FINAL
Pre-Remedial Design Investigation Work Plan
Port of Olympia Budd Inlet Sediment Site
Olympia, Washington

January 31, 2024

Prepared for

Port of Olympia
915 Washington Street NE
Olympia, Washington 98501

Prepared by

Dalton, Olmsted & Fuglevand
1001 SW Klickitat Way
Suite 200B
Seattle, Washington, 98134

DOF DALTON OLMSTED FUGLEVAND
The Budd Inlet Team

Grette Associates ENVIRONMENTAL CONSULTANTS · WestLand · MAUL FOSTER ALONGI · CRETE · moffatt & nichol · LANDAU ASSOCIATES

FINAL
Pre-Remedial Design
Investigation Work Plan
Port of Olympia Budd Inlet Sediment Site
Olympia, Washington

January 31, 2024

DALTON OLMSTED FUGLEVAND

The Budd Inlet Team

This page intentionally left blank.

TABLE OF CONTENTS

FIGURES

TABLES

ATTACHMENTS

LIST OF ABBREVIATIONS AND ACRONYMS

Draft Alternatives Memorandum	Draft Identification and Evaluation of Interim Action Alternatives Memorandum
AET	apparent effects threshold
AO	Agreed Order
Cascade Pole	Cascade Pole site
CDF	confined disposal facility
City	City of Olympia
cm	centimeter
COC	chemical of concern
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CSL	cleanup screening level
D/F	dioxin and furan
DMMO	Dredged Material Management Office
DMMP	Dredged Material Management Program
DNR	Washington State Department of Natural Resources
DOF	Dalton Olmsted & Fuglevand
Ecology	Washington State Department of Ecology
EDD	electronic data deliverable
EDR	engineering design report
EIM	Environmental Information Management System
ENR	enhanced natural recovery
EPA	US Environmental Protection Agency
ESA	Endangered Species Act
ft	feet/foot
GPS	global positioning system
HASP	Health and Safety Plan
HpCDD	heptachlorodibenzo-*p*-dioxin
IAP	interim action plan
IDP	Inadvertent Discovery Plan
Landau	Landau Associates, Inc.
LOTT	LOTT Clean Water Alliance
MHHW	mean higher high water
MLLW	mean lower low water
MTCA	Model Toxics Control Act
OC	organic carbon normalized
OD	ordnance datum
OSV	Ocean Survey Vessel
PCB	polychlorinated biphenyl

LIST OF ABBREVIATIONS AND ACRONYMS (continued)

Port .... Port of Olympia
PQL .... practical quantitation limit
PSEP .... Puget Sound Estuary Program
QAPP .... Quality Assurance Project Plan
RAL .... remedial action level
RBC .... risk-based concentration
RCW .... Revised Code of Washington
SCL .... sediment cleanup level
SCUM .... Sediment Cleanup User's Manual
SEPA .... State Environmental Policy Act
SIM .... selected ion monitoring
SMA .... Sediment Management Area
SMS .... sediment management standards
SWAC .... surface weighted average concentration
TCLP .... toxicity characteristic leaching procedure
TEQ .... toxicity equivalency quotient
UCT-KED .... Universal Cell Technology-Kinetic Energy Discrimination
USACE .... US Army Corps of Engineers
UTL .... upper tolerance limit
WAC .... Washington Administrative Code
Work Plan .... Pre-Remedial Design Investigation Work Plan

1.0 INTRODUCTION

This Pre-Remedial Design Investigation Work Plan (Work Plan) has been prepared as required by Amendment No. 2 to Agreed Order (AO) No. DE 6083. AO No. DE 6083 was entered into by the Washington State Department of Ecology (Ecology) and the Port of Olympia (Port) on December 5, 2008. This Work Plan has been prepared consistent with the requirements of "Task 8: Pre-Remedial Design Investigation Work Plan" of AO Amendment No. 2, effective June 9, 2023.

This Work Plan is focused on a geographical and technical subset of investigations and related work plans for the overall Budd Inlet Sediment site, as shown on Figure 1-1. This Work Plan is focused on the collection of sediment chemistry data in:

- Subtidal and intertidal areas east and north of the Port Peninsula to the confluence of the shallow and deep draft federal navigation channels.
- The former log pond.
- Potential mitigation area: On the west shoreline in West Bay in the vicinity of West Bay Park.

These areas collectively are defined as the "Sub-Area 1 Project Area" within this Work Plan (see Figure 1-2). The Sub-Area 1 Project Area comprises the East Bay, Log Pond, and West Bay Park Segments, as shown on Figure 1-2, that have been identified as feasible to address in an initial phase of sampling.

This Work Plan is consistent with AO Task 8: Pre-Remedial Design Investigation Work Plan. Additional sediment sampling will be completed in subsequent stages of work at the Budd Inlet Sediment site, as illustrated on Figure 1-3 below, to work toward satisfying the requirements of Task 8.

This Work Plan describes planned intertidal and subtidal sediment sampling for chemical analysis. Both surface and subsurface sediment samples will be collected and analyzed for chemical contamination.

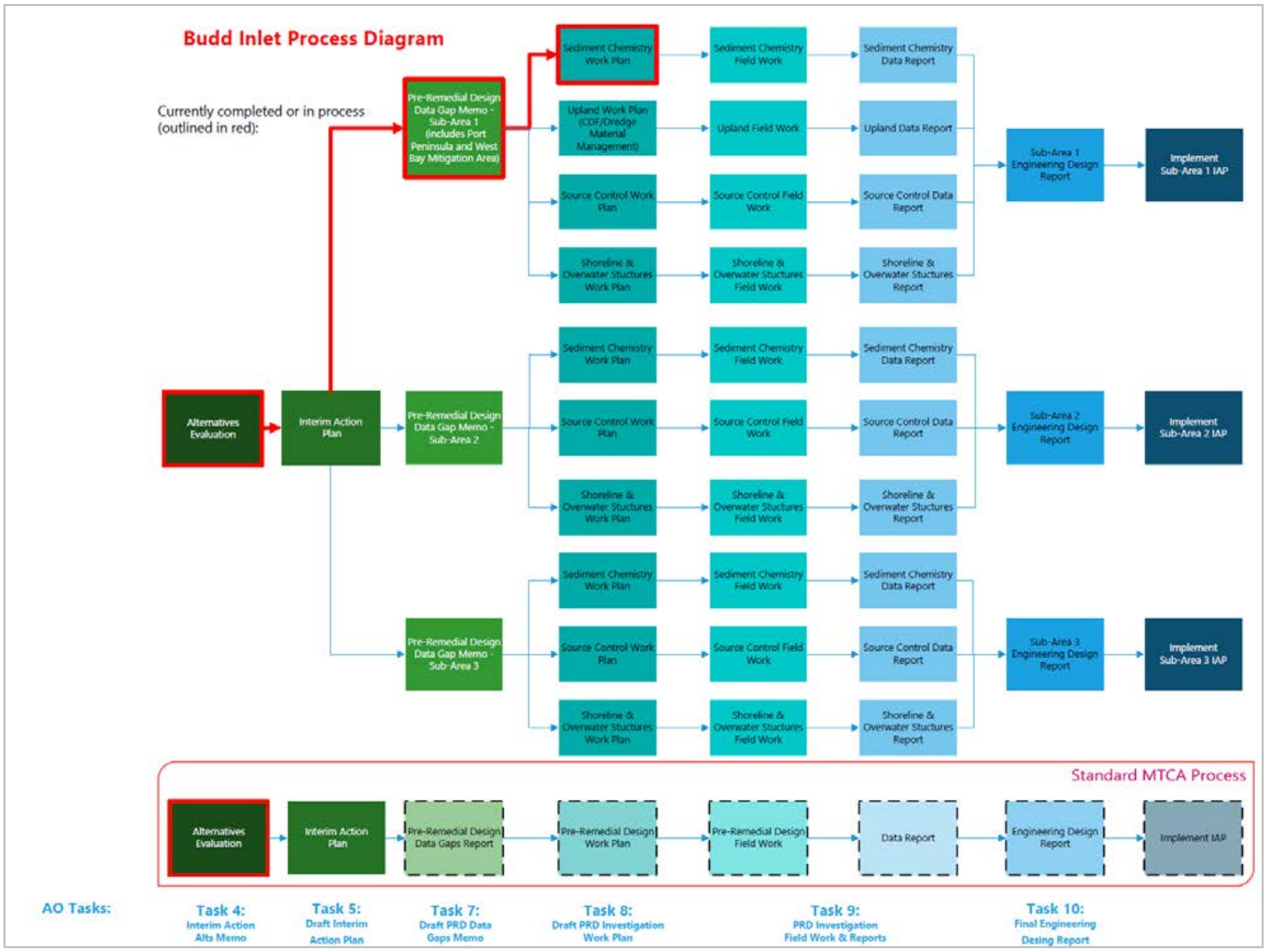


Figure 1-3: Budd Inlet Process vs. Standard Model Toxics Control Act (MTCA) Process Diagram (Ecology, September 2023)

Additional work plans will be prepared for the Sub-Area 1 Project Area in response to additional data needs, including geotechnical and upland site data collection, and source control studies. The current sediment chemistry data collection will be used to inform and guide these future studies. This workflow process, as previously discussed with Ecology, is depicted on Figure 1-3, with the tasks associated with AO Amendment No. 2 shown below the process diagram.

For each study within the Sub-Area 1 Project Area, a data report will be prepared and submitted to Ecology. At the completion of data collection within the Sub-Area 1 Project Area, a Sub-Area 1 Project Area Engineering Design Report (EDR) will be prepared and submitted to Ecology. Following review and approval of the final Sub-Area 1 Project Area EDR by Ecology, the Sub-Area 1 Project Area portion of the interim action plan (IAP) will be implemented for the Sub-Area 1 Project Area.

Additionally, similar work plans for sediment chemistry, geotechnical data, and source control evaluations will be prepared for the Sub-Area 2 Project Area and then for the remainder of the Budd Inlet Site (Sub-Area 3), extending to the north as required, based upon contamination identified by previous and future sediment investigations. These work plans may be prepared in parallel or in series, to be coordinated with Ecology.

As required by Task 8 of AO Amendment No. 2, this Work Plan for sediment chemistry sampling in the Sub-Area 1 Project Area describes:

- Field sediment chemistry investigations to be performed
- Data use
- Data collection methodologies
- Reporting requirements, and
- Schedule.

As further required by Task 8 of AO Amendment No. 2, this Work Plan includes the following supporting plans as attachments:

- Sampling and Analysis Plan (SAP)/Quality Assurance Project Plan (QAPP; Attachment A)
- Health and Safety Plan (HASP; Attachment B)
- Inadvertent Discovery Plan (IDP; Attachment C)

1.1 Objectives of the Pre-Design Sediment Sampling

Within the Sub-Area 1 Project Area, multiple surface and subsurface sediment samples will be collected to fill existing sediment chemistry data gaps, consistent with the requirements of Task 8 of AO Amendment No. 2, which states, "the Work Plan will be focused on collection of data to fill data gaps identified in the PRD Memo." Existing sediment chemistry sample density for dioxin/furans (D/Fs) and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) are shown on Figures 2-1 through 2-3 and Figures 2-4 through 2-6 respectively.

Objectives of the pre-remedial design sediment sampling detailed in this Work Plan include:

- Collection of sediment chemistry data to support remedial design within the Sub-Area 1 Project Area where a specific remedial approach was proposed in the Draft Identification and Evaluation of Interim Action Alternatives Memorandum (DOF et al. 2023).
- Collection of sediment chemistry data to refine the extent of contamination in surface and subsurface sediments within the Sub-Area 1 Project Area.
- Collection of sediment chemistry data to support detailed design-level evaluation of the Sub-Area 1 Project Area.

Specifically, data will be collected to:

- Support calculation of surface weighted average concentrations (SWAC) for cadmium, cPAHs, dioxin-like polychlorinated biphenyls (PCBs), and D/Fs via collection of surface sediment (0-10 centimeter [cm]) data.

- Support calculation of intertidal SWACs for cadmium, cPAHs, dioxin-like PCBs, and D/Fs via collection of surface sediment data (0-45 cm) data in intertidal areas.
- Support determination of the depth of contamination within areas proposed for remedial dredging within the Draft Alternatives Memorandum (DOF et al. 2023). This includes hot spots, navigational areas, and around the Moxlie Creek Outfall at the southern end of Sub-Area 1 Project Area.
- Support initial source control assessment.
- Support initial dredge material management assessment.

1.2 Regulatory Framework

Under the Puget Sound Initiative (Initiative), Ecology identified Budd Inlet as a high-priority cleanup area that requires focused sediment cleanup primarily due to elevated concentrations in sediment (Ecology 2008). As part of the Initiative, Ecology issued AOs to property owners to investigate and clean up contaminated sites within Budd Inlet.

Ecology and the Port entered into AO No. DE 6083 in 2008 to complete a pilot remedial dredging action in a portion of the Port's berthing area (completed in 2009). In 2012, the AO was amended to require the Port to evaluate a larger area, referred to as the Study Area, and address contaminated sediment in the vicinity of the Port Peninsula (Ecology 2012a). In 2023 the AO was amended a second time to include additional tasks, including the preparation of a Pre-Remedial Design Investigation Work Plan (Ecology 2023a). This Work Plan for sediment chemistry investigation within the defined Sub-Area 1 Project Area is one component of the overall Work Plan required by AO Amendment No. 2. Future work plans will be prepared for additional studies within the Sub-Area 1 Project Area and the remainder of the Budd Inlet Sediments site.

The Port (performing party for the remediation) and Ecology (lead regulatory agency) are currently working in a collaborative process to develop, design, and permit Budd Inlet sediment remediation such that remedial work will be complete prior to the potential upcoming removal of the Capitol Lake dam. Removal of the dam is expected to significantly increase the sediment load into Budd Inlet. If new sediment from Capitol Lake enters Budd Inlet prior to remediation, the total volume of sediment to remediate in Budd Inlet would likely increase, because the new sediment likely could not be separately managed from the impacted sediment in a cost-effective manner.

This work is being performed as required by Amendment No. 2 to 2008 AO No. DE 6083, entered by Ecology and the Port on June 8, 2023. Ecology is the lead regulatory authority for this work.

1.2.1 Permitting and Other Approvals

In-water sampling will require a US Army Corps of Engineers (USACE) permit. The Nationwide Permit 6 covers sampling activities, and the USACE will likely use this permit to authorize this cleanup action. Endangered Species Act (ESA) consultation will be conducted concurrent with the USACE permit process. Whether or not ESA consultation is necessary, and what level of consultation (formal or informal) is necessary, would be determined by the USACE.

State and local permits generally are not required under a state-led cleanup project. Revised Code of Washington (RCW) 70A.305.090 exempts state-led cleanup projects from the procedural requirements of obtaining permits under programs including the hydraulic code (RCW 77.55) and the Shoreline Management Act (RCW 90.58). However, RCW 70A.305.090 requires that Ecology ensure the project complies with the substantive provisions of these programs.

In-water sampling is exempt from review under the State Environmental Policy Act (SEPA), per Washington Administrative Code (WAC) 197-11-800 (17), which exempts data collection. The SEPA lead agency (likely the Port in this case) would be responsible for determining whether the project meets this exemption.

1.3 General Site Information

The Port's Marine Terminal facility is located in the northern portion of the City of Olympia (City) on a peninsula within Budd Inlet, which is a small embayment in southern Puget Sound (Figure 1-2). Southern Budd Inlet is divided into West Bay and East Bay by the Port Peninsula. The filling of tidelands in the late 1800s and 1900s created the Port Peninsula and the downtown area of Olympia. The upland Port Peninsula consists of approximately 150 acres. Detailed background information related to property features, regulatory background, and historical operational uses are presented in the Existing Information Summary and Data Gaps Memorandum (Anchor QEA 2012a).

