	--	**0.44**	**0.14**	**0.33**	**0.14**	0.99 U	0.98 U	**0.51**	**2.1**	**4.54**	**0.23**	**0.32**	**0.96**	**0.17**	**0.31**	**0.06**	33.4	43.3	40.2	48.8	64.7	50.1
1,2,3,7,8-PeCDD	--	--	0.05 U	0.06 U	0.06 U	0.03 U	0.05 U	**0.07 J**	0.05 U	**0.35 J**	0.36 U	0.09 U	**0.05 J**	**0.18 J**	0.11 U	0.04 U	0.04 U	2.47	2.73	2.48	2.68	4.65	3.31
Total PeCDD	--	--	**0.28**	**0.11**	**0.25**	**0.07**	0.99 U	**0.17**	0.99 U	**3.91**	**3.27**	**0.21**	**0.19**	**0.66**	**0.6**	**0.48**	**0.11**	32.7	33.3	28 J	55.1 J	59.1	38.9
1,2,3,4,7,8-HxCDF	--	--	0.07 U	0.06 U	0.07 U	0.04 U	0.03 U	0.03 U	**0.15 J**	**0.36 J**	**0.88 J**	**0.13 J**	**0.1 J**	0.28 U	0.06 U	0.08 U	0.03 U	4.98	6.91	4.61 J	7.57 J	8.98	6.81
1,2,3,6,7,8-HxCDF	--	--	0.03 U	0.02 U	0.03 U	0.03 U	0.03 U	0.03 U	0.07 U	0.03 U	**0.43 J**	0.02 U	0.02 U	0.18 U	**0.05 J**	0.03 U	0.03 U	2.25	2.81	2.1	2.97	3.81	3.07
2,3,4,6,7,8-HxCDF	--	--	0.03 U	0.02 U	0.02 U	0.03 U	0.03 U	0.03 U	0.10 U	0.19 U	0.56 U	0.02 U	0.02 U	0.1 U	0.03 U	0.03 U	0.03 U	3.41	3.04	3.06	2.48	6.04	4.79
1,2,3,7,8,9-HxCDF	--	--	**0.11 J**	0.02 U	0.03 U	0.04 U	0.04 U	0.08 U	0.02 U	0.04 U	**0.37 J**	0.03 U	0.08 U	**0.16 J**	0.06 U	**0.09 J**	0.03 U	1.18	1.52	1.27	2.50	2.11	1.73
Total HxCDF	--	--	**2.12**	**0.68**	**0.96**	**0.75**	**0.65**	**0.19**	**2.39**	**6.88**	**15.7**	**1.68**	**1.04**	**4.99**	**0.99**	**1.19**	**0.44**	80.1	245	95.6 J	159 J	204	159
1,2,3,4,7,8-HxCDD	--	--	**0.12 J**	0.07 U	0.05 U	0.04 U	0.05 U	0.07 U	0.05 U	**0.3 J**	**0.57 J**	0.11 U	0.04 U	0.2 U	**0.17 J**	0.16 U	0.04 U	2.93	3.46	2.69	2.89	4.79	3.97
1,2,3,6,7,8-HxCDD	--	--	**0.45 J**	**0.18 J**	**0.27 J**	**0.24 J**	0.19 U	0.04 U	0.46 U	**1.02**	**2.64**	0.39 U	**0.2 J**	1.02 U	0.25 U	**0.31 J**	0.04 U	10.3	25.7	13 J	18.6 J	26.2	19.6
1,2,3,7,8,9-HxCDD	--	--	0.24 U	0.17 U	0.18 U	0.21 U	0.2 U	0.12 U	0.05 U	0.68 U	**1.38**	0.21 U	0.05 U	0.49 U	**0.3 J**	0.27 U	**0.14 J**	5.99	9.63	5.82	6.82	12.1	9.38
Total HxCDD	--	--	4.22 U	2.55 U	2.51 U	2.46 U	1.68 U	1.44 U	4.14 U	**11.3**	**25.1**	2.89 U	1.87 U	**8.84**	4.47 U	3.9 U	1.45 U	139	244	126	151	270	209
1,2,3,4,6,7,8-HpCDF	--	--	**1.37**	0.45 U	0.72 U	0.52 U	0.83 U	0.22 U	**1.33**	**4.39**	**10.1**	**1.02**	0.65 U	**3.17**	**0.93 J**	**0.93 J**	0.41 U	61.6	182	51.1	71.5	138	109
1,2,3,4,7,8,9-HpCDF	--	--	0.07 U	0.06 U	0.02 U	0.03 U	0.07 U	0.02 U	0.06 U	0.18 U	0.49 U	0.03 U	0.04 U	0.17 U	**0.08 J**	0.10 U	0.04 U	2.55	6.3	1.97	3.20	4.65	3.97
Total HpCDF	--	--	**3.39**	**1.37**	**1.85**	**1.8**	**1.81**	**0.62**	**3.61**	**12.9**	**26**	**2.8**	**1.64**	**8.41**	**2.2**	**2.61**	**0.94**	148	643	126 J	195 J	338	264
1,2,3,4,6,7,8-HpCDD	--	--	**11.3**	5.14 U	6.23 U	7.19 U	3.72 U	2.14 U	**11.8**	**25.9**	**73.3**	9.69 U	5.16 U	**24.4**	6.06 U	6.77 U	3.12 U	255	893	292 J	457 J	663	456
Total HpCDD	--	--	26.3 U	12.1 U	15.1 U	17.1 U	8.93 U	5.34 U	**27.3**	**62.2**	**179**	21.2 U	12.2 U	**57**	16.2 U	17.3 U	7.91 U	642	1920	707	981	1580	1080
OCDF	--	--	**1.5 J**	**0.77 J**	0.9 U	**1.19 J**	0.88 U	0.38 U	**1.64 J**	**7.54**	**12.9**	**1.36 J**	**0.76 J**	**4.21**	**1.11 J**	**1.61 J**	**0.56 J**	73.1	453	57.1	69.2	190	144
OCDD	--	--	**97.6**	47.4 U	50.4 U	75.5 U	29.3 U	16.5 U	**111**	**213**	**614**	**95.9**	42.6 U	**213**	46.4 U	61.1 U	25.6 U	1830	5920 E	2110 J	3690 EJ	4930 E	3320
Dioxin TEQ	--	--	**0.224**	**0.018**	**0.027**	**0.024**	ND	**0.070**	**0.180**	**0.887**	**1.725**	**0.052**	**0.094**	**0.537**	**0.062**	**0.050**	**0.014**	**9.963**	**21.527**	**10.607**	**15.050**	**21.699**	**15.849**

Table 3
2017 Summary of Sediment Results (Dry Weight)
Cascade Pole Site
Port of Olympia, Washington

Notes:
U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
E = The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL)
Bold = Detected compound.

(a) Where chemical criteria in this table represent the sum of individual compounds or isomers, the following methods shall be applied:
  (i) Where chemical analyses identify an undetected value for every individual compound/isomer, then the single highest detection limit shall represent the sum of the respective compounds/isomers.
  (ii) Where chemical analyses detect one or more individual compounds/isomers, only the detected concentrations will be added to represent the group sum.
(b) The LPAH criterion represents the sum of the following "low molecular weight polynuclear aromatic hydrocarbon" compounds: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, and anthracene. The LPAH criterion is not the sum of the criteria values for the individual LPAH compounds listed.
(c) The total benzofluoranthenes criterion represents the sum of the concentrations of the "B," "J," and "K" isomers.
(d) The HPAH criterion represents the sum of the following "high molecular weight polynuclear aromatic hydrocarbon" compounds: fluoranthene, pyrene, benzo(a)anthracene, chrysene, total benzofluoranthenes, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene. The HPAH criterion is not the sum of the criteria values for the individual HPAH compounds as listed.

Abbreviations and Acronyms:
CSL = cleanup screening level
EPA = US Environmnetal Protection Agency
HPAH = high molecular weight polcyclic aromatic hydrocarbon
HpCDD = Heptachlorinated Dibenzo-p-Dioxin
HpCDF = Heptachlorinated Dibenzofuran
HxCDD = Hexachlorinated Dibenzo-p-Dioxin
HxCDF = Hexachlorinated Dibenzofuran
LPAH = low molecular weight polcyclic aromatic hydrocarbon
µg/kg = microgram per kilogram
OC = carbon normalized
OCDD = Octachlorinated Dibenzo-p-Dioxin
OCDF = Octachlorinated Dibenzofuran
PeCDD = Pentachlorinated Dibenzo-p-Dioxin
PeCDF = Pentachlorinated Dibenzofuran
% = percent
pg/g = picogram per gram
PAH = polycyclic aromatic hydrocarbon
SIM = selected ion monitoring
SCO = sediment cleanup objective
TCDD = Tetrachlorinated Dibenzo-p-Dioxin
TCDF = Tetrachlorinated Dibenzofuran
TEQ = toxicity equivalency

Table 4
2017 Surface Sediment Analytical Results
Cascade Pole Site
Port of Olympia, Washington