1.3.1 East Bay

A federally authorized navigation channel runs from the area north of the Port Peninsula and extends into the East Bay of Budd Inlet. This channel was originally dredged by the USACE and the marina basin was dredged by the Port, to support development of the East Bay Marina, now Swantown Marina, and the dredge material was used as fill to expand the Port Peninsula (Figure 1-2). The federal navigation channel also extends to the boat launch ramp located just north of Swantown Marina. Prior to the USACE channel dredging and subsequent construction of the Marina, the Sub-Area 1 Project Area was historically used for log storage.

Two sites under AOs with Ecology are located on the Port Peninsula adjacent to the Sub-Area 1 Project Area (Figure 1-4): The Cascade Pole site (Cascade Pole; located on the north end of the peninsula) and the East Bay Redevelopment site (located on the southern portion of the peninsula). The Port has been addressing contamination at Cascade Pole since 1990. The previous cleanup activities at Cascade Pole include several interim actions to remove and contain contamination both on the uplands (groundwater and soil) and in sediments, out to the "Multiple Benefits Line" (Figure 1-2). The historical activities at East Bay Redevelopment site caused soil contamination. The Port, along with the City and LOTT Clean Water Alliance (LOTT), worked with Ecology to implement the Cleanup Action Plan for the site. Remediation included removal of some soil contamination hot spots. Remaining impacted soil was covered with a cap of clean soil, pavement, or buildings.

Moxlie Creek originates from an artesian spring approximately 1.5 miles south of Budd Inlet. It flows into the Sub-Area 1 Project Area through a mile-long culvert that receives stormwater flows from urban areas, including road runoff from city streets and state and federal highways, before discharging at the southern end of the Sub-Area 1 Project Area (Anchor QEA 2012a).

1.3.2 US Army Corps of Engineers and Authorized Federal Navigation Channels

The two federally authorized navigation channels within Budd Inlet are described below. The shallow draft channel is part of the Sub-Area 1 Project Area and is included in this Work Plan. The deep draft channel will be included in the future Sub-Area 2 and Sub-Area 3 Work Plans as appropriate.

- The deep draft (-30 feet [ft] mean lower low water [MLLW] authorized depth) navigation channel starts in the northern section of Budd Inlet and extends into West Bay, including the Turning Basin. The Port's berthing areas at the Marine Terminal are outside the federal channel.
- The shallow draft (-13 MLLW and -12 MLLW authorized depths) extends from the deep draft navigation channel north of the Port Peninsula into the Sub-Area 1 Project Area and south to the Boatworks area.

The USACE is responsible for dredging federally authorized channels (with direction and funding from Congress) but will not dredge channels within an Ecology-listed contaminated site. In discussions, USACE has indicated that remediation in the federally authorized navigation channels must consider future maintenance dredging requirements. As such, any restrictions on future dredge, such as a cap over contaminated sediments, must be greater than 2 ft below the typical overdredge allowance of 2 ft below authorized depth; 4 ft below the overdredge (OD) elevation is preferred by the USACE (Hicks, J., 2023, personal communication).

In the shallow draft channel in East Bay, where the authorized depth is -13 ft MLLW, a 2-ft overdredge allowance is -15 ft MLLW, the minimum additional 2-ft clearance required by USACE is -17 ft MLLW, and the preferred 4-ft allowance below OD is -19 ft MLLW.

These guidelines from the USACE have been considered and incorporated into the planned sediment sampling within the federally authorized navigation channels.

The Swantown Marina boat basin is maintained by the Port and is not part of the federally authorized navigation channel.

1.4 Work Plan Organization

The remainder of this Work Plan is divided into the following sections and attachments, consistent with AO Amendment No. 2, Task 8:

Field Investigations to Be Performed and Data Collection Methodologies (Work Plan Section 2)
This section generally describes the methods to be used to collect the various types of sediment samples for chemical analysis to inform remedial design requirements. Additional details are provided in the SAP/QAPP (Attachment A).

Data Use (Work Plan Section 3)
This section expands on the objectives defined in Section 1.1 and describes the intended data use for each type of sediment sample, specifically each sample planned to be collected at both surface and subsurface locations. Surface sediment samplings include samples in the Sub-Area 1 Project Area within both intertidal areas (0-45 cm sample depth) and subtidal areas (0-10 cm sample depth). Subsurface samples are at depths deeper than 10 cm below the surface in subtidal areas and deeper than 45 cm below the surface in the intertidal areas.

Reporting Requirements (Work Plan Section 4)
This section describes how the various types of data will be reported and details associated reporting requirements. Specifics on laboratory processes and reporting are presented in the SAP/QAPP (Attachment A).

Schedule (Work Plan Section 5)
This section describes the planned schedule for implementation of the Work Plan, laboratory analyses, and data report preparation.

Attachments to This Work Plan

- SAP/QAPP: The SAP/QAPP provides details on sediment-related field procedures, laboratory methodologies, and quality assurance requirements.
- HASP: The HASP addresses project and task-specific health and safety procedures and requirements for sediment sampling.
- IDP: The IDP provides guidance and procedures to be followed in the case of an inadvertent discovery of potentially historically significant artifacts.

2.0 FIELD INVESTIGATIONS TO BE PERFORMED

The sediment chemistry field investigations proposed in this Work Plan have been developed to fill sediment chemistry data gaps in the Budd Inlet Sub-Area 1 Project Area as identified in the Draft Final Pre-Remedial Design Data Gaps Memorandum (DOF 2023).

Existing surface sediment data are limited in geographical coverage throughout most of Budd Inlet and the Sub-Area 1 Project Area. Proposed surface sediment samples will be collected on an approximately 500-foot-grid spacing throughout most of the Sub-Area 1 Project Area, with increased density of samples near existing outfalls and in the vicinity of Moxlie Creek. Surface sediment samples will be collected using a grab sampler (power grab or similar) or by using hand tools in intertidal areas during low tide in areas where boat access is limited.

Existing subsurface sediment data are limited in geographical coverage throughout most of Budd Inlet and the Sub-Area 1 Project Area. Proposed subsurface sediment samples will be collected on an approximately 500-foot-grid spacing throughout the Sub-Area 1 Project Area, with greater density of samples in the navigation channel, near outfalls, and within the vicinity of Moxlie Creek. Samples of subsurface sediment will be collected using a vibracorer.

Sediment samples will be sent to a laboratory for chemical analysis as detailed in Sections 2.1, 2.2, and 2.3 of this Work Plan. Detailed procedures for sample collection, identification, handling, and laboratory analysis are presented in the attached SAP/QAPP. The rationale for different sampling approaches is discussed below and in Section 3.0.

2.1 Surface Sediment Sampling (0-10 cm below mudline) in Subtidal and Intertidal Areas

Surface sediment samples (0-10 cm below mudline) will be collected throughout the Sub-Area 1 Project Area as shown on Figure 2-7. This includes samples within intertidal and subtidal areas. These samples will be collected using a power grab or similar surface sediment sampling device and will be analyzed for the Primary Chemical of Concern (COC) suite. Alternatively, within intertidal areas samples may be collected using hand tools as necessary as described in the SAP/QAPP. Samples near outfalls will also be analyzed for the Source Control suite. The Primary COC suite includes D/Fs (dioxin toxicity equivalency quotient [TEQ]), cPAHs, PCBs as congeners (PCB TEQ), and cadmium. The Source Control suite consists of the Sediment Management Standards Marine suite (Sediment Cleanup User's Manual [SCUM], Table 8-1) developed for protection of the benthic community and the Primary COC suite, as detailed in the attached SAP/QAPP.

2.2 Surface Sediment Sampling (0-45 cm below mudline) in Intertidal Areas

The intertidal areas are located between elevations -4’ MLLW and +16’ MLLW based on typical lowest and highest tides annually. Within the mapped intertidal areas of the Sub-Area 1 Project Area, surface sediment samples (0-45 cm below mudline) will be collected as shown on Figure 2-8. These samples will be collected using a vibracorer and will be analyzed for the Primary COC suite. Samples near outfalls will also be analyzed for the Source Control suite, as detailed in the attached SAP/QAPP.

2.3 Subsurface Sediment Sampling (below 10 cm [~0.3 ft] within subtidal areas, below 45 cm [~1.5 ft] within intertidal areas)

Subsurface sediment samples (deeper than 10 cm [~0.3 ft] in subtidal areas, deeper than 45 cm [~1.5 ft] in intertidal areas) will be collected throughout the Sub-Area 1 Project Area as shown on Figure 2-9. These samples will be collected using a vibracorer and will be analyzed for the Primary COC suite at all sample locations and for the Z-layer suite at locations where dredging is anticipated to occur, as detailed in the attached SAP/QAPP. The Z-layer suite consisted of the USACE Dredged Material Management Program Standard List of Chemicals of Concern (Dredged Material Management Program [DMMP] User Manual, Table 8-3). The cores will be sampled based on a 1’ *in situ* sample interval (take samples from the core to represent 1’ *in situ* intervals).

2.4 Field Data Collection Preparation

Prior to implementing the field sediment sampling program, the following supporting activities will be completed:

- Permitting as described in Section 1.2.1
- Coordination and Right of Entry from the Washington State Department of Natural Resources (DNR) for sampling on DNR property
- Field utility locate to identify any underground utilities within the Sub-Area 1 Project Area
- Identification of project support areas, including:
  - Sampling vessel moorage
  - Core sample processing area
  - Property access, as needed
- Contracting and coordination with sampling vessel
- Contracting and coordination with analytical laboratory.

3.0 DATA USE

Sediment samples will be collected throughout the Sub-Area 1 Project Area to support multiple project objectives, as presented in Section 1.1, including refining the extent of contamination in surface and subsurface sediments and providing data to inform remedial design requirements, as practicable, for development of remedial alternatives within areas of insufficient existing data and to identify areas where additional investigation is needed to determine additional sources of contamination entering the Sub-Area 1 Project Area. Data will also be used to:

- Define the nature and extent of chemical contamination throughout the Sub-Area 1 Project Area, including identification of areas of significantly elevated chemical concentrations or "hot spots."
- Determine surface sediment chemistry for recalculation of surface and intertidal SWACs as appropriate.
- Map chemical concentrations in sediment, both horizontally and vertically, to support design, confirm potential COCs in the Z-layer (the surface exposed by dredging, if dredging is performed), and evaluate potential capping of contaminated sediments within areas where capping is a selected remedy and below the Z-layer if necessary, based on a proposed dredging remedy within that Sediment Management Area (SMA).
    - Sufficient data density is required to define an accurate dredge prism, horizontally and vertically, to remove the impacted sediments.
- Determine sediment chemistry in the vicinity of existing and former outfalls for identification of potential current or historical sources of contamination.
- Determine sediment chemistry for the development and evaluation of potential dredged material management options, including onsite confined disposal facilities (CDFs) either upland or in water. Additional sediment and upland investigations will be performed in the future as part of a focused work plan, as appropriate.
- Determine sediment physical parameters, such as grain size and density, to evaluate dredgeability, dredged material management, and sediment management approaches other than dredging, including capping or enhanced natural recovery (ENR).

Planned sampling locations and intended data use are presented in Table 1 below. Tables 2, 3, and 4 provide additional details and describe locations to be sampled, previous contamination in the vicinity, depth intervals to be initially analyzed, and chemicals of concern to be analyzed. Additional core intervals may be analyzed, as needed, to determine the depth of contamination based on initial analyses. Cores will be driven to the depth indicated in Tables 3 and 4 or to refusal, whichever is encountered first. If sample acceptance criteria are not achieved, the core will be rejected, and the vessel will shift no more than 20 feet from the target location and attempt to collect an acceptable core. At least three attempts to collect an acceptable core will be made for each sample location. If a core is not collected that meets acceptance criteria after three attempts, the field lead will determine if additional attempts are likely to result in a core that will meet acceptance criteria or if a core already collected will contain enough sediment for the analysis suite appropriate for the sample location.

Table 1. Sampling Approach

Sample Type	Locations	Data Use
Surface sediment samples (0-10 cm)	Sub-Area 1 Project Area–Wide (Figure 2-1 and Table 2)	Update SWAC and determine sediment physical parameters, such as grain size and density, to evaluate dredgeability, dredged material management, and sediment management approaches other than dredging, including capping or ENR.
	Near stormwater outfalls within Sub-Area 1 Project Area (Figure 2-1 and Table 2)	Evaluate, and identify potential current or historical sources,
Intertidal surface sediment samples (0-45 cm)	Intertidal areas within Sub-Area 1 Project Area (Figure 2-8 and Table 2)	Update SWAC and determine sediment physical parameters, such as grain size and density, to evaluate dredgeability, dredged material management, and sediment management approaches other than dredging, including capping or ENR.
	Near stormwater outfalls within Sub Area 1 Project Area (Figure 2-8 and Table 2)	Evaluate, and identify potential current or historical sources,
Subsurface sediment samples (below 10 cm [~0.3 ft] subtidal, below 45 cm [~1.5 ft] intertidal)	Sub-Area 1 Project Area–Wide (Figure 2-9 and Table 2)	Evaluate depth of contamination and for the development and evaluation of potential dredged material management options,
	Near stormwater outfalls within Sub-Area 1 Project Area	Evaluate, and identify potential current or historical sources,
	Anticipated Remedial Dredging Areas (Figure 2-9 and Table 2)	Evaluate sediments anticipated to be exposed by dredging (Z-layer) and to define an accurate dredge prism, horizontally and vertically, to remove the impacted sediments.

Note:

All outfalls, current and historical, are shown on Figure 2-7.

Based on previous studies and existing data, this Work Plan is focused on analytes as follows:

- Sitewide: Cadmium, 7 cPAHs, D/Fs, and 12 dioxin-like PCBs.
- In areas with dredging as a proposed remedy in the Draft Alternatives Memorandum (DOF et al. 2023): Dredged Material Management Office (DMMO) suite of chemicals in sediments anticipated to be exposed by dredging, the Z-layer. The full list of analytes is presented in Table 3 of the SAP/QAPP (Attachment A) as the “Z-layer” analytical suite.
- Near outfalls and other potential source areas: Washington sediment management standards (SMS) marine list of chemicals. The full list of analytes is presented in Table 3 of the SAP/QAPP (Attachment A) as the “Source Control” Marine List analytical suite.

Specific analytical suites and related methods and detection/reporting limit information is provided in the SAP/QAPP. Existing sediment data have been used as guidance in developing the planned analytical suite and analysis program. Archived core samples representing 1-ft intervals will be sequentially analyzed, as needed, to delineate the depth of contamination at each coring location. Not all 1-ft core intervals will be analyzed. Additional details and rationale for the planned sampling are as follows:

- Sitewide chemicals identified for testing are based on those identified as primary COCs in the Investigation Report and as determined in coordination with Ecology.
- Surface sediment samples (grab samples 0-10 cm below mudline) collected throughout the Sub-Area 1 Project Area will be used to update the Sub-Area 1 Project Area–specific SWACs. Samples will be analyzed for arsenic, mercury, cadmium, D/Fs, 12 dioxin-like PCBs, pentachlorophenol, and 7 cPAHs.
- Intertidal surface sediment samples (vibracore samples 0-45 cm below mudline) collected throughout the intertidal portions of the Sub-Area 1 Project Area will be used to update the Sub-Area 1 Project Area–specific intertidal SWACs. Samples will be analyzed for arsenic, mercury, cadmium, D/Fs, dioxin-like PCBs, pentachlorophenol, and cPAHs.
- Within areas where the identified proposed remedial action is dredging, based on the Draft Alternatives Memorandum (DOF et al. 2023), samples will be collected with a focus on identifying the depth of contamination, and the sediment quality of the sediment surface anticipated to be exposed by dredging (i.e., the Z-layer). Sample results will be used to design the remedial action in these areas. Samples used to identify the depth of contamination will be analyzed for cadmium, D/Fs, PCBs, and cPAHs. Z-layer samples will be analyzed for the required DMMP suite of chemicals.
- In areas near outfalls, surface and subsurface sediment samples will be collected to evaluate potential previous and ongoing sources of contamination. Additionally, these data will support development of potential remedial alternatives for these areas, as needed. Samples will be analyzed for the Source Control suite of chemicals.
- In areas immediately adjacent to the federal navigation channel in the Sub-Area 1 Project Area, samples will be collected to evaluate potential contamination and the depth of contamination, if present. These data will be used in design of the remedial action and dredging within the federally authorized channel to reduce potential for recontamination and

redistribution following dredging. These samples will be analyzed for cadmium, D/Fs, PCBs, and cPAHs.

3.1 Data Management and Analysis

Field investigation personnel will be responsible for maintaining a daily record of significant events, observations, and measurements during field investigations. Field records may consist of a bound logbook or of paper or electronic field data sheets. A separate entry will be made for each sample collected. Field logbooks and forms will be included in the project files at the end of field activities to provide a record of sampling.

The laboratory shall record the results of each analysis in a Laboratory Information Management System in accordance with the contracted laboratory's quality assurance plan. Data will be provided as electronic data deliverables (EDDs), which will be imported directly into an EQuIS database used for data storage. Validated laboratory results will be exported and provided as part of the final report. Data will be managed in such a way that they can be provided to Ecology in its Environmental Management Information database.

Data may be reduced to summarize particular data sets and to aid interpretation of the results. Statistical analyses may also be applied to results. Data-reduction quality control checks will be performed on all hand-entered data, any calculations, and any data graphically displayed. Data may be further reduced and managed using one or more of the following computer software applications:

- Microsoft Excel (spreadsheet)
- EQuIS (database)
- AutoCAD and/or ArcGIS (graphics)
- EPA ProUCL (statistical software).

Data analyses, validation, and quality assurance methods are provided in the SAP, which is an attachment to this work plan. A description of the types of analyses that will be performed, and the products of each analysis, should be presented to indicate what data gaps the analysis would fulfill and is provided in Section 1.1 of this work plan.

In addition to the data management software listed above, SWACs may be calculated for the primary risk drivers (cadmium, total D/F and PCB TEQ, and cPAHs) with the incorporation of new data proposed in this work plan. SWACs will be calculated using the following steps:

1) The data density visualization tool in ArcGIS Pro will be used to determine the areas where data are sufficient for interpolation. Interpolations will be developed using the inverse distance-weighted method in ArcGIS Pro 3.1.0.
2) Following interpolation, the SWAC area will be divided into a raster grid, with 50-ft by 50-ft cells or a smaller grid size (e.g., 10-ft by 10-ft cells). Each grid cell will be assigned the interpolated value at the centroid of the grid cell.

3) Grid cells with interpolated values below SCLs will be removed from the SWAC area prior to calculation of SWACs.
4) SWACs will be calculated using the equation $SWACc = \Sigma ((SAi / TSA) * SCi)$. SAi is the surface area of the ith cell, TSA is the sum of all cell surface areas, and SCi is the interpolated surface concentration (SC) of the ith cell.

If SWAC evaluations are conducted with the new data, remedial action levels (RALs) may be updated as determined necessary using the following procedure:

- Interpolated surfaces may be developed for the surface (0-10 cm) and near surface (0-45 cm) and SWAC areas determined based on data density (i.e., East Bay). The SWAC area will then be divided into a raster grid, and each grid cell assigned the interpolated value at the centroid of the grid cell.
- A hill-topping procedure may be used where raster grid cells are replaced with estimated post-remediation concentrations for various RALs identified.
- The SWAC may be recalculated with each grid cell replacement for various RALs to identify which RAL achieves a preliminary sediment cleanup level. RAL curves showing SWAC reduction (remediation benefit) and approximate associated remediation acres (as a proxy for remediation cost) may be developed.

4.0 REPORTING REQUIREMENTS

As required by AO Amendment No. 2, Task 9, “following field investigation and data analysis, the Port shall prepare a Pre-Remedial Design Investigation Report and submit it to Ecology for review and comment. The investigation report will present the data collected during the Pre-Remedial Design Field Investigation and identify if there are additional data gaps that need to be addressed by another phase of pre-remedial design sampling. Potential data evaluation methods are described in Section 3.1 of this report. If further data gaps are identified, Tasks 7 through 9 will be repeated until there is sufficient data. If future data gaps are identified, they will be addressed through a schedule change.” The investigation report will include the following:

- Summary of field procedures and any deviations from the Work Plan and SAP/QAPP
- Figures showing sample locations and results
- Tabulated data
- Statistical methods used to evaluate the data
- Validated data and a data validation memo
- Data submittal to the Environmental Information Management System (EIM).

As previously discussed, this Work Plan is focused on a geographical and technical subset of future investigations and related work plans to be prepared for the overall Budd Inlet Site. This Work Plan is focused on the collection of sediment chemistry data within the Sub-Area 1 Project Area and north of the Port Peninsula to the confluence of the shallow and deep draft federal navigation channels, the former log pond, and a small area of the west shoreline in West Bay. These areas collectively are defined as the “Sub-Area 1 Project Area” within this Work Plan.

Following completion of this Sub-Area 1 Project Area sediment chemistry investigation, data will be validated as described within the SAP/QAPP, and a Sub-Area 1 Project Area sediment chemistry data report, including a data validation memorandum, will be prepared and submitted to Ecology. Data validation will be performed as detailed in the SAP/QAPP. It is anticipated that at least one more, and possibly two, sediment investigation events will be required within the Sub-Area 1 Project Area to fully evaluate, define the nature and extent of contamination, and inform the design of the sediment remedial action within the Sub-Area 1 Project Area.

At the completion of data collection, which includes additional studies and additional sediment, upland, overwater structure and shoreline, and source control investigations as needed within the Sub-Area 1 Project Area, a Sub-Area 1 Project Area EDR consistent with the IAP will be prepared and submitted to Ecology.

5.0 SCHEDULE

The Port is targeting January 2024 for implementation of the proposed field investigation. The exact schedule is dependent on multiple factors, as listed below:

- Ecology approvals of the Work Plan and attachments
- Weather
- Subcontractor availability
- In-water work window
- Permitting and other approvals.

The Port is actively working to address and manage these various issues, as practicable.

The Port's preferred schedule is to start the surface sediment sampling in early January 2024, followed by subsurface sediment sampling.

Depending upon field conditions, weather, and other factors, it is anticipated to take approximately 2 to 4 weeks to collect the surface samples and approximately 3 to 4 weeks to collect the planned sediment cores.

Consistent with AO Amendment No. 2, the Port will submit a "Draft Pre-Remedial Design Investigation Report" to Ecology and submit data to the EIM within 90 calendar days following receipt of all pre-validated laboratory data.

6.0 REFERENCES/BIBLIOGRAPHY

Anchor QEA. 2012a. Budd Inlet Sediment Site Existing Information Summary and Data Gaps Memorandum. Anchor QEA, LLC. October.

Anchor QEA. 2012c. Port of Olympia Source Control Investigations Data Report. Anchor QEA, LLC. June.

Anchor QEA. 2014. Port of Olympia Source Control Investigations Data Report. Anchor QEA, LLC. April.

Anchor QEA. 2016b. Final Investigation Report, Port of Olympia Budd Inlet Sediment Site. Anchor QEA, LLC. August.

Anchor QEA. 2017. Budd Inlet Storm Drain Sampling Data Report, Budd Inlet Sediment Site. Anchor QEA, LLC. June.

City of Olympia, LOTT, and Port of Olympia. 2019. Olympia Sea Level Rise Response Plan. March 2019.

City of Olympia. 2021b. Shoreline Management Plan. City of Olympia. June.

DMMP. 2006. Supplemental Determination on the Suitability of Dredged Material Tested for Dioxin/Furans within the Olympia Harbor Federal/Port Navigation Project, Evaluated Under Section 404 of the Clean Water Act for Open-Water Disposal at the Anderson/Ketron Island Non-Dispersive Site, and for Beneficial Use. Dredged Material Management Program. September 14.

DMMP. 2014. Memorandum: Applicability of Previous Testing Within the Shoaled Areas of the Olympia Harbor Federal Navigation Channel and Need for Further Testing. CENWS-OD-TS-NR. Dredged Material Management Program. March 19.

DOF (Dalton, Olmstead & Fuglevand); Grette Associates; WestLand Engineering & Environmental Services, Inc.; Maul Foster & Alongi, Inc.; Crete Consulting, Inc., Moffat & Nichol; Thomas Architecture Studios; Landau Associates, Inc. 2023. Draft Revised Identification and Evaluation of Interim Action Alternatives Memorandum, Budd Inlet Sediment Site, Olympia, Washington. May 19.

DOF. 2023. Draft Final Pre-Remedial Design Data Gaps Memorandum: Budd Inlet Sub-Area 1 (East Bay, Log Pond, Upland Confined Disposal Facility, and West Bay Park), Budd Inlet Sediment Site, Olympia, Washington. November 3.

Duxbury, A.C., M.A. Friebertshauser, and E.P. Richey. 1972. Budd Inlet Circulation and Flushing Study. Report to Arvid Grant and Associates, Inc. June 29.

Ecology. 1990. Standards for Confined Disposal of Contaminated Sediments. Publication No. 90-09-900. Washington State Department of Ecology. January.

Ecology. 2008. Agreed Order No. DE 6083. Washington State Department of Ecology. December 5.

Ecology. 2012a. First Amendment to the Agreed Order No. DE 6083. Washington State Department of Ecology. February 15.

Ecology. 2012b. Environmental Information Management Database. Available at: http://www.ecy.wa.gov/eim.

Ecology. 2013. Sediment Management Standards—Chapter 173-204 WAC. Final Rule. Washington State Department of Ecology. February 22.

Ecology. 2018. South Puget Sound Regional Background, Final Data Evaluation and Summary Report. Publication No. 18-09-117. Washington State Department of Ecology. May.

Ecology. 2021b. Sediment Cleanup User's Manual (SCUM), Guidance for Implementing the Cleanup Provisions of the Sediment Management Standards, Chapter 173-204 WAC. Publication No. 12-09-057. Washington State Department of Ecology. Revised December. https://apps.ecology.wa.gov/publications/documents/1209057.pdf.

Ecology. 2023a. Second Amendment to Agreed Order No. DE 6083. Washington State Department of Ecology. June 9.

Ecology. 2023b. Sustainable Remediation: Climate Change Resiliency and Green Remediation-A Guide for Cleanup Project Managers. Publication No. 71-09-052. Washington State Department of Ecology. Revised January.

EPA. 2023. "Beneficial Use of Dredged Material under CWA Section 404." US Environmental Protection Agency. April 6. https://www.epa.gov/cwa-404/beneficial-use-dredged-material-under-cwa-section-404.

Hicks, J. 2023. Personal communication (with Rob Webb, President, Principal Engineer, Dalton, Olmstead & Fuglevand) J. Hicks, US Army Corps of Engineers. Re: *Dredging Requirements*. September 14.

Landau. 2004. Remedial Action Completion Report, Cascade Pole Sediment Remediation Project, Olympia, Washington. Landau Associates, Inc. March 12.

Landau. 2017. Sediment Quality Report Cascade Pole Site Olympia, Washington. Landau Associates, Inc. November.

Landau. 2022. Sediment Quality Report Cascade Pole Site Olympia, Washington. Landau Associates, Inc. November.

Miller, I.M., H. Morgan, G. Mauger, T. Newton, R. Weldon, D. Schmidt, M. Welch, and E. Grossman. 2018. Projected Sea Level Rise for Washington State—A 2018 Assessment. Washington Coastal Resilience Project. Washington Sea Grant, University of Washington Climate Impacts Group, University of Oregon, University of Washington, and US Geological Survey. Updated July 2019.

NewFields. 2016. Budd Inlet Sediment Dioxin Source Study, Olympia, WA. Final Report. March.

Port of Olympia. 2012. Port of Olympia 2013-2025 Strategic Plan Vision 2025. Adopted by Port Commission November 5, 2012. Available at 2013-Strategic-Plan-Update_201308131828344407.pdf (portolympia.com).

Port of Olympia. 2017. Port of Olympia Comprehensive Scheme of Harbor Improvements. Commission Approval Date: May 22, 2017. Available at 1_Port-of-Olympia-CSHI_FINAL_May-22-2017_201705261652447413.pdf (portolympia.com).

Port of Olympia. 2019. A Community-Informed Plan for Our Future, Port Vision 2050 Action Plan. August 26. Available at Port-Vision-2050-Action-Plan-Resolution-1.pdf (portolympia.com).

SAIC. 2006. Olympia Federal Navigation Channel and the Port of Olympia Berthing Area, Olympia, WA - Data Report (Olympia Harbor Navigation Project). Science Applications International Corporation. April 29.

SAIC. 2007. Sediment Characterization Study, Budd Inlet, Olympia, WA, Sampling and Analysis Plan, Preliminary Final. Science Applications International Corporation. March.

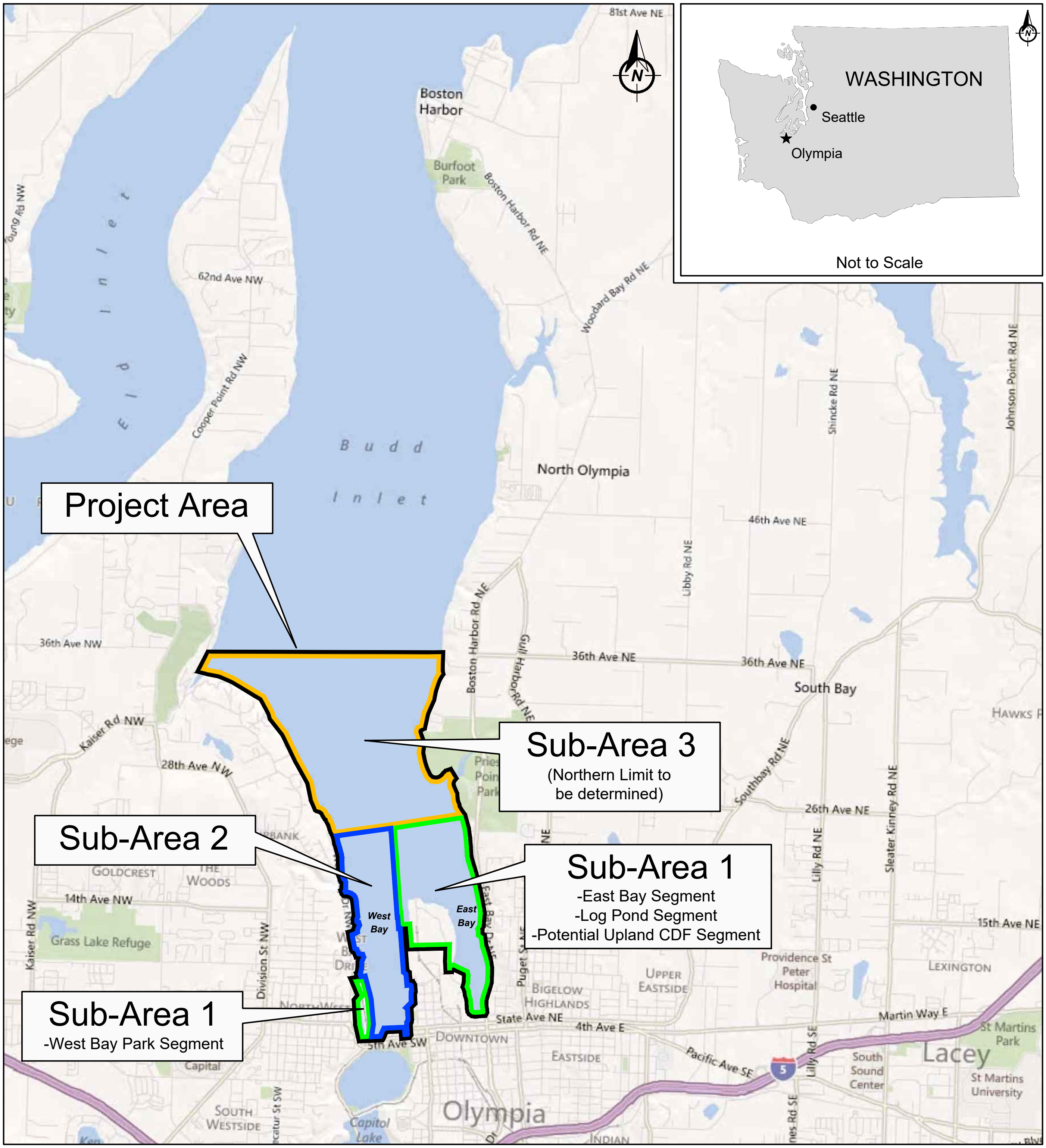
SAIC. 2008. Sediment Characterization Study – Budd Inlet - Final Data Report. Science Applications International Corporation. March 12.