Analyte	SMS Criteria		Sample Location, Lab Sample Identification, and Sample Date					
	Sediment Quality Standard (a)	Project-Specific Cleanup Screening Level CSL(b)	CP-16-S 17H0211-01 8/16/2017	CP-17-S 17H0211-02 8/16/2017	CP-18-S 17H0211-03 8/16/2017	Dup of CP-18-S CP-Dup1-S 17H0211-06 8/16/2017	CP-19-S 17H0211-04 8/16/2017	CP-20-S 17H0211-05 8/16/2017
Dioxins (pg/g TEQ dry weight; EPA 8290A)	---	80	**9.963**	**21.527**	**10.607**	**15.050**	**21.699**	**15.849**
Polycyclic Aromatic Hydrocarbons (mg/kg OC; EPA 8270D-SIM)								
Naphthalene	99	170	**24.0**	**111.7**	**23.1**	**67.8**	**21.1**	**23.4**
Acenaphthylene	66	66	**1.7**	**2.0**	**0.9**	**2.1**	**1.2**	**1.8**
Acenaphthene	16	57	**3.6**	**19.8**	**5.1**	**12.3**	**4.2**	**4.0**
Fluorene	23	79	**3.6**	**18.3**	**3.4**	**7.6**	**3.1**	**2.7**
Phenanthrene	100	480	**11.7**	**39.3**	**7.5**	**19.5**	**8.8**	**9.5**
Anthracene	220	1,200	**6.9**	**19.7**	**3.8**	**9.6**	**6.0**	**4.6**
2-Methylnaphthalene	38	64	**4.3**	**13.0**	**4.5**	**10.8**	**2.8**	**4.8**
LPAH (c,d)	370	780	**51.6**	**210.7**	**43.8**	**118.8**	**44.4**	**45.9**
Fluoranthene	160	1,200	**18.9**	**52.9**	**10.0**	**26.9**	**10.0**	**15.5**
Pyrene	1,000	1,400	**21.0**	**68.2**	**13.8**	**37.4**	**16.7**	**20.4**
Benzo(a)anthracene	110	270	**8.7**	**13.3**	**2.3**	**7.3**	**12.8**	**4.8**
Chrysene	110	460	**13.9**	**23.9**	**2.4**	**8.7**	**18.7**	**5.7**
Total Benzofluoranthenes	230	450	**13.4**	**24.4**	**4.7**	**14.3**	**23.0**	**13.8**
Benzo(a)pyrene	99	210	**6.3**	**10.9**	**2.1**	**6.1**	**11.2**	**6.0**
Indeno(1,2,3-cd)pyrene	34	88	**3.7**	**4.9**	**1.1**	**3.4**	**4.8**	**2.9**
Dibenz(a,h)anthracene	12	33	**1.4**	**1.6**	**0.3**	1.2 U	**1.6**	**1.0**
Benzo(g,h,i)perylene	31	78	**4.5**	**5.8**	**1.6**	**4.3**	**5.0**	**3.0**
HPAH (c,e,f)	960	5,300	**91.7**	**206**	**38.3**	**109**	**104**	**73.2**
Semivolatiles (mg/kg OC; EPA 8270D-SIM)								
Dibenzofuran	15	80	**3.5**	**16**	**3.4**	**7**	**3.6**	**3.0**
Conventionals (%)								
Total Organic Carbon (SW9060M)	10 (g)	10 (g)	0.62 J	1.03	2.04 J	0.8 J	2.5	2.26
Total Solids (SM2540B)	---	---	65.85	68.86	64.60	65.42	46.11	43.49

Notes:

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

Bold = Detected compound.

Green Shaded Box = Exceeds SQS

Abbreviations and Acronyms:

EPA = US Environmnetal Protection Agency
HPAH = high molecular weight polcyclic aromatic hydrocarbon
LPAH = low molecular weight polcyclic aromatic hydrocarbon
mg/kg = milligram per kilogram
OC = carbon normalized
pg/g = picogram per gram
SIM = selected ion monitoring

(a) SMS Sediment Quality Standard; adopted in 1995 (Chapter 173-204 WAC), updated in 2017 by SCUM II (draft).
(b) SMS Cleanup Screening Level (Chapter 173-204 WAC); adopted in 2001 per the Compliance Monitoring Plan.
(c) Where chemical criteria in this table represent the sum of individual compounds or isomers, the following methods shall be applied:
  (i) Where chemical analyses identify an undetected value for every individual compound/isomer, then the single highest detection limit shall represent the sum of the respective compounds/isomers.
  (ii) Where chemical analyses detect one or more individual compounds/isomers, only the detected concentrations will be added to represent the group sum.
(d) The LPAH criterion represents the sum of the following "low molecular weight polynuclear aromatic hydrocarbon" compounds: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, and anthracene. The LPAH criterion is not the sum of the criteria values for the individual LPAH compounds listed.
(e) The total benzofluoranthenes criterion represents the sum of the concentrations of the "B," "J," and "K" isomers.
(f) The HPAH criterion represents the sum of the following "high molecular weight polynuclear aromatic hydrocarbon" compounds: fluoranthene, pyrene, benzo(a)anthracene, chrysene, total benzofluoranthenes, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene. The HPAH criterion is not the sum of the criteria values for the individual HPAH compounds as listed.
(g) DMMP clarification paper and SMS technical information memorandum: Management of Wood Waste Under Dredged Material Management Program and the SMS Cleanup Program.

APPENDIX A

Sediment Exploration Logs

Soil Classification System

MAJOR DIVISIONS			GRAPHIC SYMBOL	USCS LETTER SYMBOL[1]	TYPICAL DESCRIPTIONS [2][3]
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)		GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
				GP	Poorly graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		GM	Silty gravel; gravel/sand/silt mixture(s)
				GC	Clayey gravel; gravel/sand/clay mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No. 4 sieve)	CLEAN SAND (Little or no fines)		SW	Well-graded sand; gravelly sand; little or no fines
				SP	Poorly graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)		SM	Silty sand; sand/silt mixture(s)
				SC	Clayey sand; sand/clay mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY (Liquid limit less than 50)			ML	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity
				CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay
				OL	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid limit greater than 50)			MH	Inorganic silt; micaceous or diatomaceous fine sand
				CH	Inorganic clay of high plasticity; fat clay
				OH	Organic clay of medium to high plasticity; organic silt
	HIGHLY ORGANIC SOIL			PT	Peat; humus; swamp soil with high organic content

OTHER MATERIALS	GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT		AC or PC	Asphalt concrete pavement or Portland cement pavement
ROCK		RK	Rock (See Rock Classification)
WOOD		WD	Wood, lumber, wood chips
DEBRIS		DB	Construction debris, garbage

Notes:
1. USCS letter symbols correspond to symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM for sand or gravel) indicate soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
2. Soil descriptions are based on the general approach presented in the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the Standard Test Method for Classification of Soils for Engineering Purposes, as outlined in ASTM D 2487.
3. Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:

Primary Constituent:	> 50% - "GRAVEL," "SAND," "SILT," "CLAY," etc.
Secondary Constituents:	> 30% and ≤ 50% - "very gravelly," "very sandy," "very silty," etc.
	> 15% and ≤ 30% - "gravelly," "sandy," "silty," etc.
Additional Constituents:	> 5% and ≤ 15% - "with gravel," "with sand," "with silt," etc.
	≤ 5% - "with trace gravel," "with trace sand," "with trace silt," etc., or not noted.

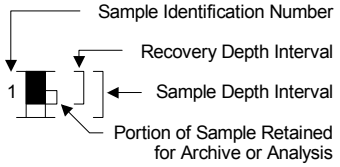
4. Soil density or consistency descriptions are based on judgement using a combination of sampler penetration blow counts, drilling or excavating conditions, field tests, and laboratory tests, as appropriate.

Drilling and Sampling Key

SAMPLER TYPE

Code	Description
a	3.25-inch O.D., 2.42-inch I.D. Split Spoon
b	2.00-inch O.D., 1.50-inch I.D. Split Spoon
c	Shelby Tube
d	Grab Sample
e	Single-Tube Core Barrel
f	Double-Tube Core Barrel
g	2.50-inch O.D., 2.00-inch I.D. WSDOT
h	3.00-inch O.D., 2.375-inch I.D. Mod. California
i	Other - See text if applicable
1	300-lb Hammer, 30-inch Drop
2	140-lb Hammer, 30-inch Drop
3	Pushed
4	Vibrocore (Rotosonic/Geoprobe)
5	Other - See text if applicable

SAMPLE NUMBER & INTERVAL



Field and Lab Test Data

Code	Description
PP = 1.0	Pocket Penetrometer, tsf
TV = 0.5	Torvane, tsf
PID = 100	Photoionization Detector VOC screening, ppm
W = 10	Moisture Content, %
D = 120	Dry Density, pcf
-200 = 60	Material smaller than No. 200 sieve, %
GS	Grain Size - See separate figure for data
AL	Atterberg Limits - See separate figure for data
GT	Other Geotechnical Testing
CA	Chemical Analysis

Groundwater

▽	Approximate water level at time of drilling (ATD)
▼	Approximate water level at time other than ATD

LANDAU ASSOCIATES

Cascade Pole 2017 Performance Monitoring Olympia, WA

Soil Classification System and Key

Figure A-1

CP-01

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Vibracorer Ground Elevation (ft): +9.8	
0						SM	Brown to gray, very silty fine SAND with shells; slight hydrogen sulfide odor, no sheen (loose, wet)	Groundwater not encountered.
						SP	**(MARINE DEPOSITS)**	
	CP-01-M						Brown, fine to coarse SAND with trace gravel; no odor, no sheen (medium dense, wet)	
							(BACKFILL)	
2						SP	Dark gray, fine to medium SAND with trace silt and shell fragments; no odor, no sheen (medium dense, wet)	
		e4					**(MARINE DEPOSITS)**	
4								
6								
8								
10								

Boring Completed 08/17/17
Total Depth of Boring = 7.0 ft.

Point located at State Plane Coordinates:
North: 638208.57
East: 1041876.98

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

0021041.010.012 9/14/17 N:\PROJECTS\0021041.010.012.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Cascade Pole 2017
Performance Monitoring
Olympia, WA

Log of Boring CP-01

Figure
A-2

CP-02

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Vibracorer Ground Elevation (ft): +7.6	
0						SP-SM	Gray, fine to coarse SAND with silt; slight hydrogen sulfide odor, no sheen (medium dense, wet) **(MARINE DEPOSITS)**	Groundwater not encountered.
2	CP-02-M					SP	Brown, fine to coarse SAND with trace silt; no odor, no sheen (medium dense, wet) **(BACKFILL)**	
4		e4				SP	Black, fine SAND with shell fragments; no odor, no sheen (medium dense, wet) **(MARINE DEPOSITS)**	
6						SM	Dark gray, silty fine SAND; hydrogen sulfide odor, no sheen (loose, wet) **(MARINE DEPOSITS)**	
8								
10								

Boring Completed 08/17/17
Total Depth of Boring = 7.0 ft.

Point located at State Plane Coordinates:
North: 638216.40
East: 1042099.14

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

0021041.010.012 9/14/17 N:\PROJECTS\0021041.010.012.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Cascade Pole 2017
Performance Monitoring
Olympia, WA

Log of Boring CP-02

Figure
A-3

CP-03

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Vibracorer Ground Elevation (ft): +3.5	
0						SM	Dark gray, very silty fine SAND; no odor, no sheen (loose, wet)	
						SP	**(MARINE DEPOSITS)**	Groundwater not encountered.
							Gray to brown, fine to coarse SAND with trace small gravel; no odor, no sheen (medium dense, wet)	
							(BACKFILL)	
2	CP-03-M							
		e4						
						ML	Dark gray, SILT with shells and trace wood debris; no odor, no sheen (stiff, wet)	
4							**(MARINE DEPOSITS)**	
6								
8								
10								

Boring Completed 08/16/17
Total Depth of Boring = 7.0 ft.