TCPHSS. 2010. Priest Point Park Sediment Sampling Project. Prepared for the Washington State Department of Ecology. Thurston County Public Health and Social Services November.

USACE. 2021. Dredged Material Evaluation and Disposal Procedures User Manual. US Army Corps of Engineers.

USACE. 2022. Memorandum: Implementation Guidance for Section 125(a)(2)(C) of the Water Resources Development Act of 2020, Beneficial Use of Dredged Material. US Army Corps of Engineers. November 7.

USACE. 2023. “Discover, Learn, and Grow Beneficial Uses of Dredged Sediment.” Dredging Operations Technical Support, US Army Corps of Engineers. https://budm.el.erdc.dren.mil/.



Note
1. Background imagery: Bing Maps
2. All boundaries are approximate.

Legend
- Project Area (Northern Limit to be determined)
- Sub-Area 1
- Sub-Area 2
- Sub-Area 3 (Northern Limit to be determined)

0 0.5 1
Scale in Miles

This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.
PLOT TIME: 1/5/2024 2:44 PM MOD TIME: 1/5/2024 1:08 PM USER: Lee Barras DWG: P:\Port of Olympia\Budd Inlet\CAD\Figures\R PRDI Work Plan\2024-01 IWP_1-1 Vicinity Map.dwg

DOF Dalton Olmsted Fuglevand
The Budd Inlet Team

Port of Olympia
Budd Inlet - Olympia, WA
Project Sub-Area 1 Pre-Remedial Design Investigation Work Plan

Vicinity Map & Budd Inlet Project Sub-Areas

Figure 1-1

January 5, 2024

Grette Associates Environmental Consultants | WestLand Engineering & Environmental Services, Inc. | Maul Foster Alongi | Crete Consulting, Inc. | moffatt & nichol | TAS | Landau Associates

0 600 1200
Scale in Feet

Notes

1. Horizontal Datum: Washington State Plane South, NAD83.
2. Background imagery: Google Earth Pro, 07/25/2022.
3. All boundaries are approximate.

Legend

- Project Area
- Sub-Area 1
- Sub-Area 2
- Sub-Area 3
- Multiple Benefits Line (Cascade Pole Site)
- Slurry Cut-off Wall (Cascade Pole Site)
- Federal Navigation Channel
- Mean Higher High Waterline (MHHW)
- Berth Delineation

DOF DALTON OLMSTED FUGLEVAND
The Budd Inlet Team

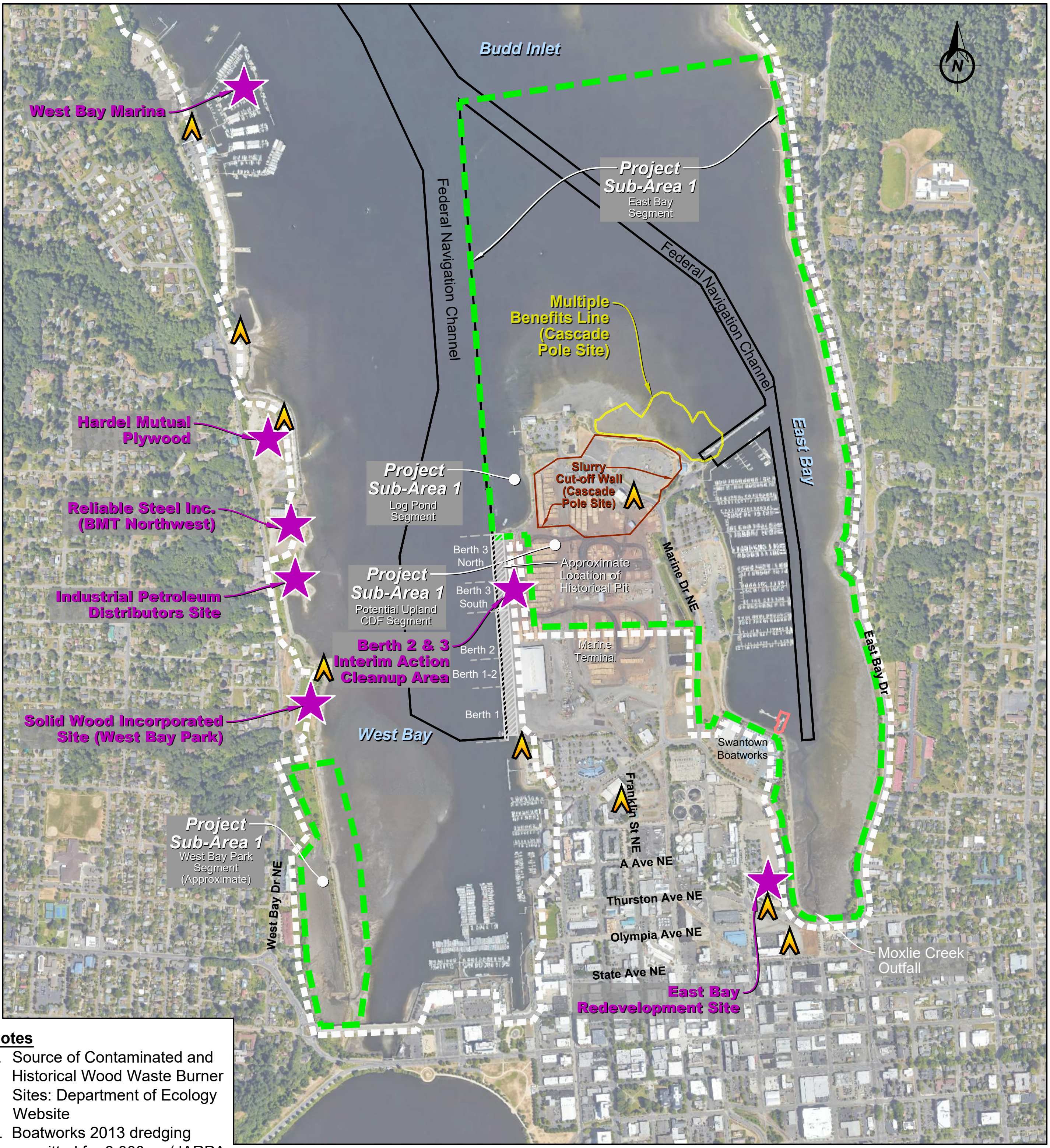
PORT of OLYMPIA
Budd Inlet - Olympia, WA
Project Sub-Area 1 Pre-Remedial Design Investigation Work Plan

Project Area & Site Features in South Budd Inlet

Figure 1-2

Grette Associates LLC ENVIRONMENTAL CONSULTANTS · WestLand Engineering & Environmental Services, Inc. 100% EMPLOYEE OWNED · MAUL FOSTER ALONGI · CRETE CONSULTING, INC. · moffatt & nichol · FAS · LANDAU ASSOCIATES

January 5, 2024



Notes

1. Source of Contaminated and Historical Wood Waste Burner Sites: Department of Ecology Website
2. Boatworks 2013 dredging permitted for 3,000 cy (JARPA NWS-2012-1098). Dredging reported to have occurred in late 2013 or early 2014 per November 29, 2013 Article in Dredging Today "Port of Olympia Dredging Project Starts (USA)".
3. Background imagery: Google Earth Pro, 07/25/2022.

Legend

- Known Contaminated Site
- Historical Wood Waste Burner
- Project Area
- Sub-Area 1
- Multiple Benefits Line (Cascade Pole Site)
- Slurry Cut-off Wall (Cascade Pole Site)
- Approx. Boatworks Dredge Area 2013/2014 (See note 1)
- Federal Navigation Channel
- Berth Delineation

DOF DALTON OLMSTED FUGLEVAND
The Budd Inlet Team

PORT of OLYMPIA
Budd Inlet - Olympia, WA
Project Sub-Area 1 Pre-Remedial Design Investigation Work Plan

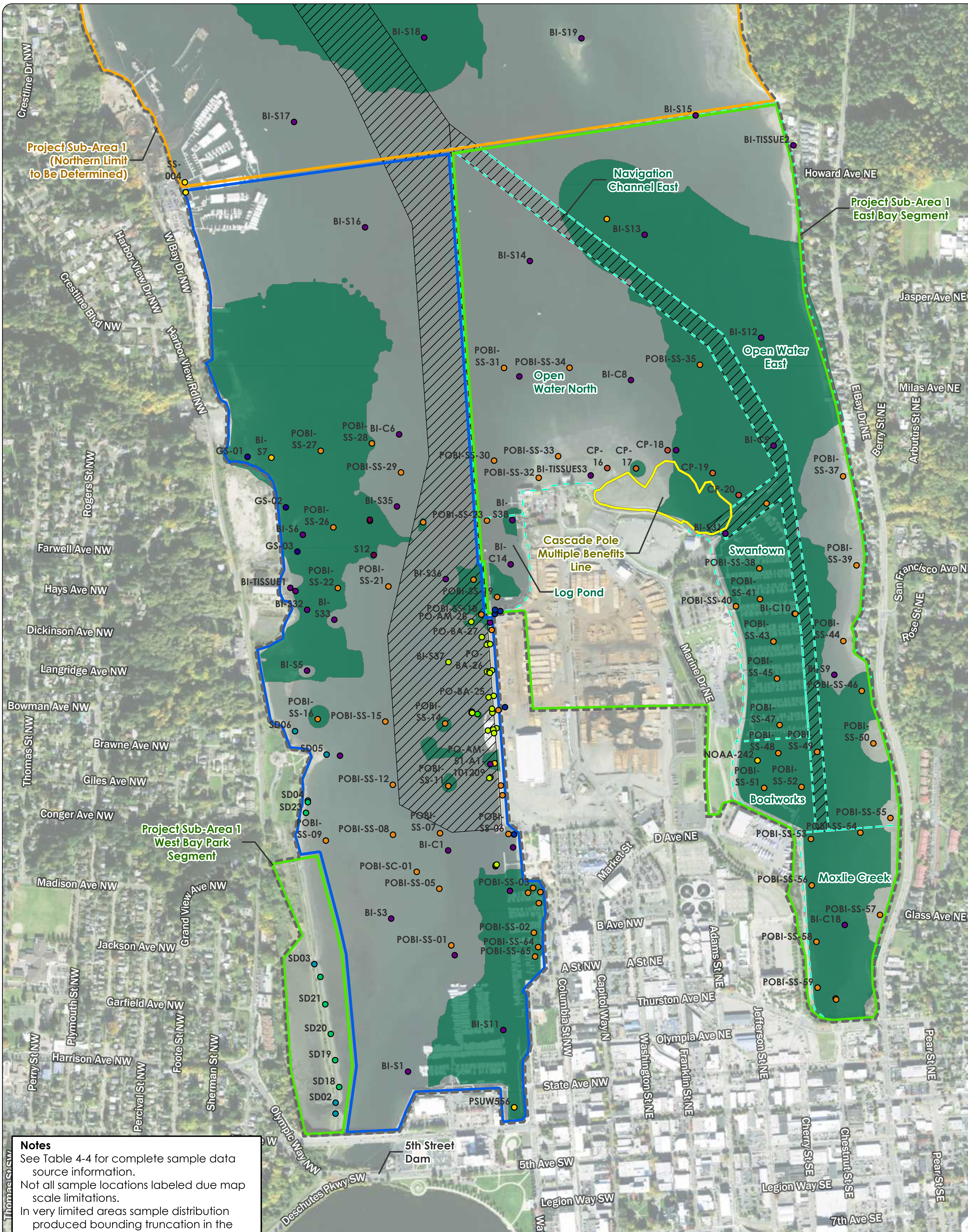
Locations of Other Known Contaminated Sites

Figure 1-4

January 5, 2023

Grette Associates LLC Environmental Consultants · WestLand 100% Employee Owned Engineering & Environmental Services, Inc. · Maul Foster Alongi · Crete Consulting, Inc. · moffatt & nichol · TAS · Landau Associates

PLOT TIME: 1/5/2024 2:45 PM MOD TIME: 1/5/2024 12:49 PM USER: Lee Barras DWG: P:\Port of Olympia\Budd Inlet\CAD\Figures\R PRDI Work Plan\2024-01 IWP_1-4 Contam-Sites.dwg



Notes

See Table 4-4 for complete sample data source information.

Not all sample locations labeled due map scale limitations.

In very limited areas sample distribution produced bounding truncation in the IDW surface.

EIM = Washington State Department of Ecology's Environmental Information Management database.

IDW = Inverse distance weighted.

TEQ = toxic equivalency.

0 750

Feet

Data Sources

Aerial photograph from U.S. Department of Agriculture; navigational channel from U.S. Army Corps of Engineers.

Legend

- Project Area
- Project Sub-Area 1
- Project Sub-Area 2
- Project Sub-Area 3
- Cascade Pole Multiple Benefits Line
- Sediment Management Area within Sub-Area 1
- Navigational Channel

Dioxins/Furans TEQ IDW Surface (0-10 cm below mudline)

- Area Exceeding Regional Background of 19 ng/kg

Dioxin/Furan Sample Locations within Project Area (0-10 cm below mudline)

EIM Study Name, Year Sampled

- OHPSD06, 2006
- BUDD07, 2007
- Budd Inlet Hardel 07, 2007
- Budd Inlet W Bay 07, 2007
- FS94656838Ph2, 2007
- WB1577RIFS, 2008
- OlyMarineTerminal08, 2009
- OlyMarineTerminal08, 2010
- AODE5272, 2011
- BuddOakDioxins, 2011
- UWI2011, 2011
- G1300053, 2013
- FS1385, 2017
- FS1385, 2022