Point located at State Plane Coordinates:
North: 638263.34
East: 1042235.23

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

0021041.010.012 9/14/17 N:\PROJECTS\0021041.010.012.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Cascade Pole 2017
Performance Monitoring
Olympia, WA

Log of Boring CP-03

Figure
A-4

CP-04

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Vibracorer Ground Elevation (ft): +4.6	
0						SP-SM	Dark gray, fine to medium SAND with silt and gravel and trace wood debris (no odor, no sheen) (medium dense, wet) **(MARINE DEPOSITS)**	Groundwater not encountered.
2						SP	Brown, fine to medium SAND with trace gravel; no odor, no sheen (medium dense, wet) **(BACKFILL)**	
4	CP-04-M	e4				SP	Black, fine SAND; moderate odor, no sheen (medium dense, wet) **(MARINE DEPOSITS)**	
6						SM	Dark gray, silty fine SAND wiht shell fragments; slight petroleum odor, no sheen (soft, wet) **(MARINE DEPOSITS)**	
8								
10								

Boring Completed 08/17/17
Total Depth of Boring = 7.0 ft.

Point located at State Plane Coordinates:
North: 638131.80
East: 1042241.20

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

0021041.010.012 9/14/17 N:\PROJECTS\0021041.010.012.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Cascade Pole 2017
Performance Monitoring
Olympia, WA

Log of Boring CP-04

Figure
A-5

CP-05

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Vibracorer Ground Elevation (ft): +0.1	
0						SP	Brown, fine to medium SAND with trace gravel; no odor, no sheen (medium dense, wet) **(MARINE DEPOSITS)**	Groundwater not encountered.
2						SP	Brown, fine to coarse SAND with small gravel; no odor, no sheen (medium dense, wet) **(BACKFILL)**	
4		e4						
6	CP-05-M					ML	Dark gray, SILT with fine sand; strong hydrogen sulfide odor, no sheen (soft, wet) **(MARINE DEPOSITS)**	
8								
10								

Boring Completed 08/17/17
Total Depth of Boring = 7.0 ft.

Point located at State Plane Coordinates:
North: 638116.08
East: 1042397.81

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

0021041.010.012 9/14/17 N:\PROJECTS\0021041.010.012.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Cascade Pole 2017
Performance Monitoring
Olympia, WA

Log of Boring CP-05

Figure
A-6

CP-06

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Vibracorer Ground Elevation (ft): +0.9	
0						ML	Dark gray, sandy SILT; slight hydrogen sulfide odor, no sheen (stiff, wet) **(MARINE DEPOSITS)**	Groundwater not encountered.
						SP	Brown, fine to coarse SAND with gravel; no odor, no sheen (medium dense, wet) **(BACKFILL)**	
2	CP-06-M	e4						
4						ML	Dark gray, SILT with shells; slight hydrogen sulfide odor, no sheen (soft, wet) **(MARINE DEPOSITS)**	
6								
8								
10								

Boring Completed 08/17/17
Total Depth of Boring = 5.0 ft.

Point located at State Plane Coordinates:
North: 638004.52
East: 1042466.73

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

0021041.010.012 9/14/17 N:\PROJECTS\0021041.010.012.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Cascade Pole 2017
Performance Monitoring
Olympia, WA

Log of Boring CP-06

Figure
A-7

CP-07

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Vibracorer Ground Elevation (ft): +9.5	
0						SM	Dark gray, very silty SAND; slight hydrogen sulfide odor, no sheen (loose, wet) **(MARINE DEPOSITS)**	Groundwater not encountered.
						SP-SM SP	Dark gray, fine to coarse SAND with silt and gravel; slight hydrogen sulfide odor, no sheen (loose, wet) **(BACKFILL)**	
	CP-07-M	e4					Brown, fine to coarse SAND with gravel; no odor, no sheen (medium dense, wet) **(BACKFILL)**	
2						SM	Dark gray, silty fine SAND with shell fragments; slight hydrogen sulfide odor, no sheen (medium dense, wet) **(MARINE DEPOSITS)**	
4								
6								
8								
10								

Boring Completed 08/17/17
Total Depth of Boring = 3.1 ft.

Point located at State Plane Coordinates:
North: 638299.55
East: 1041765.05

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

0021041.010.012 9/14/17 N:\PROJECTS\0021041.010.012.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Cascade Pole 2017
Performance Monitoring
Olympia, WA

Log of Boring CP-07

Figure
A-8

CP-08

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Vibracorer Ground Elevation (ft): +10.4	
0						SP	Brown, gravelly, fine to coarse SAND; no odor, no sheen (medium dense, wet) **(BACKFILL)**	Groundwater not encountered.
	CP-08-M							
2						ML	Dark gray, SILT with fine sand and shell fragments; strong hydrogen sulfide odor, no sheen (stiff, wet) **(MARINE DEPOSITS)**	
		e4						
4								
6								
8								
10								

Boring Completed 08/17/17
Total Depth of Boring = 7.0 ft.

Point located at State Plane Coordinates:
North: 638381.42
East: 1041832.37

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

0021041.010.012 9/14/17 N:\PROJECTS\0021041.010.012.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Cascade Pole 2017
Performance Monitoring
Olympia, WA

Log of Boring CP-08

Figure
A-9

CP-09

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Vibracorer Ground Elevation (ft): +7.1	
0						ML	Dark gray, very sandy SILT; moderate hydrogen sulfide odor, no sheen (soft, wet) **(MARINE DEPOSITS)**	Groundwater not encountered.
	CP-09-M					GP	Brown, very sandy GRAVEL; no odor, no sheen (medium dense, wet) **(BACKFILL)**	
2						SM	Dark gray, silty, very fine SAND; moderate hydrogen sulfide odor, no sheen (loose, wet) **(MARINE DEPOSITS)**	
		e4						
4						ML	Dark gray, sandy SILT; very strong hydrogen sulfide odor, no sheen (loose, wet) **(MARINE DEPOSITS)**	
6								
8								
10								

Boring Completed 08/17/17
Total Depth of Boring = 7.0 ft.

Point located at State Plane Coordinates:
North: 638278.52
East: 1041976.36

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

0021041.010.012 9/14/17 N:\PROJECTS\0021041.010.012.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Cascade Pole 2017
Performance Monitoring
Olympia, WA

Log of Boring CP-09

Figure
A-10

CP-10

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Vibracorer Ground Elevation (ft): +6.8	
0						ML	Dark gray, SILT with trace sand and shell fragments; no odor, no sheen (soft, wet) **(MARINE DEPOSITS)**	Groundwater not encountered.
						SP	Gray to brown, fine to coarse SAND with trace small gravel; no odor, no sheen (medium dense, wet) **(BACKFILL)**	
	CP-10-M							
2		e4						
						SP-SM	Dark gray, fine to medium SAND with silt and shell fragments; slight hydrogen sulfide odor, no sheen (stiff, wet) **(MARINE DEPOSITS)**	
4								

Boring Completed 08/16/17
Total Depth of Boring = 4.1 ft.

Point located at State Plane Coordinates:
North: 638355.30
East: 1042090.91

6

8

10

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

0021041.010.012 9/14/17 N:\PROJECTS\0021041.010.012.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Cascade Pole 2017
Performance Monitoring
Olympia, WA

Log of Boring CP-10

Figure
A-11

CP-11

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Vibracorer Ground Elevation (ft): +3.9	
0						ML	Dark gray, sandy SILT with trace shell fragments; no odor, no sheen (soft, wet) **(MARINE DEPOSITS)**	Groundwater not encountered.
						SP	Gray to brown, fine to coarse SAND with trace gravel; no odor, no sheen (medium dense, wet) **(BACKFILL)**	
	CP-11-M							
2								
		e4				ML	Dark gray, SILT with sand; no odor, no sheen (soft, wet) **(MARINE DEPOSITS)**	
4								
6								
8								
10								

Boring Completed 08/16/17
Total Depth of Boring = 7.0 ft.

Point located at State Plane Coordinates:
North: 638436.42
East: 1042183.14

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

0021041.010.012 9/14/17 N:\PROJECTS\0021041.010.012.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Cascade Pole 2017
Performance Monitoring
Olympia, WA

Log of Boring CP-11

Figure
A-12

CP-12

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Vibracorer Ground Elevation (ft): +1.3	
0						SP	Brown, fine to coarse SAND with gravel; no odor, no sheen (medium dense, wet) **(BACKFILL)**	Groundwater not encountered.
	CP-12-M							
2						SM	Dark gray, silty fine SAND with shell fragments; hydrogen sulfide odor, no sheen (loose, wet) **(MARINE DEPOSITS)**	
		e4				ML	Dark gray, SILT with trace sand and shell fragments; no odor, no sheen (soft, wet) **(MARINE DEPOSITS)**	
4								
6								
8								
10								

Boring Completed 08/16/17
Total Depth of Boring = 7.0 ft.

Point located at State Plane Coordinates:
North: 638311.19
East: 1042341.41

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

0021041.010.012 9/14/17 N:\PROJECTS\0021041.010.012.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Cascade Pole 2017
Performance Monitoring
Olympia, WA

Log of Boring CP-12

Figure
A-13

CP-13

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Vibracorer Ground Elevation (ft): -2.2	
0						SM	Dark gray, very silty fine SAND with shells; no odor, no sheen (loose, wet)	
						SP	**(MARINE DEPOSITS)**	Groundwater not encountered.
							Gray to brown, fine to coarse SAND with gravel; no odor, no sheen (medium dense, wet)	
							(BACKFILL)	
2	CP-13-M							
		e4				ML	Dark gray, SILT with fine sand; slight hydrogen sulfide odor, no sheen (soft, wet)	
							(MARINE DEPOSITS)	
4								
						ML	Dark gray, sandy, clayey SILT with shells; slight hydrogen sulfide odor, no sheen (soft, wet)	
							(MARINE DEPOSITS)	
6								
8								
10								

Boring Completed 08/17/17
Total Depth of Boring = 7.0 ft.

Point located at State Plane Coordinates:
North: 638309.30
East: 1042523.39

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

0021041.010.012 9/14/17 N:\PROJECTS\0021041.010.012.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Cascade Pole 2017
Performance Monitoring
Olympia, WA

Log of Boring CP-13

Figure
A-14

CP-14

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Vibracorer Ground Elevation (ft): -3.0	
0						ML	Dark gray, sandy SILT with shell fragments; no odor, no sheen (soft, wet) **(MARINE DEPOSITS)**	Groundwater not encountered.
						SP	Gray to brown, fine to coarse SAND with small gravel; no odor, no sheen (medium dense, wet) **(BACKFILL)**	
2								
		e4						
4	CP-14-M							
6						ML	Dark gray, sandy SILT with abundant shell fragments; strong hydrogen sulfide odor, no sheen (soft, wet) **(MARINE DEPOSITS)**	
8								
10								

Boring Completed 08/17/17
Total Depth of Boring = 7.0 ft.

Point located at State Plane Coordinates:
North: 638141.15
East: 1042533.23

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

0021041.010.012 9/14/17 N:\PROJECTS\0021041.010.012.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Cascade Pole 2017
Performance Monitoring
Olympia, WA

Log of Boring CP-14

Figure
A-15

CP-15

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Vibracorer Ground Elevation (ft): -8.7	
0						ML	Black, SILT with sand; no odor, no sheen (soft, wet) **(MARINE DEPOSITS)**	Groundwater not encountered.
						SP	Dark gray, fine to coarse SAND with trace gravel; no odor, no sheen (loose, wet) **(BACKFILL)**	
2								
	CP-15-M	e4						
4						ML	Dark gray, SILT with shell fragments and wood debris; hydrogen sulfide odor, no sheen (soft, wet) **(MARINE DEPOSITS)**	
6								
8								
10								

Boring Completed 08/17/17
Total Depth of Boring = 7.0 ft.

Point located at State Plane Coordinates:
North: 638090.65
East: 1042633.93

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

0021041.010.012 9/14/17 N:\PROJECTS\0021041.010.012.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Cascade Pole 2017
Performance Monitoring
Olympia, WA

Log of Boring CP-15

Figure
A-16

CP-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Power Grab Ground Elevation (ft): +7.5	
0	CP-16-S	d5				ML	Dark gray, SILT with fine sand, wood debris and few shell fragments; no odor, no sheen (soft, wet) **(MARINE DEPOSITS)**	Groundwater not encountered.
2								

Boring Completed 08/16/17
Total Depth of Boring = 0.8 ft.

Point located at State Plane Coordinates:
North: 638475.82
East: 1041728.03

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

0021041.010.012 9/14/17 N:\PROJECTS\0021041.010.012.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Cascade Pole 2017
Performance Monitoring
Olympia, WA

Log of Boring CP-16

Figure
A-17

CP-17

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Power Grab Ground Elevation (ft): +6.0	
0	CP-17-S	d5				ML	Dark gray, SILT with sand and shell fragments; no odor, no sheen (soft, wet) **(MARINE DEPOSITS)**	Groundwater not encountered.
2								

Boring Completed 08/16/17
Total Depth of Boring = 0.8 ft.

Point located at State Plane Coordinates:
North: 638476.21
East: 1041954.95

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

LANDAU ASSOCIATES

Cascade Pole 2017
Performance Monitoring
Olympia, WA

Log of Boring CP-17

Figure
A-18

CP-18

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Power Grab Ground Elevation (ft): +0.7	
0	CP-18-S	d5				ML	Dark gray, sandy SILT with shell fragments, worms and seaweed; no odor, no sheen (soft, wet) **(MARINE DEPOSITS)**	Groundwater not encountered.

Boring Completed 08/16/17
Total Depth of Boring = 0.8 ft.

Point located at State Plane Coordinates:
North: 638625.38
East: 1042208.84

2

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

0021041.010.012 9/14/17 N:\PROJECTS\0021041.010.012.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Cascade Pole 2017
Performance Monitoring
Olympia, WA

Log of Boring CP-18

Figure
A-19

CP-19

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Power Grab Ground Elevation (ft): -4.4	
0	CP-19-S	d5				ML	Dark gray, SILT with trace very fine sand and shell fragments; no odor, no sheen (soft, wet) **(MARINE DEPOSITS)**	Groundwater not encountered.
2								

Boring Completed 08/16/17
Total Depth of Boring = 0.8 ft.

Point located at State Plane Coordinates:
North: 638443.05
East: 1042564.86

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

0021041.010.012 9/14/17 N:\PROJECTS\0021041.010.012.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Cascade Pole 2017
Performance Monitoring
Olympia, WA

Log of Boring CP-19

Figure
A-20

CP-20

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: Power Grab Ground Elevation (ft): -6.4	
0	CP-20-S	d5				ML	Dark gray, SILT with fine sand, shell fragments and organics; no odor, no sheen (soft, wet) **(MARINE DEPOSITS)**	Groundwater not encountered.
2								

Boring Completed 08/16/17
Total Depth of Boring = 0.8 ft.

Point located at State Plane Coordinates:
North: 638257.98
East: 1042771.18

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

0021041.010.012 9/14/17 N:\PROJECTS\0021041.010.012.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Cascade Pole 2017
Performance Monitoring
Olympia, WA

Log of Boring CP-20

Figure
A-21

APPENDIX C

Historical Sediment Analytical Results

Table C-1
2002 Sediment Analytical Results
Cascade Pole Site
Port of Olympia, Washington

Analyte	Cleanup Levels (a)	Sample Location, Lab Sample ID, Sample Date, and Sample Type																		
		CP-01-D K2202334-002 4/11/2002 Dredge	CP-02-D K2202374-002 4/12/2002 Dredge	CP-03-S K2202330-015 4/11/2002 Surface	Dup of CP-03-S CP-90-S K2202330-016 4/11/2002 Surface	CP-03-D K2202334-004 4/11/2002 Dredge	CP-04-D K2202374-004 4/11/2002 Dredge	CP-05-S K2202330-018 4/11/2002 Surface	CP-05-D K2202374-006 4/11/2002 Dredge	CP-06-F K2204074-001 4/10/2002 Fill (b)	CP-06-D K2202334-006 4/10/2002 Dredge	CP-07-S K2202330-009 4/11/2002 Surface	CP-07-D K2202374-009 4/11/2002 Dredge	CP-08-S K2202330-010 4/11/2002 Surface	CP-08-D K2202374-011 4/12/2002 Dredge	CP-09-S K2202330-012 4/11/2002 Surface	CP-09-D K2202334-008 4/11/2002 Dredge	CP-10-D K2202334-010 4/10/2002 Dredge	CP-11-S K2202330-017 4/11/2002 Surface	CP-11-D K2202334-012 4/10/2002 Dredge
Dioxins (ng/kg TEQ dry weight; EPA 8290A) (c)	80	0.00822	0.386	7.51	5.89	0.0241	0.0183	0.107	0.693		54.4	11.7	1.82	0.571	0.609	77.9	0.398	0.0544	5.35	0
Polycyclic Aromatic Hydrocarbons (mg/kg OC; EPA 8270/8270-SIM) (d)																				
Naphthalene	170	55	13	13	11	1.0 U	0.53	11 U	18	8.8 U	13	5.0 U	5.5	7.3 U	9.3	14	45	1.9	5.2	6.4 U
Acenaphthylene	66	3.2	1.8 U	3.7 U	4.4 U	1.0 U	0.50 U	11 U	0.40	8.8 U	1.2	5.0 U	1.3 U	7.3 U	1.5 U	1.3	1.3 U	0.79 U	3.0 U	6.4 U
Acenaphthene	57	265 (e)	1.8 U	3.7 U	4.4 U	1.0 U	0.50 U	11 U	12	8.8 U	92	5.0 U	1.3 U	7.3 U	2.0	3.7	29	0.79 U	3.0 U	6.4 U
Fluorene	79	9.0	1.8 U	3.7 U	4.4 U	1.0 U	0.50 U	11 U	8.0	8.8 U	54	5.0 U	1.3 U	7.3 U	1.6	4.2	1.4	0.79 U	3.0 U	6.4 U
Phenanthrene	480	12	2.1	6.3	9.2	1.0 U	0.51	11 U	24	8.8 U	230	5.0 U	4.5	7.3 U	5.3	13	3.7	0.79 U	5.2	6.4 U
Anthracene	1200	4.5	1.8 U	6.9	8.5	1.0 U	0.50 U	11 U	5.2	8.8 U	54	6.9	3.7	7.3 U	3.7	20	1.3 U	0.79 U	4.5	6.4 U
2-Methylnaphthalene	64	2.1 U	1.8 U	3.7 U	4.4 U	1.0 U	0.50 U	11 U	3.2	8.8 U	2.8	5.0 U	1.3 U	7.3 U	1.5 U	2.4	1.3 U	0.79 U	3.0 U	6.4 U
LPAH (f,g)	780	348	15	26	28	1.0 U	1.0	11 U	67	8.8 U	446	6.9	14	7.3 U	22	57	80	1.9	15	6.4 U
Fluoranthene	1200	5.8	4.6	26	32	2.0	1.0	11 U	26	8.8 U	255	15	8.8	11	15	29	5.3	1.2	17	6.4 U
Pyrene	1400	6.8	1.8 U	13	18	2.2	0.50 U	11 U	20	8.8 U	205	12	11	10	16	25	7.1	1.4	13	6.4 U
Benzo(a)anthracene	270	2.1 U	1.8 U	11	15	1.0 U	0.50 U	11 U	7.2	8.8 U	59	5.0 U	2.4	7.3 U	8.6	12	1.8	0.79 U	6.7	6.4 U
Chrysene	460	2.1 U	1.8 U	15	25	1.0 U	0.50 U	11 U	6.0	8.8 U	59	10	3.3	7.3 U	10	21	2.0	0.79 U	11	6.4 U
Benzo(b)fluoranthene		2.1 U	1.8 U	10	15	1.0 U	0.50 U	11 U	3.6	8.8 U	30	6.4	2.9	7.3 U	7.4	12	1.6	0.79 U	7.1	6.4 U
Benzo(k)fluoranthene		2.1 U	1.8 U	9	16	1.0 U	0.50 U	11 U	4.0	8.8 U	28	6.3	2.7	7.3 U	6.0	11	1.6	0.79 U	6.7	6.4 U
Total benzofluoranthenes (g,h)	450	2.1 U	1.8 U	19	32	1.0 U	0.50 U	11 U	7.6	8.8 U	58	13	5.7	7.3 U	13	23	3.3	0.79 U	14	6.4 U
Benzo(a)pyrene	210	2.1 U	1.8 U	8.8	12	1.0 U	0.50 U	11 U	4.4	8.8 U	31	5.0 U	2.5	7.3 U	5.8	10	1.7	0.79 U	5.7	6.4 U
Indeno(1,2,3-c,d)pyrene	88	2.1 U	1.8 U	4.9	7.0	1.0 U	0.50 U	11 U	2.5	8.8 U	14	5.0 U	2.2	7.3 U	3.5	7.9	1.3	0.79 U	3.8	6.4 U
Dibenzo(a,h)anthracene	33	2.1 U	1.8 U	3.7 U	4.4 U	1.0 U	0.50 U	11 U	0.40	8.8 U	2.7	5.0 U	1.3 U	7.3 U	1.5 U	1.7	1.3 U	0.79 U	3.0 U	6.4 U
Benzo(g,h,i)perylene	78	2.1 U	1.8 U	4.1	5.8	1.0 U	0.50 U	11 U	1.8	8.8 U	9.2	5.0 U	2.0	7.3 U	2.8	7.0	1.3 U	0.8	3.4	6.4 U
HPAH (g,i)	5300	13	4.6	102	147	4.2	1.0	11 U	76	8.8 U	693	49	38	21	75	136	22	3.4	74	6.4 U
Dibenzofuran (mg/kg OC)	58	19	1.8 U	3.7 U	4.4 U	1.0 U	0.50 U	11 U	5.6	8.8 U	35	5.0 U	1.3 U	7.3 U	1.5 U	2.4	1.3 U	0.79 U	3.0 U	6.4 U
cPAH (µg/kg dry wt)	4300	0.0	0.0	92.8	119.1	0.0	0.0	0.0	702.0	0	5335.0	27.2	82.0	0.0	176.0	636.0	51.1	0.0	85.9	0.0
Conventionals (percent)																				
Total Solids	NA	78.3	77.8	86	88.6	60.6	53	90.4	56.8	95	57.5	84.1	78.9	86.6	77.5	65.5	73.9	78.4	81.3	79.2
Total Organic Carbon	NA	0.31	0.37	0.16	0.13	0.83	1.89	0.05	2.5	0.06	2.39	0.12	0.51	0.08	0.43	0.84	0.51	0.81	0.21	0.1