DALTON OLMSTED FUGLEVAND

The Budd Inlet Team

PORT of OLYMPIA

Budd Inlet - Olympia, WA

Project Sub-Area 1 Pre-Remedial Design Investigation Work Plan

Dioxins/Furans Sediment Surface (0-10 cm below mudline) Sample Density

Figure 2-1

December 1, 2023

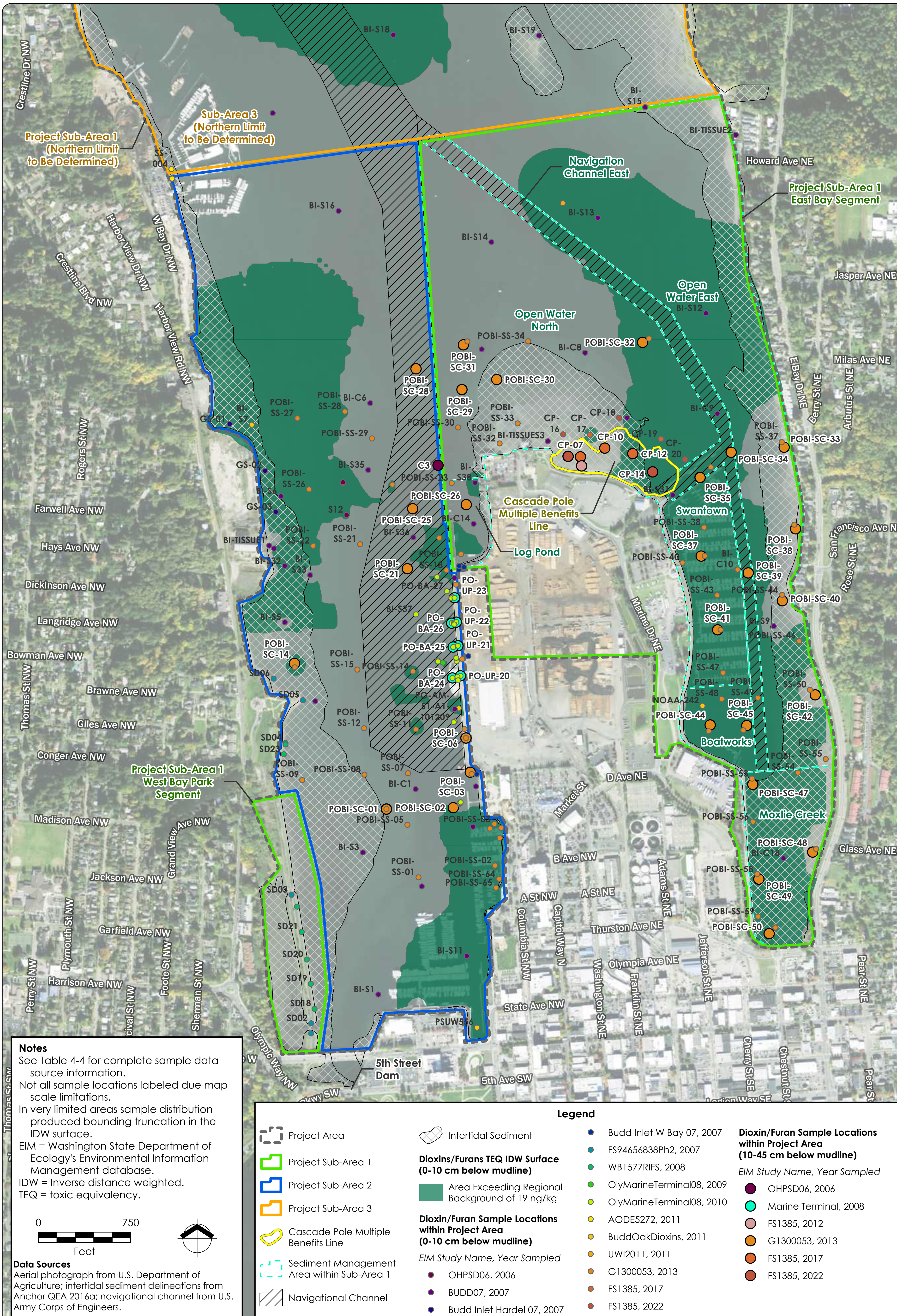
Path: C:\Workspace\0_MFA_Projects\M0781\03\001\Pro\M0781_03_001_Pre_Design_Work_Plan.aprx\Fig 2-1 Dioxin-Furans Surface Sample Density

Print Date: 12/1/2023

Reviewed By: DOF

Produced By: jroberts

Project: M0781.03.001



This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

DOF DALTON OLMSTED FUGLEVAND

The Budd Inlet Team

PORT of OLYMPIA

Budd Inlet - Olympia, WA

Project Sub-Area 1 Pre-Remedial Design Investigation Work Plan

Dioxins/Furans Sediment Near-Surface (10-45 cm below mudline) Sample Density

Figure 2-2

December 1, 2023

Grette Associates LLC ENVIRONMENTAL CONSULTANTS | WestLand 100% EMPLOYEE OWNED Engineering & Environmental Services, Inc. | MAUL FOSTER ALONGI | CRETE CONSULTING, INC. | moffatt & nichol | LANDAU ASSOCIATES

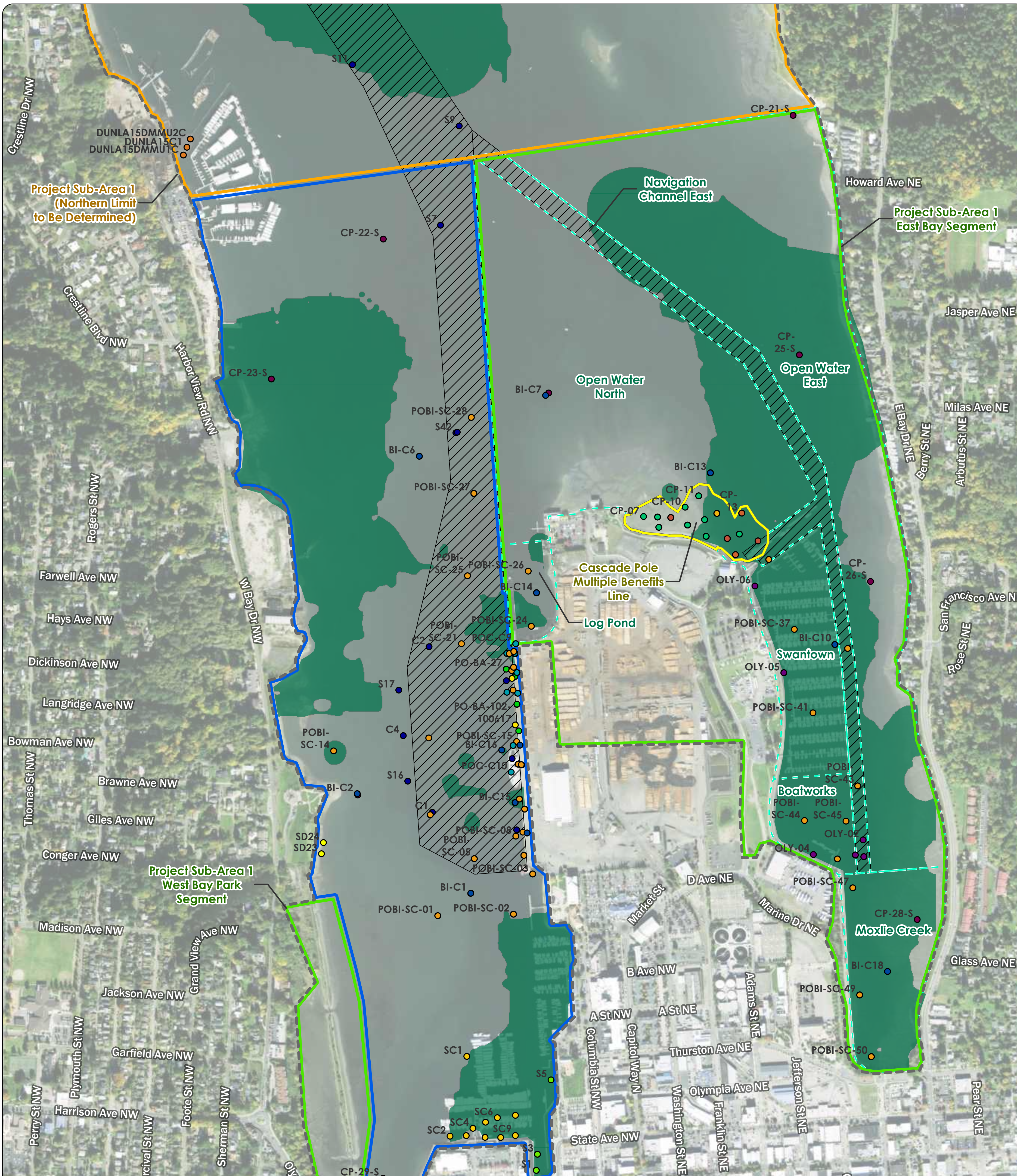
Path: C:\Workspace\0_MFA_Projects\M0781\03\001\Pro\M0781_03_001_Pre_Design_Work_Plan.aprx\Fig 2-2 Dioxin-Furans Near-Surface Sample Density

Print Date: 12/1/2023

Reviewed By: DOF

Produced By: jroberts

Project: M0781.03.001



Notes

See Table 4-4 for complete sample data source information.
Not all sample locations labeled due map scale limitations.
In very limited areas sample distribution produced bounding truncation in the IDW surface.
EIM = Washington State Department of Ecology's Environmental Information Management database.
IDW = Inverse distance weighted.
TEQ = toxic equivalency.

0 750
Feet

Data Sources
Aerial photograph from U.S. Department of Agriculture; navigational channel from U.S. Army Corps of Engineers.

Legend

- Project Area
- Project Sub-Area 1
- Project Sub-Area 2
- Project Sub-Area 3
- Cascade Pole Multiple Benefits Line
- Sediment Management Area within Sub-Area 1
- Navigational Channel

Dioxins/Furans TEQ IDW Surface (0-10 cm below mudline)
- Area Exceeding Regional Background of 19 ng/kg

Dioxin/Furan Sample Locations within Project Area (> 45 cm below mudline)
EIM Study Name, Year Sampled
- CASMON03, 2002
- CASCON03, 2003
- EB PSDDA, 2005
- OHPSD06, 2006
- BUDD07, 2007
- Budd Inlet W Bay 07, 2007
- FS1385, 2007
- OlyMarineTerminal08, 2008
- PERLA08, 2008
- WB1577RIFS, 2008
- OlyMarineTerminal08, 2010
- OLYYC11, 2011
- FS1385, 2012
- G1300053, 2013
- DUNLA15, 2015
- FS1385, 2017
- FS1385, 2022

DOF DALTON OLMSTED FUGLEVAND
The Budd Inlet Team

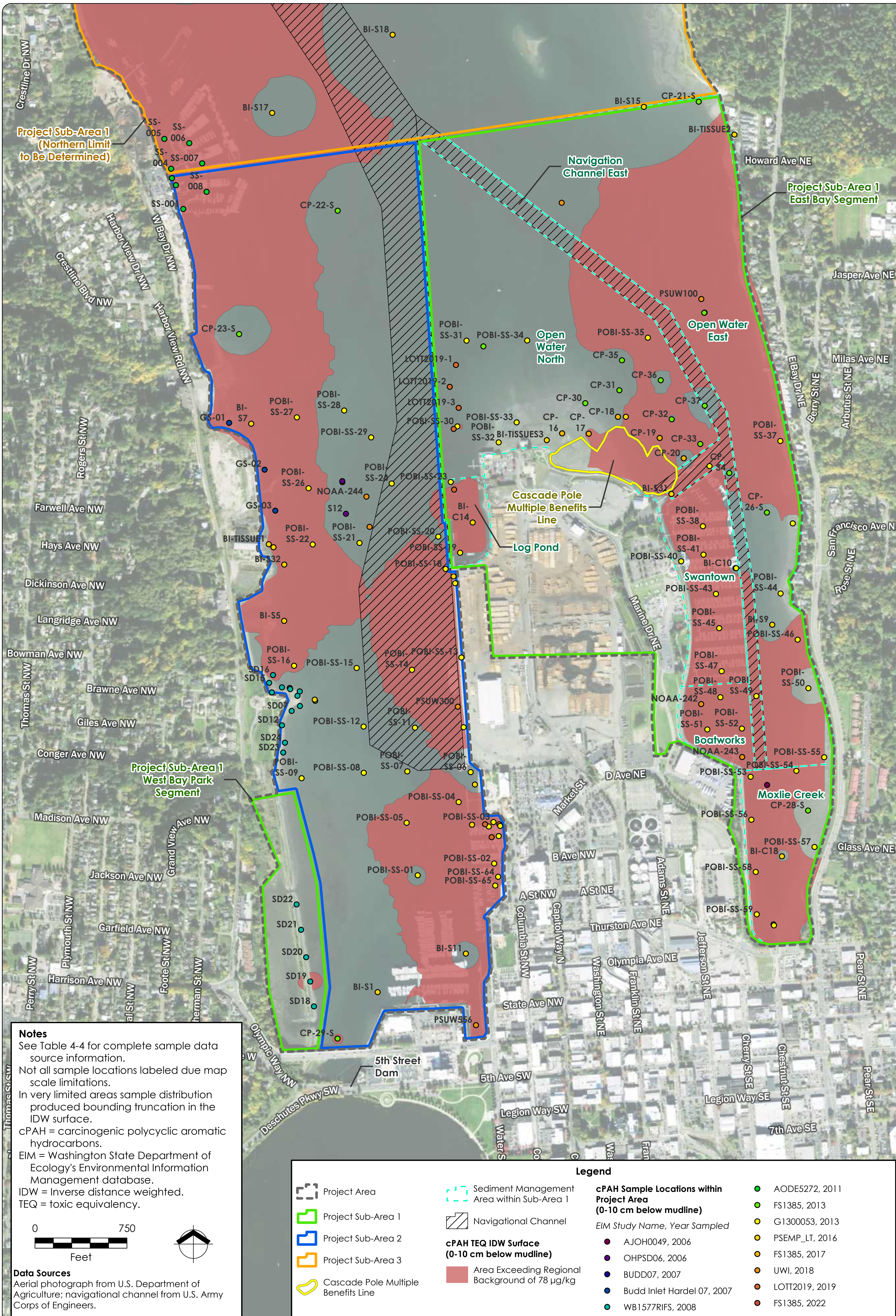
PORT of OLYMPIA
Budd Inlet - Olympia, WA
Project Sub-Area 1 Pre-Remedial Design Investigation Work Plan

Dioxins/Furans Sediment Subsurface (> 45 cm below mudline) Sample Density

Figure 2-3

December 1, 2023

Grette Associates LLC ENVIRONMENTAL CONSULTANTS | WestLand 100% EMPLOYEE OWNED Engineering & Environmental Services, Inc. | MAUL FOSTER ALONGI | CRETE CONSULTING, INC. | moffatt & nichol | LANDAU ASSOCIATES



Notes

See Table 4-4 for complete sample data source information.

Not all sample locations labeled due map scale limitations.

In very limited areas sample distribution produced bounding truncation in the IDW surface.

cPAH = carcinogenic polycyclic aromatic hydrocarbons.

EIM = Washington State Department of Ecology's Environmental Information Management database.

IDW = Inverse distance weighted.

TEQ = toxic equivalency.

0 750

Feet

Data Sources

Aerial photograph from U.S. Department of Agriculture; navigational channel from U.S. Army Corps of Engineers.