Table C-1
2002 Sediment Analytical Results
Cascade Pole Site
Port of Olympia, Washington

Analyte	Cleanup Levels (a)	Sample Location, Lab Sample ID, Sample Date, and Sample Type																
		CP-12-S K2202330-004 4/10/2002 Surface	CP-12-D K2202334-014 4/11/2002 Dredge	CP-13-S K2202330-005 4/10/2002 Surface	CP-13-D K2202374-013 4/11/2002 Dredge	CP-13-D-dup K2202374-014 4/11/2002 Dredge	CP-14-S K2202330-006 4/10/2002 Surface	CP-14-F K2204074-002 4/10/2002 Fill (i)	CP-14-D K2202334-016 4/10/2002 Dredge	CP-15-S K2202330-003 4/10/2002 Surface	CP-15-F K2204074-003 4/11/2002 Fill (i)	CP-15-D K2202334-018 4/11/2002 Dredge	CP-16-S K2202374-015 4/12/2002 Surface	CP-17-S K2202374-016 4/12/2002 Surface	CP-18-S K2202330-022 4/11/2002 Surface	CP-19-S K2202330-020 4/11/2002 Surface	Dup of CP-19-S CP-91-S K2202330-019 4/11/2002 Surface	CP-20-S K2202330-007 4/10/2002 Surface
Dioxins (ng/kg TEQ dry weight; EPA 8290A) (c)	80	0.214	0.105	0.236	34.6	19.5	0.497		18.8	0.647	0.00566	128	24.4	25.2	8.25	7.75	12.4	6.55
Polycyclic Aromatic Hydrocarbons (mg/kg OC; EPA 8270/8270-SIM) (d)																		
Naphthalene	170	7.4 U	3.1	6.0 U	22	23	6.3 U	8.7 U	26	5.0 U	9.3 U	81	3.9	9.5 J	20	13	15	6.9
Acenaphthylene	66	7.4 U	0.73	6.0 U	0.90	0.89	6.3 U	8.7 U	0.51	5.0 U	9.3 U	12 U	0.93	0.71	0.82	0.85	0.79	0.56
Acenaphthene	57	7.4 U	0.40 U	6.0 U	11	16	6.3 U	8.7 U	41	5.0 U	9.3 U	42	1.2	17 J	3.6	5.4	3.1	1.0
Fluorene	79	7.4 U	0.43	6.0 U	10	12	6.3 U	8.7 U	35	5.0 U	9.3 U	27	1.6	15	3.3	3.2	2.6	1.0
Phenanthrene	480	7.4 U	2.3	6.0 U	31	35	7.8	8.7 U	117	9.2	9.3 U	72	5.1	35	14	11 J	7.0 J	4.3
Anthracene	1200	7.4 U	0.81	6.0 U	17	19	6.3 U	8.7 U	60	5.0 U	9.3 U	165	4.7	22	7.5	6.3 J	4.0 J	2.3
2-Methylnaphthalene	64	7.4 U	0.40 U	6.0 U	3.9	4.4	6.3 U	8.7 U	4.8	5.0 U	9.3 U	12 U	0.80	3.0	2.6	1.5 J	3.0 J	0.8
LPAH (f,g)	780	7.4 U	7.4	6.0 U	92	105	7.8	8.7 U	280	9.2	9.3 U	386	17	100	49	39	33	16
Fluoranthene	1200	7.4 U	5.1	6.0 U	71	72	16	8.7 U	146	19	9.3 U	1392	167	83	25	12	14	10
Pyrene	1400	7.4 U	4.7	6.0 U	85	78	13	8.7 U	124	14	9.3 U	1772	180	124	31	20	22	16
Benzo(a)anthracene	270	7.4 U	1.8	6.0 U	25	23	6.3 U	8.7 U	44	5.0 U	9.3 U	278	44	21	10	11 J	5.2 J	3.6
Chrysene	460	7.4 U	1.7	6.0 U	29 J	23 J	6.3 U	8.7 U	41	7.6	9.3 U	278	60	32	18	30 J	6.6 J	4.3
Benzo(b)fluoranthene		7.4 U	1.1	6.0 U	18	17	6.3 U	8.7 U	23	5.0 U	9.3 U	165	19	21	7.5	17 J	6.6 J	4.0
Benzo(k)fluoranthene		7.4 U	1.3	6.0 U	17	17	6.3 U	8.7 U	22	5.0 U	9.3 U	165	25	20	7.5	16 J	6.6 J	3.6
Total benzofluoranthenes (g,h)	450	7.4 U	2.4	6.0 U	35	34	6.3 U	8.7 U	44	5.0 U	9.3 U	329	45	41	15	33 J	13 J	7.6
Benzo(a)pyrene	210	7.4 U	1.5	6.0 U	17	16	6.3 U	8.7 U	22	5.0 U	9.3 U	152	18	20	6.9	17 J	6.1 J	3.6
Indeno(1,2,3-c,d)pyrene	88	7.4 U	1.2	6.0 U	8.5	7.8	6.3 U	8.7 U	8.9	5.0 U	9.3 U	54	8.0	9.5	3.2	7.2 J	3.5 J	2.0
Dibenzo(a,h)anthracene	33	7.4 U	0.4 U	6.0 U	1.5	1.3	6.3 U	8.7 U	1.6	5.0 U	9.3 U	12 U	1.4	1.7	0.88	2.0 J	0.87 J	0.43
Benzo(g,h,i)perylene	78	7.4 U	1.2	6.0 U	5.7	5.5	6.3 U	8.7 U	5.4	5.0 U	9.3 U	38	4.6	6.5	2.5	5.4 J	2.9 J	1.8
HPAH (g,i)	5300	7.4 U	20	6.0 U	277	260	29	8.7 U	438	41	9.3 U	4295	527	338	113	137 J	74 J	49
Dibenzofuran (mg/kg OC)	58	7.4 U	0.40 U	6.0 U	8.0	8.3	6.3 U	8.7 U	21	5.0 U	9.3 U	24	1.0	11	2.1	1.9	2.0	0.76
cPAH (µg/kg dry wt)	4300	0.0	200.0	0.0	2451.0	1873.0	0.0	0	5129.0	9.1	0	8630.0	2641.0	2109.0	855.0	2235.0	810.0	654.0
Conventionals (percent)																		
Total Solids	NA	85.6	53.8	83.6	64.1	65.8	87.8	96.3	62.3	84	90.5	54.3	64.3	62.1	64.5	46.5	48.2	41.9
Total Organic Carbon	NA	0.08	2.34	0.1	2.12	1.8	0.09	0.06	3.15	0.12	0.06	0.79	1.5	1.69	1.59	2.23	2.29	3.03

Notes:
U = Indicates the compound was undetected at the reported concentration.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
Green shaded results are greater than the cleanup level or cleanup action level.
Dredge = interface of dredge material and non excavated material (1 ft interval)
Fill = interior backfill material utilized to restore excavation grade (6" interval)
Surface = surface interval of the backfill material (0-10 cm)

(a) Cleanup action levels for dioxins and cPAH.
(b) Confirmational sediment monitoring sample.
(c) Toxicity equivalent.
(d) All organic data (except dioxins) are normalized to total organic carbon; this involves dividing the dry weight concentration of the constituent by the fraction of total organic carbon present.
(e) See text.
(f) The LPAH criterion represents the sum of the following "low molecular weight polynuclear aromatic hydrocarbon" compounds: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, and anthracene. The LPAH criterion is not the sum of the criteria values for the individual LPAH compounds listed.
(g) Where chemical criteria in this table represent the sum of individual compounds or isomers, the following methods shall be applied:
(i) Where chemical analyses identify an undetected value for every individual compound/isomer, then the single highest detection limit shall represent the respective compounds/isomers.
(ii) Where chemical analyses detect one or more individual compounds/isomers, only the detected concentrations will be added to represent the group sum.
(h) The total benzofluoranthenes criterion represents the sum of the concentrations of the "B," "J," and "K" isomers.
(i) The HPAH criterion represents the sum of the following "high molecular weight polynuclear aromatic hydrocarbon" compounds: fluoranthene, pyrene, benzo(a)anthracene, chrysene, total benzofluoranthenes, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene. The HPAH critrion is not the sum of the criteria values for the individual HPAH compounds as listed.

Abbreviations and Acronyms:
cPAH = carcinogenic polycyclic aromatic hydrocarbon
dry wt = dry weight
EPA = US Environmnetal Protection Agency
HPAH = high molecular weight polcyclic aromatic hydrocarbon
ID = identification
LPAH = low molecular weight polcyclic aromatic hydrocarbon
µg/kg = microgram per kilogram
mg/kg = milligram per kilogram
ng/kg = nanogram per kilogram
OC = carbon normalized
SIM = selected ion monitoring
TEQ = toxicity equivalency

Table C-2
2007 Sediment Analytical Results
Cascade Pole Site
Port of Olympia, Washington

Analyte	Cleanup Levels (a)	Location ID, Lab Sample ID, and Sample Date																			
		CP-01-M1 LU24A 10/16/2007	CP-02-M1 LU24B 10/16/2007	CP-03-M1 LU24C 10/17/2007	CP-04-M1-B LU24D 10/16/2007	CP-04-M1-C LU24Y/LY51 10/16/2007	CP-05-M1 LU24E 10/16/2007	CP-06-M1-B LU24F 10/16/2007	CP-07-M1 LU24G 10/18/2007	CP-08-M1 LU24H 10/16/2007	CP-09-M1 LU24I 10/18/2007	CP-10-M1 LU24J 10/18/2007	CP-11-M1 LU24K 10/16/2007	CP-12-M1 LU24L 10/16/2007	CP-13-M1 LU24M 10/16/2007	CP-14-M1 LU24N 10/16/2007	CP-15-M1 LU24O 10/16/2007	CP-16-M1 LT62A 10/11/2007	CP-17-M1 LT62B 10/11/2007	CP-18-M1 LT62C 10/10/2007	CP-19-M1 LT62D 10/10/2007	CP-20-M1 LT62E 10/10/2007
Dioxins (ng/kg TEQ dry weight; EPA 8290A) (b)	80	0.433	0.0965	0.424	2.89	2.28	0.000546	0.0356	0.135	0.290	0.0308	4.44	0.0721	0.0512	0.000543	0.00110	0.0140	13.9	34.7	16.5	23.3	15.5
Polycyclic Aromatic Hydrocarbons (mg/kg OC; EPA 8270/8270-SIM) (c)																						
Naphthalene	170	5.3 U	8.9 U	3.4 U	14.0	34.1	7.2 U	12.5 U	6.3 U	4.6 U	9.4 U	5.2 U	8.9 U	9.8 U	5.0 U	12.8 U	12.3 U	0.7	2.6	0.9	2.6	3.0
Acenaphthylene	66	5.3 U	8.9 U	3.4 U	5.7 U	2.4 U	7.2 U	12.5 U	6.3 U	4.6 U	9.4 U	5.2 U	8.9 U	9.8 U	5.0 U	12.8 U	12.3 U	0.4 U	0.5	0.3 U	0.9	1.6
Acenaphthene	57	5.3 U	8.9 U	3.4 U	91.9	29.3	7.2 U	12.5 U	6.3 U	4.6 U	9.4 U	5.2 U	8.9 U	9.8 U	5.0 U	12.8 U	12.3 U	0.4	1.3	0.3 U	0.7	1.0
Fluorene	79	5.3 U	8.9 U	3.4 U	5.7 U	2.4 U	7.2 U	12.5 U	6.3 U	4.6 U	9.4 U	5.2 U	8.9 U	9.8 U	5.0 U	12.8 U	12.3 U	0.5	1.1	0.3 U	1.1	1.3
Phenanthrene	480	5.3 U	8.9 U	3.4 U	10.2	28.3	7.2 U	12.5 U	6.3 U	4.6 U	9.4 U	5.2 U	8.9 U	9.8 U	5.0 U	12.8 U	12.3 U	3.5	4.4	0.6	4.3	8.8
Anthracene	1200	5.3 U	8.9 U	3.4 U	5.7 U	2.6	7.2 U	12.5 U	6.3 U	4.6 U	9.4 U	5.2 U	8.9 U	9.8 U	5.0 U	12.8 U	12.3 U	2.4	3.5	0.7	3.5	4.6
2-Methylnaphthalene	64	5.3 U	8.9 U	3.4 U	5.7 U	2.4 U	7.2 U	12.5 U	6.3 U	4.6 U	9.4 U	5.2 U	8.9 U	9.8 U	5.0 U	12.8 U	12.3 U	0.4 U	0.4	0.3 U	0.6	0.7
LPAH (d,e)	780	5.3 U	8.9 U	3.4 U	116.0	94.3	7.2 U	12.5 U	6.3 U	4.6 U	9.4 U	5.2 U	8.9 U	9.8 U	5.0 U	12.8 U	12.3 U	7.6	13.4	2.2	13.0	20.3
Fluoranthene	1200	5.3 U	8.9 U	3.4 U	20.9	9.3	7.2 U	12.5 U	6.3 U	4.6 U	9.4 U	10.3	8.9 U	9.8 U	5.0 U	12.8 U	32.5	10.2	16.6	2.2	10.4	28.0
Pyrene	1400	5.3 U	8.9 U	3.4 U	23.3	8.8	7.2 U	12.5 U	6.3 U	6.1	9.4 U	20.4	8.9 U	9.8 U	5.0 U	12.8 U	24.5	8.7	17.2	3.3	16.7	24.2
Benzo(a)anthracene	270	5.3 U	8.9 U	3.4 U	5.7	2.4 U	7.2 U	12.5 U	6.3 U	4.6 U	9.4 U	5.2 U	8.9 U	9.8 U	5.0 U	12.8 U	12.3 U	4.2	6.6	1.2	10.9	12.6
Chrysene	460	5.3 U	8.9 U	3.4 U	7.4	2.9	7.2 U	12.5 U	6.3 U	4.6 U	9.4 U	5.2 U	8.9 U	9.8 U	5.0 U	12.8 U	27.5	5.5	11.7	2.8	12.0	19.2
Benzo(b)fluoranthene		5.3 U	8.9 U	3.4 U	9.1	3.1	7.2 U	12.5 U	6.3 U	4.6 U	9.4 U	7.7	8.9 U	9.8 U	5.0 U	12.8 U	12.3 U	5.4	11.0	6.8	21.4	23.6
Benzo(k)fluoranthene		5.3 U	8.9 U	3.4 U	5.7 U	2.4 U	7.2 U	12.5 U	6.3 U	4.6 U	9.4 U	5.2 U	8.9 U	9.8 U	5.0 U	12.8 U	12.3 U	2.2	4.4	3.1	8.9	11.0
Total benzofluoranthenes (e,g)	450	5.3 U	8.9 U	3.4 U	9.1	3.1	7.2 U	12.5 U	6.3 U	4.6 U	9.4 U	7.7	8.9 U	9.8 U	5.0 U	12.8 U	12.3	7.6	15.4	9.9	30.2	34.6
Benzo(a)pyrene	210	5.3 U	8.9 U	3.4 U	5.7	2.4 U	7.2 U	12.5 U	6.3 U	4.6 U	9.4 U	5.2 U	8.9 U	9.8 U	5.0 U	12.8 U	12.3 U	3.7	6.6	3.7	11.5	12.6
Indeno(1,2,3-c,d)pyrene	88	5.3 U	8.9 U	3.4 U	5.7 U	2.4 U	7.2 U	12.5 U	6.3 U	4.6 U	9.4 U	5.2 U	8.9 U	9.8 U	5.0 U	12.8 U	12.3 U	1.7	2.5	1.6	2.2	2.3
Dibenzo(a,h)anthracene	33	5.3 U	8.9 U	3.4 U	5.7 U	2.4 U	7.2 U	12.5 U	6.3 U	4.6 U	9.4 U	5.2 U	8.9 U	9.8 U	5.0 U	12.8 U	12.3 U	0.5	0.8	0.6	0.7	0.9
Benzo(g,h,i)perylene	78	5.3 U	8.9 U	3.4 U	5.7 U	2.4 U	7.2 U	12.5 U	6.3 U	4.6 U	9.4 U	5.2 U	8.9 U	9.8 U	5.0 U	12.8 U	12.3 U	1.7	2.5	1.5	1.8	2.0
HPAH (e,i)	5300	5.3 U	8.9 U	3.4 U	72.1	24.0	7.2 U	12.5 U	6.3 U	6.1	9.4 U	38.5	8.9 U	9.8 U	5.0 U	12.8 U	96.8	43.8	79.9	26.8	96.4	136.5
1-Methylnaphthalene		5.3 U	8.9 U	3.4 U	5.7 U	18.5	7.2 U	12.5 U	6.3 U	4.6 U	9.4 U	5.2 U	8.9 U	9.8 U	5.0 U	12.8 U	12.3 U	0.4 U	0.5	0.3 U	0.4	0.5
Dibenzofuran (mg/kg OC)	58	5.3 U	8.9 U	3.4 U	5.7 U	11.7	7.2 U	12.5 U	6.3 U	4.6 U	9.4 U	5.2 U	8.9 U	9.8 U	5.0 U	12.8 U	12.3 U	0.4 U	0.8	0.3 U	0.6	0.9
cPAH (µg/kg dry wt)	4300	ND	ND	ND	1.8	1.1	ND	ND	ND	ND	ND	0.48	ND	ND	ND	ND	0.49	13	29	17	66	72
Conventionals (percent)																						
Total Solids	NA	89.30	83.90	85.70	92.60	86.20	86.70	95.00	89.90	88.80	88.10	88.90	87.90	83.70	84.00	85.40	86.50	60.50	56.40	62.80	43.00	40.60
Total Organic Carbon	NA	0.094	0.056	0.143	0.086	0.205	0.067	0.040	0.080	0.104	0.051	0.093	0.054	0.049	0.101	0.039	0.040	1.27	1.45	1.38	1.92	1.82

Notes:
U = Indicates the compound was undetected at the reported concentration.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

Green shaded results are greater than the cleanup level or cleanup action level.

(a) Cleanup action levels for dioxins and cPAH.
(b) Confirmational sediment monitoring sample.
(c) Toxicity equivalent.
(d) All organic data (except dioxins) are normalized to total organic carbon; this involves dividing the dry weight concentration of the constituent by the fraction of total organic carbon present.
(e) See text.
(f) The LPAH criterion represents the sum of the following "low molecular weight polycyclic aromatic hydrocarbon" compounds: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, and anthracene. The LPAH criterion is not the sum of the criteria values for the individual LPAH compounds listed.
(g) Where chemical criteria in this table represent the sum of individual compounds or isomers, the following methods shall be applied:
(i) Where chemical analyses identify an undetected value for every individual compound/isomer, then the single highest detection limit shall represent the sum of the res
(ii) Where chemical analyses detect one or more individual compounds/isomers, only the detected concentrations will be added to represent the group sum.
(h) The total benzofluoranthenes criterion represents the sum of the concentrations of the "B," "J," and "K" isomers.
(i) The HPAH criterion represents the sum of the following "high molecular weight polycyclic aromatic hydrocarbon" compounds: fluoranthene, pyrene, benzo(a)anthracene, chrysene, total benzofluoranthenes, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene. The HPAH criterion is not the sum of the criteria values for the individual HPAH compounds as listed.