Legend

Project Area

Project Sub-Area 1

Project Sub-Area 2

Project Sub-Area 3

Cascade Pole Multiple Benefits Line

Sediment Management Area within Sub-Area 1

Navigational Channel

cPAH TEQ IDW Surface (0-10 cm below mudline)

Area Exceeding Regional Background of 78 µg/kg

cPAH Sample Locations within Project Area (0-10 cm below mudline)

EIM Study Name, Year Sampled

- AJOH0049, 2006
- OHPSD06, 2006
- BUDD07, 2007
- Budd Inlet Hardel 07, 2007
- WB1577RIFS, 2008
- AODE5272, 2011
- FS1385, 2013
- G1300053, 2013
- PSEMP_LT, 2016
- FS1385, 2017
- UWI, 2018
- LOTT2019, 2019
- FS1385, 2022

DALTON OLMSTED FUGLEVAND

The Budd Inlet Team

PORT of OLYMPIA

Budd Inlet - Olympia, WA

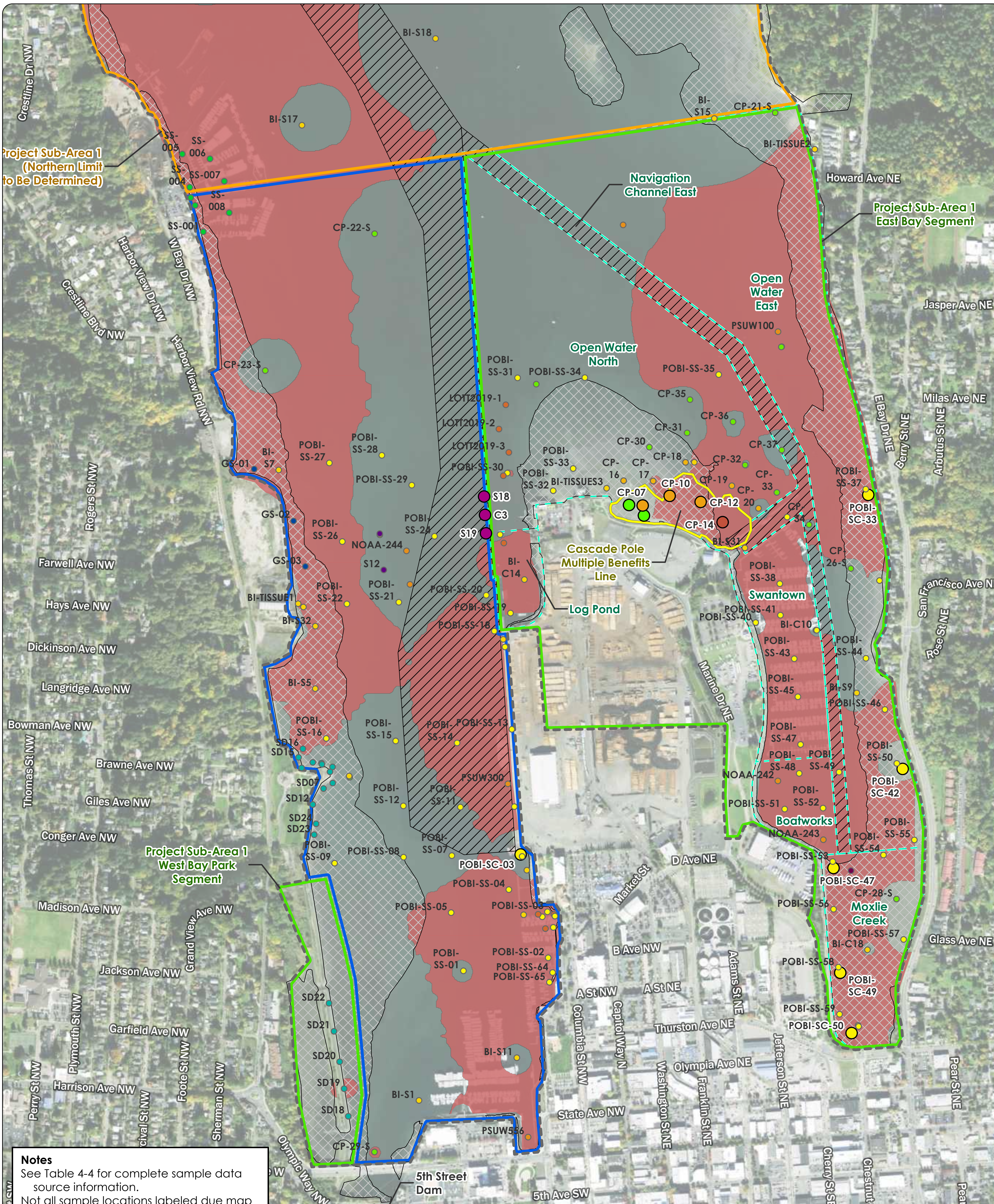
Project Sub-Area 1 Pre-Remedial Design Investigation Work Plan

cPAH Sediment Surface (0-10 cm below mudline) Sample Density

Figure 2-4

December 1, 2023

Grette Associates LLC Environmental Consultants · WestLand 100% Employee Owned Engineering & Environmental Services, Inc. · Maul Foster Alongi · Crete Consulting, Inc. · moffatt & nichol · Landau Associates



Notes

See Table 4-4 for complete sample data source information.

Not all sample locations labeled due map scale limitations.

In very limited areas sample distribution produced bounding truncation in the IDW surface.

EIM = Washington State Department of Ecology's Environmental Information Management database.

IDW = Inverse distance weighted.

TEQ = toxic equivalency.

0 750
Feet

Data Sources

Aerial photograph from U.S. Department of Agriculture; intertidal sediment delineations from Anchor QEA 2016a; navigational channel from U.S. Army Corps of Engineers.

Legend

- Project Area
- Project Sub-Area 1
- Project Sub-Area 2
- Project Sub-Area 3
- Cascade Pole Multiple Benefits Line
- Sediment Management Area within Sub-Area 1
- Navigational Channel
- Intertidal Sediment

cPAH TEQ IDW Surface (0-10 cm below mudline)

- Area Exceeding Regional Background of 78 µg/kg

cPAH Sample Locations within Project Area (0-10 cm below mudline)

EIM Study Name, Year Sampled

- AJOH0049, 2006
- OHPSD06, 2006
- BUDD07, 2007
- Budd Inlet Hardel 07, 2007
- WB1577RIFS, 2008
- AODE5272, 2011
- FS1385, 2013
- G1300053, 2013
- PSEMP_LT, 2016
- FS1385, 2017
- UWI, 2018
- LOTT2019, 2019
- FS1385, 2022

cPAH Sample Locations within Project Area (10-45 cm below mudline)

EIM Study Name, Year Sampled

- NOAA-Mussel-1986-08, 2006
- OHPSD06, 2006
- FS1385, 2012
- POBI2013, 2013
- FS1385, 2017
- FS1385, 2022

DOF DALTON OLMSTED FUGLEVAND
The Budd Inlet Team

PORT of OLYMPIA
Budd Inlet - Olympia, WA
Project Sub-Area 1 Pre-Remedial Design Investigation Work Plan

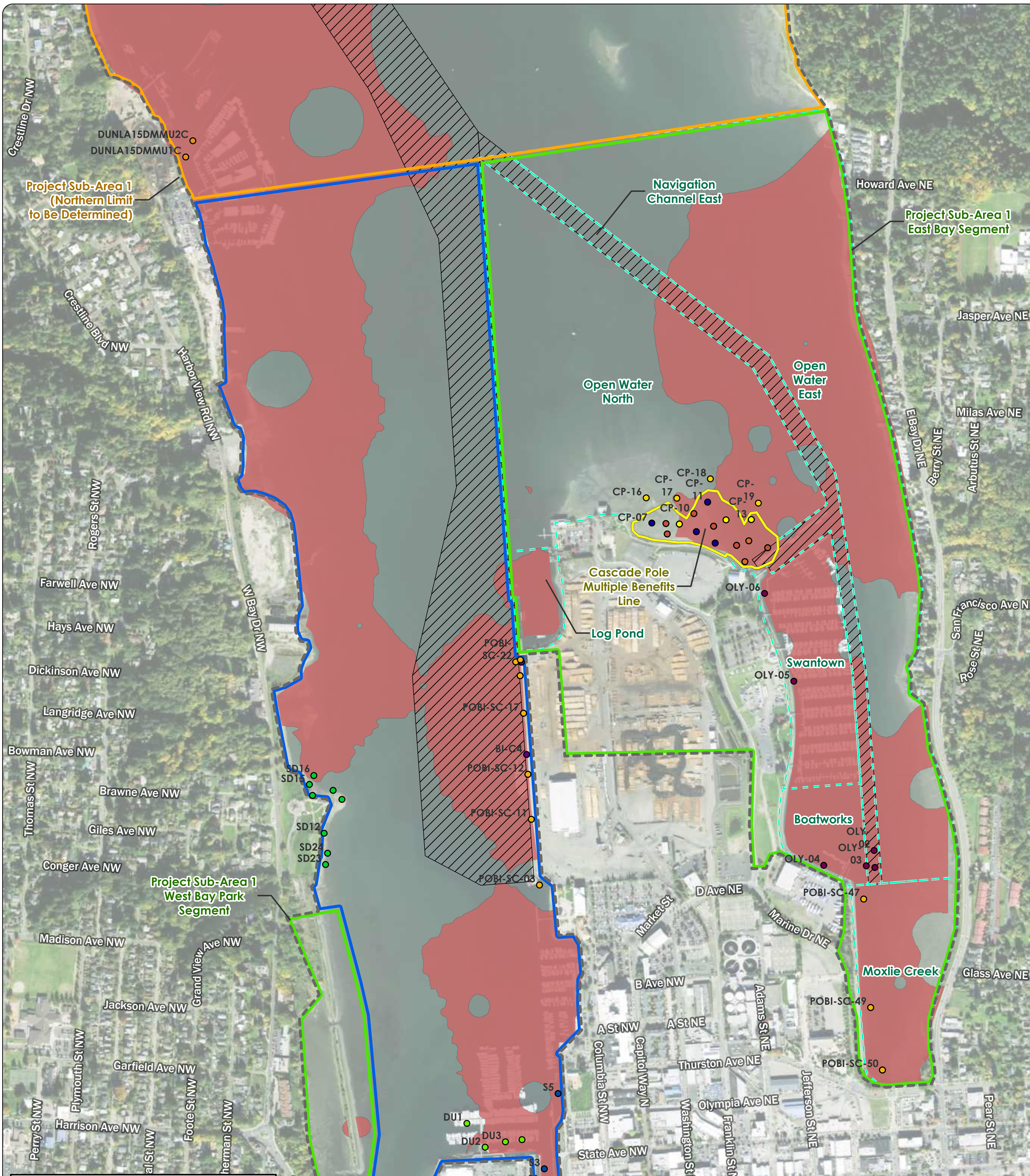
cPAH Sediment Near-Surface (10-45 cm below mudline) Sample Density

Figure 2-5

December 1, 2023

Grette Associates LLC ENVIRONMENTAL CONSULTANTS | WestLand 100% EMPLOYEE OWNED Engineering & Environmental Services, Inc. | MAUL FOSTER ALONGI | CRETE CONSULTING, INC. | moffatt & nichol | LANDAU ASSOCIATES

Path: C:\Workspace\0_MFA_Projects\M0781\03\001\Pro\M0781_03_001_Pre_Design_Work_Plan.aprx\Fig 2-5 cPAH Near-Surface Sample Density
Print Date: 12/1/2023
Reviewed By: DOF
Produced By: jroberts
Project: M0781.03.001



Notes

See Table 4-4 for complete sample data source information.
Not all sample locations labeled due map scale limitations.
In very limited areas sample distribution produced bounding truncation in the IDW surface.
cPAH = carcinogenic polycyclic aromatic hydrocarbons.
EIM = Washington State Department of Ecology's Environmental Information Management database.
IDW = Inverse distance weighted.
TEQ = toxic equivalency.

Data Sources
Aerial photograph from U.S. Department of Agriculture; navigational channel from U.S. Army Corps of Engineers.

Legend

- Project Area
- Project Sub-Area 1
- Project Sub-Area 2
- Project Sub-Area 3
- Cascade Pole Multiple Benefits Line
- Sediment Management Area within Sub-Area 1
- Navigational Channel

cPAH TEQ IDW Surface (0-10 cm below mudline)
µg/kg
- Area Exceeding Regional Background of 78 µg/kg

cPAH Sample Locations within Project Area (> 45 cm below mudline)
EIM Study Name, Year Sampled
- EB PSDDA, 2005
- BUDD07, 2007
- FS1385, 2007
- PERLA08, 2008
- VCSW0762, 2008
- WB1577RIFS, 2008
- OLYYC11, 2011
- FS1385, 2012
- FS1385, 2013
- G1300053, 2013
- DUNLA15, 2015
- FS1385, 2017
- FS1385, 2022

DOF DALTON OLMSTED FUGLEVAND
The Budd Inlet Team

PORT of OLYMPIA
Budd Inlet - Olympia, WA
Project Sub-Area 1 Pre-Remedial Design Investigation Work Plan

cPAH Sediment Subsurface (> 45 cm below mudline) Sample Density

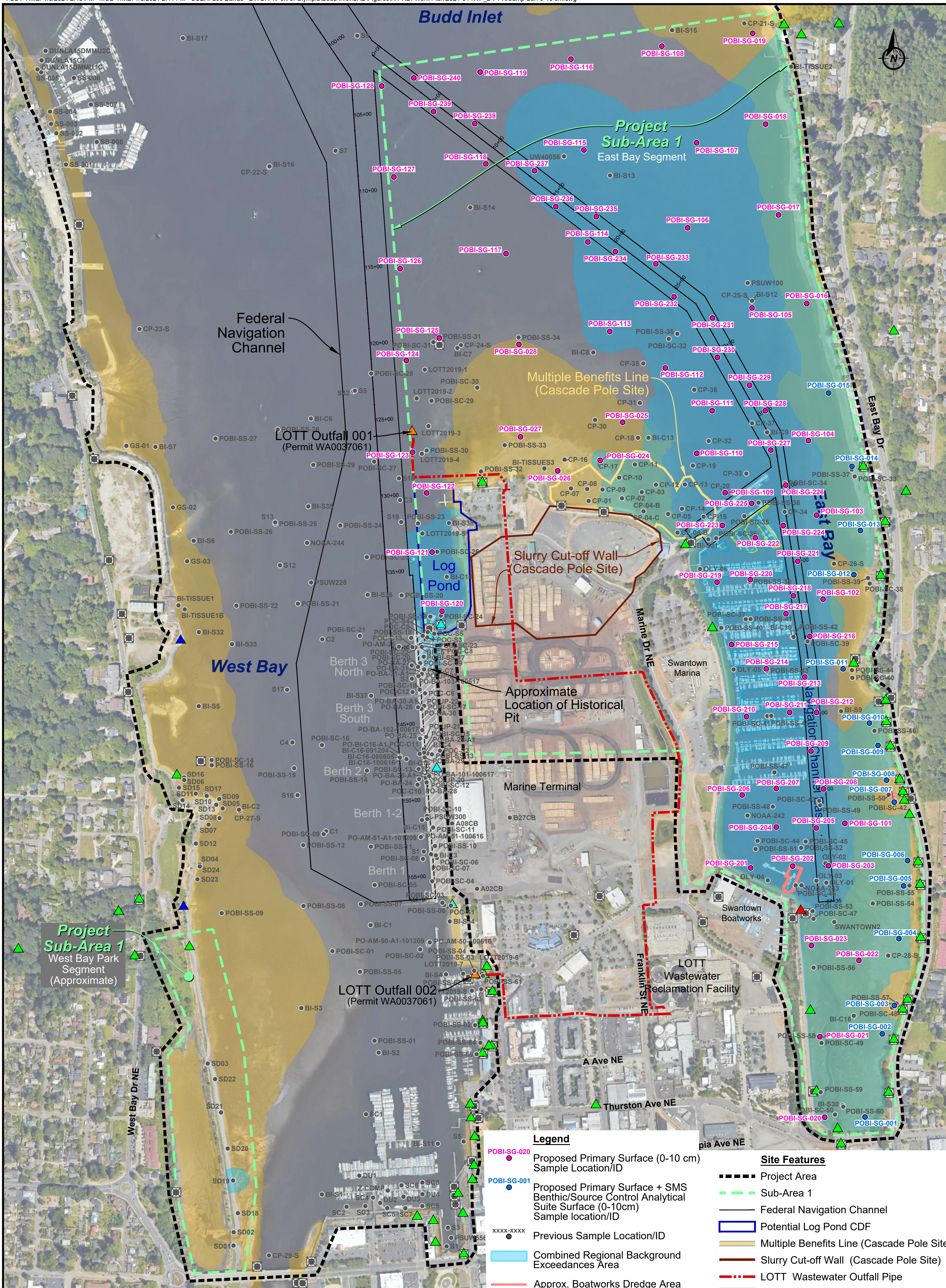
Figure 2-6

December 1, 2023

Grette Associates LLC ENVIRONMENTAL CONSULTANTS | WestLand 100% EMPLOYEE OWNED Engineering & Environmental Services, Inc. | MAUL FOSTER ALONGI | CRETE CONSULTING, INC. | moffatt & nichol | IAS | LANDAU ASSOCIATES

Path: C:\Workspace\0_MFA_Projects\M0781\03\001\Pro\M0781_03_001_Pre_Design_Work_Plan.aprx\Fig 2-6 cPAH Subsurface Sample Density
Print Date: 12/1/2023
Reviewed By: DOF
Produced By: jroberts
Project: M0781.03.001

This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.
PLOT TIME: 1/5/2024 2:45 PM MOD TIME: 1/5/2024 2:44 PM USER: Lee Barras DWG: P:\Port of Olympia\Budd Inlet\CAD\Figures\R PRDI Work Plan\2024-01 IWP_2-7 ProSamp Surf 0-10 cm.dwg



Legend

- POBI-SG-020 — Proposed Primary Surface (0-10 cm) Sample Location/ID
- POBI-SG-001 — Proposed Primary Surface + SMS Benthic/Source Control Analytical Suite Surface (0-10cm) Sample location/ID
- xxxx-xxxx — Previous Sample Location/ID
- Combined Regional Background Exceedances Area
- Approx. Boatworks Dredge Area 2013/2014 (See note 1)
- Berth Delineation

Site Features

- Project Area
- Sub-Area 1
- Federal Navigation Channel
- Potential Log Pond CDF
- Multiple Benefits Line (Cascade Pole Site)
- Slurry Cut-off Wall (Cascade Pole Site)
- LOTT Wastewater Outfall Pipe
- Intertidal Sediments Area

Outfalls

- City of Olympia Stormwater Outfall
- LOTT Wastewater/CSO Outfall
- Industrial Outfall (Boatyard General Permit)
- Industrial Stormwater Outfall (NPDES General Permit)
- Historical Outfall (~2013)

Source: City of Olympia and Thurston County GIS - November 2023

0 600
Scale in Feet

Notes

1. Boatworks 2013 dredging permitted for 3,000 cy (JARPA NWS-2012-1098). Dredging reported to have occurred in late 2013 or early 2014 per November 29, 2013 Article in Dredging Today "Port of Olympia Dredging Project Starts (USA)".
2. Background imagery: Google Earth Pro, 07/25/2022.