Abbreviations and Acronyms:
cPAH = carcinogenic polycyclic aromatic hydrocarbon
dry wt = dry weight
EPA = US Environmnetal Protection Agency
HPAH = high molecular weight polcyclic aromatic hydrocarbon
ID = identification
LPAH = low molecular weight polcyclic aromatic hydrocarbon
ND = not detected
µg/kg = microgram per kilogram
mg/kg = milligram per kilogram
ng/kg = nanogram per kilogram
OC = carbon normalized
SIM = selected ion monitoring

Table C-3
2012 Sediment Analytical Results
Cascade Pole Site
Port of Olympia, Washington

Analyte	SMS Criteria		Sample Location, Lab Sample ID, and Sample Date																		
			Agreed Order Sample Results-Phase I						Verification Sample Results-Phase II												
	Sediment Quality Standards (a)	Cleanup Screening Level (b)	CP-16-M2 VO23L 10/15/2012	CP-17-M2 VO23M 10/15/2012	CP-18-M2 VO23P 10/15/2012	CP-19-M2 VO23O 10/15/2012	CP-20-M2 VO23K 10/15/2012	Dup of CP-20-M2 DUP-1 VO23N 10/15/2012	CP-21 VY94J 1/8/2013	CP-22 VY94I 1/8/2013	CP-23 VY94H 1/8/2013	CP-24 VY94G 1/8/2013	CP-25 VY94F 1/8/2013	CP-26 VY94A 1/8/2013	CP-27 VY94B 1/8/2013	CP-28 VY94C 1/8/2013	Dup of CP-28 DUP-1 VY94K 1/8/2013	CP-29 VY94D 1/8/2013	CP-30 VY94L 1/8/2013	CP-31 VY94M 1/8/2013	CP-32 VY94N 1/8/2013
Dioxins (pg/g TEQ dry weight; EPA 8290A)		80	12.294	10.794	14.283	1.189	18.150	34.071	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (mg/kg OC; EPA 8270/8270-SIM)																					
Naphthalene	99	170	20.2	358.2	121.5	15.8	35.0 J	335.9 J	1.7 U	13.5	7.1	2.0	40.0	4.9	0.7	0.4	0.5	3.8	7.6	46.5	19.1
Acenaphthylene	66	66	0.8 J	6.9	3.4	0.8	2.0 J	5.8	1.7 U	0.3 J	0.1 J	0.2	0.8	0.2 J	0.2 U	0.2 U	0.1 J	0.6	0.4 J	2.1	1.4
Acenaphthene	16	57	2.3	59.0	15.9	1.8	4.2 J	40.6 J	1.7 U	2.7	1.0	0.4	7.1	0.8	0.2 J	0.1 J	0.1 J	0.9	1.3	8.8	2.8
Fluorene	23	79	2.2	53.7	11.2	2.0	3.3 J	39.8 J	1.7 U	1.9	0.8	0.4	6.0	0.7	0.2 J	0.1 J	0.1 J	0.9	1.1	5.6	1.8
Phenanthrene	100	480	6.0	104.5	30.8	8.9	17.7 J	78.1 J	1.7 U	5.1	1.6	1.5	15.0	2.2	0.5	0.5	0.9	5.5	3.7	14.0	5.9
Anthracene	220	1,200	2.7	51.5	12.1	4.6	3.5 J	37.5 J	1.7 U	2.5	0.8	0.6	7.9	1.0	0.2	0.2	0.3	2.0	1.3	5.7	2.1
2-Methylnaphthalene	38	64	5.6	38.8	15.9	2.1	3.7 J	27.3 J	1.7 U	1.3	0.8	0.4	3.7	0.7	0.2 J	0.1 J	0.2 J	1.1	1.1	8.1	2.2
LPAH (c,d)	370	780	34.1 J	633.8	195.0	33.9	65.8 J	537.8 J	1.7 U	25.9 J	11.6 J	5.2	76.8	9.8 J	1.8 J	1.2 J	2.1 J	13.6	15.3 J	82.7	33.0
Fluoranthene	160	1,200	6.6	179.1	32.7	6.9	27.7 J	117.2 J	1.7 U	4.7	1.6	3.5	13.6	2.6	0.7 J	0.8 J	5.5 J	12.5	3.8	14.0	4.3
Pyrene	1,000	1,400	6.7	306.0	42.1	10.5	23.8 J	179.7 J	4.1	6.9	2.6	4.4	15.0	4.1	1.2	1.3 J	5.9 J	12.0	5.7	24.6	10.9
Benzo(a)anthracene	110	270	1.9	38.8	6.4	12.5	5.8 J	21.9 J	0.9 J	2.2	0.7	1.0	5.9	0.9	0.2	0.3	0.7	2.8	0.9	4.0	2.0
Chrysene	110	460	2.3	89.6	8.3	17.1	10.8 J	36.7 J	3.7	6.1	1.0	3.9	12.9	1.3	0.3	0.5 J	2.1 J	6.0	1.2	5.9	3.0
Total Benzofluoranthenes	230	450	5.6	97.0	14.0	16.1	16.2 J	67.2 J	6.3	4.7	1.8	3.0	10.0	2.4	0.8	1.0 J	3.1 J	9.0	2.6	10.5	6.4
Benzo(a)pyrene	99	210	3.9	50.0	6.1	7.9	6.9 J	32.8 J	1.4 J	1.7	0.5	0.8	4.1	0.8	0.3	0.3	0.6	2.6	0.8	4.2	2.2
Indeno(1,2,3-cd)pyrene	34	88	1.8	16.4	2.6	2.4	3.1 J	12.5 J	1.7 U	1.1	0.4	0.6	2.7	0.5	0.2	0.2	0.5	1.3	0.7	2.6	1.5
Dibenz(a,h)anthracene	12	33	1.5 U	7.5	1.8 U	1.0	1.1 J	4.6	1.7 U	0.3 J	0.1 J	0.1 J	1.0	0.2 J	0.2 U	0.2 U	0.1 J	0.3	0.4 U	0.7	0.4
Benzo(g,h,i)perylene	31	78	2.6	18.7	2.9	2.3	3.5 J	13.3 J	1.7 U	1.2	0.4	0.6	2.7	0.6	0.3	0.2	0.5	1.3	0.9	3.2	1.6
HPAH (c,e,f)	960	5,300	31	803	115	77	99 J	486 J	16 J	29 J	9.0 J	18 J	68	13 J	4.1	4.5	19.1 J	47.7	16.6	69.8	32.2
Conventionals (%)																					
Total Organic Carbon (SW9060M)	10 (g)	10 (g)	1.24	1.34	1.07	3.04	2.60	1.28	0.268	0.890	3.36	2.51	1.40	1.97	2.57	2.87	2.19	2.00	1.04	1.14	2.20
Total Solids (SM2540B)	---	---	67.90	61.40	67.60	49.50	44.00	61.20	87.40	76.90	66.80	63.00	66.30	74.10	80.40	79.30	79.50	25.40	73.40	65.00	44.00

Table C-3
2012 Sediment Analytical Results
Cascade Pole Site
Port of Olympia, Washington

Analyte	SMS Criteria		Sample Location, Lab Sample ID, and Sample Date																	
			Verification Sample Results-Phase II					Verification Sample Results-Phase III						Agreed Order Interior Backfill Sample Results						
	Sediment Quality Standards (a)	Cleanup Screening Level (b)	CP-33 VY94O 1/8/2013	CP-34 VY94E 1/8/2013	CP-35 WD00A 1/9/2013	CP-36 WD00B 1/9/2013	CP-37 WD00C 1/9/2013	CP16-0-10 WG94E 3/8/2013	CP17-0-10 WG94D 3/8/2013	CP18-0-10 WG94A 3/8/2013	Dup of CP18-0-10 CP18DUP-0-10 WG94F 3/8/2013	CP19-0-10 WG94B 3/8/2013	CP20-0-10 WG94C 3/8/2013	CP-01-M2 VO23B 10/18/2012	CP-02-M2 VO29C 10/18/2012	CP-03-M2 VO23H 10/18/2012	CP-04-M2 VO23C 10/18/2012	Dup of CP-04-M2 DUP-2 VO23G 10/18/2012	CP-05-M2 VO29D 10/18/2012	CP-06-M2 VO23F 10/18/2012	CP-07-M2 VO23E 10/18/2012
Dioxins (pg/g TEQ dry weight; EPA 8290A)		80	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.358	1.449	0.601	0.446	0.625	0.015	0.140	0.935
Polycyclic Aromatic Hydrocarbons (mg/kg OC; EPA 8270/8270-SIM)																					
Naphthalene	99	170	7.5	2.7	14.2	16.9	2.2	12.1	71.5	106.8	93.3	20.8 J	21.3	14.5 U	18.0 U	9.1 U	49.5	53.3	20.2 U	8.1 U	10.3 U
Acenaphthylene	66	66	0.7	0.3	0.2 U	1.7	0.1 U	0.8	1.1	2.2	2.6	0.8	1.4	14.5 U	18.0 U	9.1 U	18.6 U	21.1 U	20.2 U	8.1 U	10.3 U
Acenaphthene	16	57	1.0	0.4	1.4	2.0	0.3	2.4	18.7	14.6	11.5	3.2 J	3.0	14.5 U	18.0 U	9.1 U	19.6	14.4 J	20.2 U	8.1 U	10.3 U
Fluorene	23	79	0.8	0.4	1.1	1.5	0.3	2.1	13.0	11.7	8.5	2.5 J	2.3	14.5 U	18.0 U	9.1 U	18.6 U	21.1 U	20.2 U	8.1 U	10.3 U
Phenanthrene	100	480	2.7	1.6	3.2	5.0	1.1	5.9	17.9	23.3	18.3	5.5 J	6.9	14.5 U	18.0 U	9.1 U	9.5 J	21.1 U	20.2 U	8.1 U	10.3 U
Anthracene	220	1,200	1.0	0.6	1.7	1.9	0.5	3.1	11.4	12.6	9.6	2.5 J	3.0	14.5 U	18.0 U	9.1 U	18.6 U	21.1 U	20.2 U	8.1 U	10.3 U
2-Methylnaphthalene	38	64	1.1	0.5	2.0	2.7	0.4	1.9	6.1	12.6	10.6	3.0	2.3	14.5 U	18.0 U	9.1 U	18.6 U	21.1 U	20.2 U	8.1 U	10.3 U
LPAH (c,d)	370	780	13.7	6.1	21.6	29.0	4.4	26.4	133.7	171.2	143.8	35.3	37.9	14.5 U	18.0 U	9.1 U	78.6 J	67.8 J	20.2 U	8.1 U	10.3 U
Fluoranthene	160	1,200	3.6	1.4	4.6	5.8	2.9	8.6	27.6	30.1	28.8	7.6	12.2	14.5 U	18.0 U	9.1 U	18.6 U	21.1 U	20.2 U	8.1 U	10.3 U
Pyrene	1,000	1,400	5.3	2.7	7.3	8.5	3.2	9.5	27.6	39.8	40.4	12.8	16.3	8.1 J	18.0 U	9.1 U	18.6 U	21.1 U	20.2 U	8.1 U	10.3 U
Benzo(a)anthracene	110	270	1.5	1.0	1.4 J	2.0 J	0.7 J	1.8	6.5	6.5	6.3	4.5 J	6.4	14.5 U	18.0 U	9.1 U	18.6 U	21.1 U	20.2 U	8.1 U	10.3 U
Chrysene	110	460	1.8	1.5	2.8	3.5	1.1	2.1	8.9	7.7	8.7	5.2 J	7.2	14.5 U	18.0 U	9.1 U	18.6 U	21.1 U	20.2 U	8.1 U	10.3 U
Total Benzofluoranthenes	230	450	4.5	3.1	3.6	3.8	2.0	3.7	12.2	13.6	15.4	10.4 J	10.8	29.8 U	36.0 U	18.3 U	38.1 U	43.3 U	40.4 U	16.1 U	20.1 U
Benzo(a)pyrene	99	210	1.5	1.0	1.2	1.6	0.6	1.3	4.4	4.7	5.3	4.2 J	5.8	14.5 U	18.0 U	9.1 U	18.6 U	21.1 U	20.2 U	8.1 U	10.3 U
Indeno(1,2,3-cd)pyrene	34	88	0.9	0.7	0.6	0.8	0.4	0.8	2.4	2.0	2.7	2.0 J	3.3	14.5 U	18.0 U	9.1 U	18.6 U	21.1 U	20.2 U	8.1 U	10.3 U
Dibenz(a,h)anthracene	12	33	0.2	0.2	0.2 J	0.2	0.1 J	0.2 J	0.7	0.6	0.8	0.6	0.8	14.5 U	18.0 U	9.1 U	18.6 U	21.1 U	20.2 U	8.1 U	10.3 U
Benzo(g,h,i)perylene	31	78	0.9	0.9	0.8	1.1	0.5	1.0	2.8	3.1	3.5	2.0 J	3.9	14.5 U	18.0 U	9.1 U	18.6 U	21.1 U	20.2 U	8.1 U	10.3 U
HPAH (c,e,f)	960	5,300	20.2	12.4	22.5	27.3	11.6	29.0	93.2	108.0	111.8	49.2	66.5	8.1 J	18.0 U	9.1 U	18.6 U	21.1 U	20.2 U	8.1 U	10.3 U
Conventionals (%)																					
Total Organic Carbon (SW9060M)	10 (g)	10 (g)	3.58	3.57	2.18	2.60	3.74	1.16	1.23	1.03	1.04	2.89	3.62	0.124	0.100	0.197	0.097	0.0900	0.089	0.223	0.184
Total Solids (SM2540B)	---	---	44.10	31.30	49.90	48.90	29.70	69.50	60.30	64.40	63.60	46.40	42.30	88.80	90.20	89.40	87.90	88.90	85.90	88.00	87.50

Table C-3
2012 Sediment Analytical Results
Cascade Pole Site
Port of Olympia, Washington

Analyte	SMS Criteria		Sample Location, Lab Sample ID, and Sample Date													
			Agreed Order Interior Backfill Sample Results								Subsurface Sediment Verification Sample Results					
	Sediment Quality Standards (a)	Cleanup Screening Level (b)	CP-08-M2 VO29F 10/18/2012	CP-09-M2 VO23D 10/18/2012	CP-10-M2 VO29A 10/18/2012	CP-11-M2 VO29E 10/18/2012	CP-12-M2 VO29B 10/18/2012	CP-13-M2 VO23I 10/18/2012	CP-14-M2 VO23J 10/18/2012	CP-15-M2 VO23A 10/18/2012	CP-16-1-2 WF91B 3/4/2013	CP-17-1-2 WF91A 3/4/2013	CP-18-1-2 WF91F 3/4/2013	CP-19-1-2 WF91E 3/4/2013	CP-20-1-2 WF91C 3/4/2013	Dup of CP-20 CP-20-1-2DUP WF91D 3/4/2013
Dioxins (pg/g TEQ dry weight; EPA 8290A)		80	0.470	0.173	0.893	0.308	0.422	0.183	0.163	0.490	NA	NA	NA	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (mg/kg OC; EPA 8270/8270-SIM)																
Naphthalene	99	170	19.4	19.8 U	6.4 J	9.2 U	9.4 U	8.5 U	10.7 U	6.2 U	12.1	20.3	69.9	40.4	1.9 J	2.8 J
Acenaphthylene	66	66	5.2 U	19.8 U	12.5 U	9.2 U	9.4 U	8.5 U	10.7 U	6.2 U	2.2	0.4 J	0.8	6.3	0.2	0.1 J
Acenaphthene	16	57	6.4	19.8 U	12.5 U	9.2 U	9.4 U	8.5 U	10.7 U	6.2 U	1.6	4.4	3.3	4.4	0.3 J	0.7 J
Fluorene	23	79	5.8	19.8 U	12.5 U	9.2 U	9.4 U	8.5 U	10.7 U	6.2 U	1.6	3.7	1.9	5.7	0.4	0.5
Phenanthrene	100	480	23.5	19.8 U	12.5 U	9.2 U	9.4 U	8.5 U	10.7 U	6.2 U	6.4	4.7	4.6	18.3	1.5	1.3
Anthracene	220	1,200	6.1	19.8 U	12.5 U	9.2 U	9.4 U	8.5 U	10.7 U	6.2 U	2.2	3.5	2.3	5.4	0.6	0.5
2-Methylnaphthalene	38	64	2.6 J	19.8 U	12.5 U	9.2 U	9.4 U	8.5 U	10.7 U	6.2 U	2.2	3.1	3.6	6.0	0.3 J	0.6 J
LPAH (c,d)	370	780	61.2	19.8 U	6.4 J	9.2 U	9.4 U	8.5 U	10.7 U	6.2 U	26.0	37.0	82.8	80.5	4.9	5.8
Fluoranthene	160	1,200	15.9	19.8 U	12.5 U	9.2 U	9.4 U	8.5 U	10.7 U	6.2 U	8.3	8.9	8.7	17.3	1.7	1.1
Pyrene	1,000	1,400	15.9	19.8 U	12.5 U	9.2 U	9.4 U	8.5 U	10.7 U	6.2 U	11.2	9.8	9.5	23.1	2.3	1.5
Benzo(a)anthracene	110	270	4.3 J	19.8 U	12.5 U	9.2 U	9.4 U	8.5 U	10.7 U	6.2 U	2.0	2.0	2.6	3.9	0.6	0.6
Chrysene	110	460	6.7	19.8 U	12.5 U	9.2 U	9.4 U	8.5 U	10.7 U	6.2 U	2.1	2.1	2.6	4.2	0.6 J	1.2 J
Total Benzofluoranthenes	230	450	7.2 J	38.5 U	25.7 U	18.9 U	18.8 U	17.1 U	21.3 U	12.5 U	3.7	3.6	4.6	8.3	1.0	1.0
Benzo(a)pyrene	99	210	3.5 J	19.8 U	12.5 U	9.2 U	9.4 U	8.5 U	10.7 U	6.2 U	1.6	1.3	1.9	3.9	0.5	0.5
Indeno(1,2,3-cd)pyrene	34	88	5.2 U	19.8 U	12.5 U	9.2 U	9.4 U	8.5 U	10.7 U	6.2 U	0.9	0.6	0.9	2.2	0.2	0.2
Dibenz(a,h)anthracene	12	33	5.2 U	19.8 U	12.5 U	9.2 U	9.4 U	8.5 U	10.7 U	6.2 U	0.4 U	0.4 U	0.5 U	0.5 J	0.2 U	0.1 J
Benzo(g,h,i)perylene	31	78	5.2 U	19.8 U	12.5 U	9.2 U	9.4 U	8.5 U	10.7 U	6.2 U	1.5	1.0	1.2	3.4	0.2	0.2
HPAH (c,e,f)	960	5,300	53.6 J	19.8 U	12.5 U	9.2 U	9.4 U	8.5 U	10.7 U	6.2 U	31.2	29.3	32.1	66.8	7.1	6.5
Conventionals (%)																
Total Organic Carbon (SW9060M)	10 (g)	10 (g)	0.345	0.096	0.144	0.196	0.192	0.211	0.169	0.289	2.66	1.65	0.988	2.80	0.868 J	1.52
Total Solids (SM2540B)	---	---	85.90	88.00	88.90	87.10	87.00	86.60	87.00	88.10	78.90	65.90	76.50	43.70	48.20	48.70

Notes:

U = Indicates the compound was not detected at the reported concentration.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ = The analyte was not detected in the sample; the reported sample reporting limit is an estimate.
Green Shaded Box = Exceeds SQS
Blue Shaded Box = Exceeds SQS and CSL

(a) SMS Sediment Quality Standard (Chapter 173-204 WAC).
(b) SMS Cleanup Screening Level (Chapter 173-204 WAC).
(c) Where chemical criteria in this table represent the sum of individual compounds or isomers, the following methods shall be applied:
  (i) Where chemical analyses identify an undetected value for every individual compound/isomer, then the single highest detection limit shall represent the sum of the respective compounds/isomers.
  (ii) Where chemical analyses detect one or more individual compounds/isomers, only the detected concentrations will be added to represent the group sum.
(d) The LPAH criterion represents the sum of the following "low molecular weight polycyclic aromatic hydrocarbon" compounds: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, and anthracene. The LPAH criterion is not the sum of the criteria values for the individual LPAH compounds listed.
(e) The total benzofluoranthenes criterion represents the sum of the concentrations of the "B," "J," and "K" isomers.
(f) The HPAH criterion represents the sum of the following "high molecular weight polycyclic aromatic hydrocarbon" compounds: fluoranthene, pyrene, benzo(a)anthracene, chrysene, total benzofluoranthenes, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene. The HPAH criterion is not the sum of the criteria values for the individual HPAH compounds as listed.
(g) DMMP clarification paper and SMS technical information memorandum: Management of Wood Waste Under Dredged Material Management Program and the SMS Cleanup Program.

Abbreviations and Acronyms:

EPA = US Environmnetal Protection Agency
HPAH = high molecular weight polcyclic aromatic hydrocarbon
ID = identification
LPAH = low molecular weight polcyclic aromatic hydrocarbon
mg/kg = milligram per kilogram
NA = not analyzed
OC = carbon normalized
pg/g = picogram per gram
SIM = selected ion monitoring