DOF DALTON OLMSTED FUGLEVAND
The Budd Inlet Team

PORT of OLYMPIA
Budd Inlet - Olympia, WA
Project Sub-Area 1 Pre-Remedial Design Investigation Work Plan

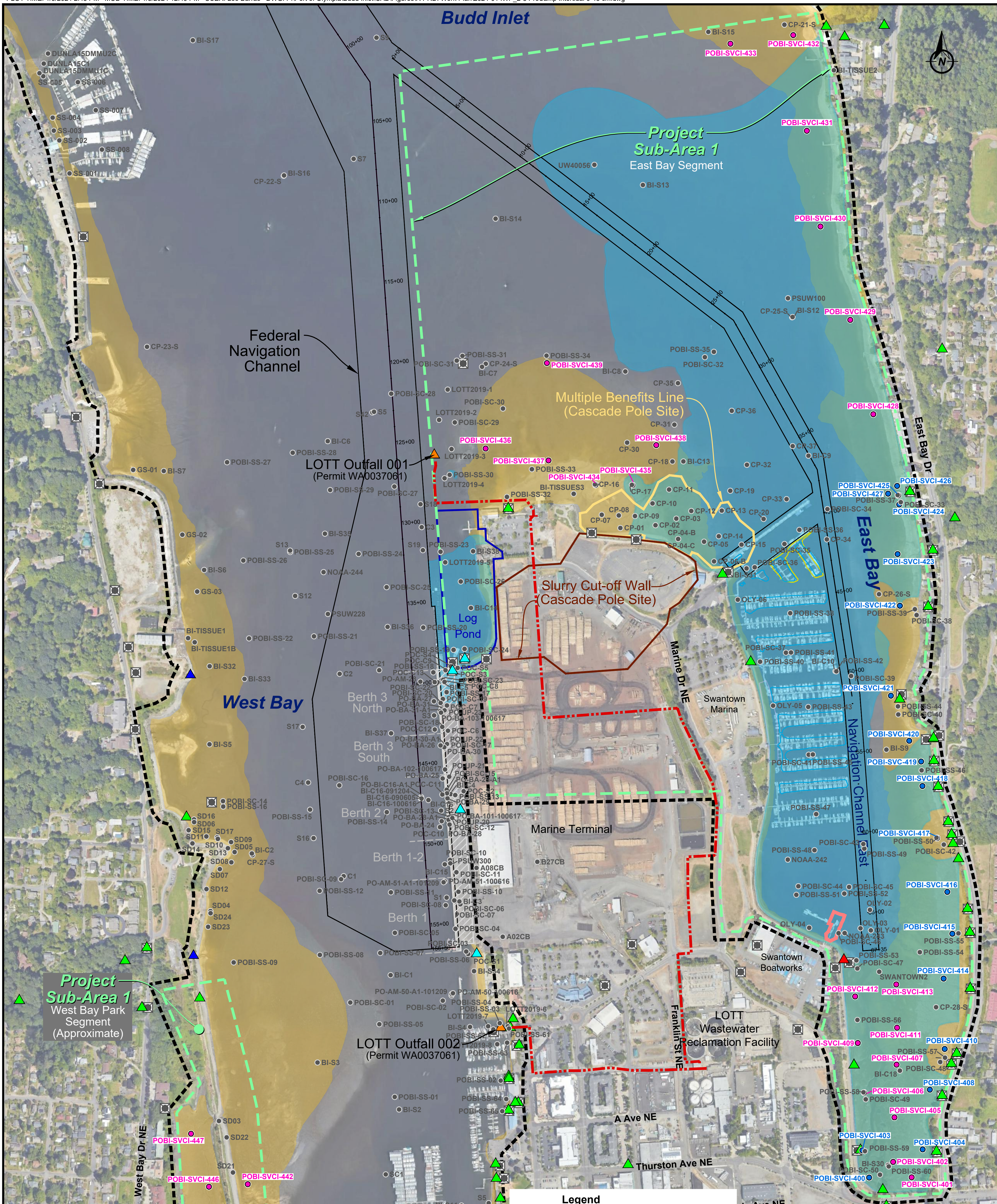
Proposed Surface (0-10 cm) Sediment Sample Locations

Figure 2-7

January 4, 2024

Grette Associates ENVIRONMENTAL CONSULTANTS | WestLand | MAUL FOSTER ALONGI | CRETE | moffatt & nichol | LANDAU ASSOCIATES

This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.
PLOT TIME: 1/5/2024 2:45 PM MOD TIME: 1/5/2024 12:49 PM USER: Lee Barras DWG: P:\Port of Olympia\Budd Inlet\CAD\Figures\R PRDI Work Plan\2024-01 IWP_2-8 ProSamp Intertidal 0-45 cm.dwg



Legend

- POBI-SVCI-xxx — Proposed Primary Intertidal (0-45 cm) Sample Location/ID
- POBI-SVCI-xxx — Proposed Primary Intertidal + SMS Benthic/Source Control Analytical Suite Near Surface (0-45cm) Sample location/ID
- xxxx-xxxx — Previous Sample Location/ID
- Combined Regional Background Exceedances Area
- Approx. Boatworks Dredge Area 2013/2014 (See note 1)
- Berth Delineation

Site Features

- Project Area
- Sub-Area 1
- Federal Navigation Channel
- Potential Log Pond CDF
- Multiple Benefits Line (Cascade Pole Site)
- Slurry Cut-off Wall (Cascade Pole Site)
- LOTT Wastewater Outfall Pipe
- Intertidal Sediments Area

Outfalls

- City of Olympia Stormwater Outfall
- LOTT Wastewater/CSO Outfall
- Industrial Outfall (Boatyard General Permit)
- Industrial Stormwater Outfall (NPDES General Permit)
- Historical Outfall (~2013)

Source: City of Olympia and Thurston County GIS - November 2023

0 600
Scale in Feet

Notes

1. Boatworks 2013 dredging permitted for 3,000 cy (JARPA NWS-2012-1098). Dredging reported to have occurred in late 2013 or early 2014 per November 29, 2013 Article in Dredging Today "Port of Olympia Dredging Project Starts (USA)".
2. Background imagery: Google Earth Pro, 07/25/2022.

DOF DALTON OLMSTED FUGLEVAND
The Budd Inlet Team

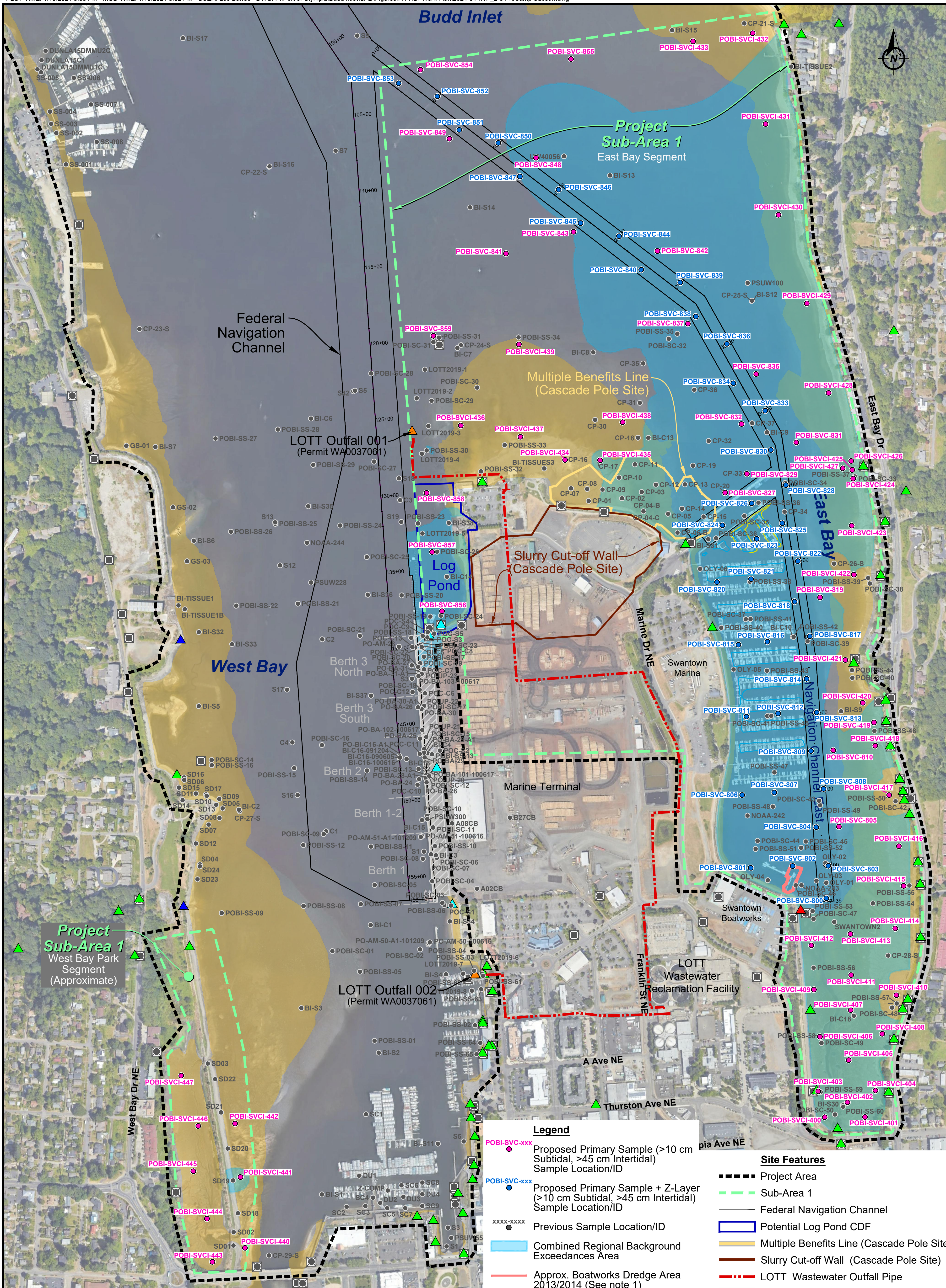
PORT of OLYMPIA
Budd Inlet - Olympia, WA
Project Sub-Area 1 Pre-Remedial Design Investigation Work Plan

Proposed Intertidal Surface (0-45 cm) Sediment Sample Locations

Figure 2-8

January 4, 2024

Grette Associates · WestLand · Maul Foster Alongi · Crete · moffatt & nichol · Landau Associates



Legend

- POBI-SVC-xxx — Proposed Primary Sample (>10 cm Subtidal, >45 cm Intertidal) Sample Location/ID
- POBI-SVC-xxx — Proposed Primary Sample + Z-Layer (>10 cm Subtidal, >45 cm Intertidal) Sample Location/ID
- xxxx-xxxx — Previous Sample Location/ID
- Combined Regional Background Exceedances Area
- Approx. Boatworks Dredge Area 2013/2014 (See note 1)
- Berth Delineation

Site Features

- Project Area
- Sub-Area 1
- Federal Navigation Channel
- Potential Log Pond CDF
- Multiple Benefits Line (Cascade Pole Site)
- Slurry Cut-off Wall (Cascade Pole Site)
- LOTT Wastewater Outfall Pipe
- Intertidal Sediments Area

Outfalls

- City of Olympia Stormwater Outfall
- LOTT Wastewater/CSO Outfall
- Industrial Outfall (Boatyard General Permit)
- Industrial Stormwater Outfall (NPDES General Permit)
- Historical Outfall (~2013)

Source: City of Olympia and Thurston County GIS - November 2023

0 600
Scale in Feet

Notes

1. Boatworks 2013 dredging permitted for 3,000 cy (JARPA NWS-2012-1098). Dredging reported to have occurred in late 2013 or early 2014 per November 29, 2013 Article in Dredging Today "Port of Olympia Dredging Project Starts (USA)".
2. Background imagery: Google Earth Pro, 07/25/2022.

DOF DALTON OLMSTED FUGLEVAND
The Budd Inlet Team

PORT of OLYMPIA
Budd Inlet - Olympia, WA
Project Sub-Area 1 Pre-Remedial Design Investigation Work Plan

Proposed Subsurface (>10 cm Subtidal, >45 cm Intertidal) Sample Locations

Figure 2-9

January 19, 2024

Grette Associates · WestLand · Maul Foster Alongi · CRETE · moffatt & nichol · LANDAU ASSOCIATES

Table 2. Sediment Grab and Vibracore Planned Analysis
Port of Olympia Budd Inlet Sediment Site

Surface Power Grab Samples				Intertidal Vibracore Samples				Subtidal Vibracore Samples			
	Analytical Suite				Analytical Suite				Analytical Suite		
Location	Primary	Z-layer	SMS Benthic/Source Control	Location	Primary	Z-layer	SMS Benthic/Source Control	Location	Primary	Z-layer	SMS Benthic/Source Control
POBI-SG-001	X		X	POBI-SVCI-400	X		X	POBI-SVC-800	X	X	
POBI-SG-002	X		X	POBI-SVCI-401	X			POBI-SVC-801	X	X	
POBI-SG-003	X		X	POBI-SVCI-402	X			POBI-SVC-802	X	X	
POBI-SG-004	X		X	POBI-SVCI-403	X		X	POBI-SVC-803	X	X	
POBI-SG-005	X		X	POBI-SVCI-404	X		X	POBI-SVC-804	X	X	
POBI-SG-006	X		X	POBI-SVCI-405	X			POBI-SVC-805	X		
POBI-SG-007	X		X	POBI-SVCI-406	X			POBI-SVC-806	X	X	
POBI-SG-008	X		X	POBI-SVCI-407	X			POBI-SVC-807	X	X	
POBI-SG-009	X		X	POBI-SVCI-408	X		X	POBI-SVC-808	X	X	
POBI-SG-010	X		X	POBI-SVCI-409	X			POBI-SVC-809	X	X	
POBI-SG-011	X		X	POBI-SVCI-410	X		X	POBI-SVC-810	X		
POBI-SG-012	X		X	POBI-SVCI-411	X			POBI-SVC-811	X	X	
POBI-SG-013	X		X	POBI-SVCI-412	X			POBI-SVC-812	X	X	
POBI-SG-014	X		X	POBI-SVCI-413	X			POBI-SVC-813	X	X	
POBI-SG-015	X		X	POBI-SVCI-414	X		X	POBI-SVC-814	X	X	
POBI-SG-016	X			POBI-SVCI-415	X		X	POBI-SVC-815	X	X	
POBI-SG-017	X			POBI-SVCI-416	X		X	POBI-SVC-816	X	X	
POBI-SG-018	X			POBI-SVCI-417	X		X	POBI-SVC-817	X	X	
POBI-SG-019	X			POBI-SVCI-418	X		X	POBI-SVC-818	X	X	
POBI-SG-020	X			POBI-SVCI-419	X		X	POBI-SVC-819	X		
POBI-SG-021	X			POBI-SVCI-420	X		X	POBI-SVC-820	X	X	
POBI-SG-022	X			POBI-SVCI-421	X		X	POBI-SVC-821	X	X	
POBI-SG-023	X			POBI-SVCI-422	X		X	POBI-SVC-822	X	X	
POBI-SG-024	X			POBI-SVCI-423	X		X	POBI-SVC-823	X	X	
POBI-SG-025	X			POBI-SVCI-424	X		X	POBI-SVC-824	X	X	
POBI-SG-026	X			POBI-SVCI-425	X		X	POBI-SVC-825	X	X	
POBI-SG-027	X			POBI-SVCI-426	X		X	POBI-SVC-826	X	X	
POBI-SG-028	X			POBI-SVCI-427	X		X	POBI-SVC-827	X		
POBI-SG-101	X			POBI-SVCI-428	X			POBI-SVC-828	X	X	
POBI-SG-102	X			POBI-SVCI-429	X			POBI-SVC-829	X		
POBI-SG-103	X			POBI-SVCI-430	X			POBI-SVC-830	X	X	
POBI-SG-104	X			POBI-SVCI-431	X			POBI-SVC-831	X		
POBI-SG-105	X			POBI-SVCI-432	X			POBI-SVC-832	X		
POBI-SG-106	X			POBI-SVCI-433	X			POBI-SVC-833	X	X	
POBI-SG-107	X			POBI-SVCI-434	X			POBI-SVC-834	X	X	
POBI-SG-108	X			POBI-SVCI-435	X			POBI-SVC-835	X		
POBI-SG-109	X			POBI-SVCI-436	X			POBI-SVC-836	X	X	
POBI-SG-110	X			POBI-SVCI-437	X			POBI-SVC-837	X		
POBI-SG-111	X			POBI-SVCI-438	X			POBI-SVC-838	X	X	
POBI-SG-112	X			POBI-SVCI-439	X			POBI-SVC-839	X	X	
POBI-SG-113	X			POBI-SVCI-440	X			POBI-SVC-840	X	X	
POBI-SG-114	X			POBI-SVCI-441	X			POBI-SVC-841	X		
POBI-SG-115	X			POBI-SVCI-442	X			POBI-SVC-842	X		
POBI-SG-116	X			POBI-SVCI-443	X			POBI-SVC-843	X		

Table 2. Sediment Grab and Vibracore Planned Analysis
Port of Olympia Budd Inlet Sediment Site

Surface Power Grab Samples				Intertidal Vibracore Samples				Subtidal Vibracore Samples			
	Analytical Suite				Analytical Suite				Analytical Suite		
Location	Primary	Z-layer	SMS Benthic/Source Control	Location	Primary	Z-layer	SMS Benthic/Source Control	Location	Primary	Z-layer	SMS Benthic/Source Control
POBI-SG-117	X			POBI-SVCI-444	X			POBI-SVC-844	X	X	
POBI-SG-118	X			POBI-SVCI-445	X			POBI-SVC-845	X	X	
POBI-SG-119	X			POBI-SVCI-446	X			POBI-SVC-846	X	X	
POBI-SG-120	X			POBI-SVCI-447	X			POBI-SVC-847	X	X	
POBI-SG-121	X							POBI-SVC-848	X		
POBI-SG-122	X							POBI-SVC-849	X		
POBI-SG-123	X							POBI-SVC-850	X	X	
POBI-SG-124	X							POBI-SVC-851	X	X	
POBI-SG-125	X							POBI-SVC-852	X	X	
POBI-SG-126	X							POBI-SVC-853	X	X	
POBI-SG-127	X							POBI-SVC-854	X		
POBI-SG-128	X							POBI-SVC-855	X		
POBI-SG-201	X							POBI-SVC-856	X		
POBI-SG-202	X							POBI-SVC-857	X		
POBI-SG-203	X							POBI-SVC-858	X		
POBI-SG-204	X							POBI-SVC-859	X		
POBI-SG-205	X										
POBI-SG-206	X										
POBI-SG-207	X										
POBI-SG-208	X										
POBI-SG-209	X										
POBI-SG-210	X										
POBI-SG-211	X										
POBI-SG-212	X										
POBI-SG-213	X										
POBI-SG-214	X										
POBI-SG-215	X										
POBI-SG-216	X										
POBI-SG-217	X										
POBI-SG-218	X										
POBI-SG-219	X										
POBI-SG-220	X										
POBI-SG-221	X										
POBI-SG-222	X										
POBI-SG-223	X										
POBI-SG-224	X										
POBI-SG-225	X										
POBI-SG-226	X										
POBI-SG-227	X										
POBI-SG-228	X										
POBI-SG-229	X										
POBI-SG-230	X										
POBI-SG-231	X										
POBI-SG-232	X										

Table 2. Sediment Grab and Vibracore Planned Analysis
Port of Olympia Budd Inlet Sediment Site

Surface Power Grab Samples				Intertidal Vibracore Samples				Subtidal Vibracore Samples			
	Analytical Suite				Analytical Suite				Analytical Suite		
Location	Primary	Z-layer	SMS Benthic/Source Control	Location	Primary	Z-layer	SMS Benthic/Source Control	Location	Primary	Z-layer	SMS Benthic/Source Control
POBI-SG-233	X										
POBI-SG-234	X										
POBI-SG-235	X										
POBI-SG-236	X										
POBI-SG-237	X										
POBI-SG-238	X										
POBI-SG-239	X										
POBI-SG-240	X										

Table 3. Subtidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVC-800

Notes: Prev sample OLYC01 D/F above CUL to 12' below ML

Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML
			Mudline El	-3.2	0-1'
		1	Design El	-13	1'-2'
		1	Distances to:		2'-3'
		1	Design	9.8	3'-4'
		1	OD	11.8	4'-5'
		1	OD - 2'	13.80	5'-6'
		1	OD - 4'	15.80	6'-7'
		1			7'-8'
		1			8'-9'
		1			9'-10'
		1			10'-11'
1		1*			11'-12'
1		1*			12'-13'
1	Potential DMMO	1*			13'-14'
1		1*			14'-15'
1		1*			15'-16'

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

POBI-SVC-801

Notes:

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-6.6
1'-2'			1	Design El	-8
2'-3'			1	Distances to:	
3'-4'	1			Design	1.4
4'-5'			1*	OD	3.4
5'-6'	1	Potential DMMO	1*	OD - 2'	5.40
6'-7'			1*	OD - 4'	7.40
7'-8'	1		1*		
8'-9'					
9'-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					
14'-15'					
15'-16'					

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

POBI-SVC-802

Notes:

Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML
			Mudline El	-10.2	0-1'
		1	Design El	-12	1'-2'
		1	Distances to:		2'-3'
1		1*	Design	1.8	3'-4'
		1*	OD	3.8	4'-5'
1	Potential DMMO	1*	OD - 2'	5.80	5'-6'
		1*	OD - 4'	7.80	6'-7'
1		1*			7'-8'
					8'-9'
					9'-10'
					10'-11'
					11'-12'
					12'-13'
					13'-14'

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

POBI-SVC-803

Notes: OLYC03 D/F above CUL to 10' below ML

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-5
1'-2'			1	Design El	-13
2'-3'			1	Distances to:	
3'-4'			1	Design	8
4'-5'			1	OD	10
5'-6'			1	OD - 2'	12.00
6'-7'			1	OD - 4'	14.00
7'-8'			1		
8'-9'			1		
9'-10'	1		1*		
10'-11'			1*		
11'-12'	1	Potential DMMO	1*		
12'-13'			1*		
13'-14'	1		1*		

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

[1] Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 3. Subtidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVC-804

Notes:

Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML
			Mudline El	-11.2	0-1'
		1	Design El	-13	1'-2'
		1	Distances to:		2'-3'
1		1*	Design	1.8	3'-4'
		1*	OD	3.8	4'-5'
1	Potential DMMO	1*	OD - 2'	5.80	5'-6'
		1*	OD - 4'	7.80	6'-7'
1		1*			7'-8'
					8'-9'
					9-10'
					10'-11'
					11'-12'
					12'-13'
					13'-14'

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

POBI-SVC-805

Notes: No bathy data available.

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-
1'-2'	1			Design El	*
2'-3'	1			Distances to:	
3'-4'			1	Design	*
4'-5'			1	OD	*
5'-6'			1	OD - 2'	*
6'-7'			1	OD - 4'	*
7'-8'			1		
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

* Sample location outside of marina and navigation channel.

POBI-SVC-806

Notes:

Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML
			Mudline El	-8.5	0-1'
1		1*	Design El	-8	1'-2'
		1*	Distances to:		2'-3'
1	Potential DMMO	1*	Design	-0.5	3'-4'
		1*	OD	1.5	4'-5'
		1*	OD - 2'	3.50	5'-6'
		1	OD - 4'	5.50	6'-7'
		1			7'-8'
					8'-9'
					9-10'
					10'-11'
					11'-12'
					12'-13'
					13'-14'

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

POBI-SVC-807

Notes:

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-11.2
1'-2'	1		1*	Design El	-10
2'-3'		Potential DMMO	1*	Distances to:	
3'-4'	1		1*	Design	-1.2
4'-5'			1*	OD	0.8
5'-6'			1	OD - 2'	2.80
6'-7'			1	OD - 4'	4.80
7'-8'			1		
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

1. Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 3. Subtidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVC-808

Notes:

Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML
			Mudline El	-10.8	0-1'
1			Design El	-13	1'-2'
		1*	Distances to:		2'-3'
1		1*	Design	2.2	3'-4'
	Potential DMMO	1*	OD	4.2	4'-5'
		1*	OD - 2'	6.20	5'-6'
		1*	OD - 4'	8.20	6'-7'
		1*			7'-8'
					8'-9'
					9-10'
					10'-11'
					11'-12'
					12'-13'
					13'-14'

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

POBI-SVC-809

Notes:

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-12.8
1'-2'	1		1*	Design El	-13
2'-3'			1*	Distances to:	
3'-4'	1	Potential DMMO	1*	Design	0.2
4'-5'			1*	OD	2.2
5'-6'			1*	OD - 2'	4.20
6'-7'			1*	OD - 4'	6.20
7'-8'					
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

POBI-SVC-810

Notes: ML El -0.1'

Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML
			Mudline El	-0.1	0-1'
1			Design El	*	1'-2'
1			Distances to:		2'-3'
		1	Design	*	3'-4'
		1	OD	*	4'-5'
		1	OD - 2'	*	5'-6'
		1	OD - 4'	*	6'-7'
		1			7'-8'
					8'-9'
					9-10'
					10'-11'
					11'-12'
					12'-13'
					13'-14'

* Sample location outside of marina and navigation channel.

POBI-SVC-811

Notes:

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-9.8
1'-2'	1		1*	Design El	-10
2'-3'			1*	Distances to:	
3'-4'	1	Potential DMMO	1*	Design	0.2
4'-5'			1*	OD	2.2
5'-6'			1*	OD - 2'	4.20
6'-7'			1*	OD - 4'	6.20
7'-8'					
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

1. Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 3. Subtidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVC-812

Notes:

Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML
			Mudline El	-11.6	0-1'
1		1*	Design El	-12	1'-2'
		1*	Distances to:		2'-3'
1	Potential DMMO	1*	Design	0.4	3'-4'
		1*	OD	2.4	4'-5'
		1*	OD - 2'	4.40	5'-6'
		1*	OD - 4'	6.40	6'-7'
					7'-8'
					8'-9'
					9-10'
					10'-11'
					11'-12'
					12'-13'
					13'-14'

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

POBI-SVC-813

Notes:

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-12.8
1'-2'	1		1*	Design El	-13
2'-3'			1*	Distances to:	
3'-4'	1	Potential DMMO	1*	Design	0.2
4'-5'			1*	OD	2.2
5'-6'			1*	OD - 2'	4.20
6'-7'			1*	OD - 4'	6.20
7'-8'					
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

POBI-SVC-814

Notes:

Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML
			Mudline El	-13.7	0-1'
1		1*	Design El	-13	1'-2'
1		1*	Distances to:		2'-3'
	Potential DMMO	1*	Design	-0.7	3'-4'
		1*	OD	1.3	4'-5'
		1*	OD - 2'	3.30	5'-6'
			OD - 4'	5.30	6'-7'
					7'-8'
					8'-9'
					9-10'
					10'-11'
					11'-12'
					12'-13'
					13'-14'

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

POBI-SVC-815

Notes:

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-11.2
1'-2'	1		1	Design El	-12
2'-3'	1		1	Distances to:	
3'-4'		Potential DMMO	1	Design	0.8
4'-5'			1	OD	2.8
5'-6'			1	OD - 2'	4.80
6'-7'			1	OD - 4'	6.80
7'-8'					
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

1. Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 3. Subtidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVC-816

Notes:

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-11.7
1'-2'	1	Potential DMMO	1*	Design El	-12
2'-3'	1		1*	Distances to:	
3'-4'			1*	Design	0.3
4'-5'			1*	OD	2.3
5'-6'			1*	OD - 2'	4.30
6'-7'			1*	OD - 4'	6.30
7'-8'					
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

POBI-SVC-817

Notes:

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-13.1
1'-2'	1	Potential DMMO	1*	Design El	-13
2'-3'	1		1*	Distances to:	
3'-4'			1*	Design	-0.1
4'-5'			1*	OD	1.9
5'-6'			1*	OD - 2'	3.90
6'-7'			1	OD - 4'	5.90
7'-8'					
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

POBI-SVC-818

Notes:

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-15.6
1'-2'	1	Potential DMMO	1*	Design El	-13
2'-3'			1*	Distances to:	
3'-4'	1		1*	Design	-2.6
4'-5'			1	OD	-0.6
5'-6'			1	OD - 2'	1.40
6'-7'			1	OD - 4'	3.40
7'-8'			1		
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

POBI-SVC-819

Notes:

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-0.3
1'-2'	1			Design El	*
2'-3'	1			Distances to:	
3'-4'			1	Design	*
4'-5'			1	OD	*
5'-6'			1	OD - 2'	*
6'-7'			1	OD - 4'	*
7'-8'			1		
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

* Sample location outside of marina and navigation channel.

1. Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 3. Subtidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVC-820						POBI-SVC-821				
Notes:						Notes:				
Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
			Mudline El	-10.8	0-1'				Mudline El	-11.6
1	Potential DMMO	1*	Design El	-12	1'-2'	1	Potential DMMO	1*	Design El	-12
		1*	Distances to:		2'-3'			1*	Distances to:	
1		1*	Design	1.2	3'-4'	1		1*	Design	0.4
		1*	OD	3.2	4'-5'			1*	OD	2.4
		1*	OD - 2'	5.20	5'-6'			1*	OD - 2'	4.40
		1*	OD - 4'	7.20	6'-7'			1*	OD - 4'	6.40
		1*			7'-8'					
					8'-9'					
					9-10'					
					10'-11'					
					11'-12'					
					12'-13'					
					13'-14'					
*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.						*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.				

POBI-SVC-822						POBI-SVC-823				
Notes:						Notes:				
Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
			Mudline El	-13.8	0-1'				Mudline El	-12.4
1	Potential DMMO	1*	Design El	-13	1'-2'	1	Potential DMMO	1*	Design El	-12
		1*	Distances to:		2'-3'			1*	Distances to:	
1		1*	Design	-0.8	3'-4'	1		1*	Design	-0.4
		1*	OD	1.2	4'-5'			1*	OD	1.6
		1*	OD - 2'	3.20	5'-6'			1*	OD - 2'	3.60
		1	OD - 4'	5.20	6'-7'			1	OD - 4'	5.60
		1			7'-8'			1		
					8'-9'					
					9-10'					
					10'-11'					
					11'-12'					
					12'-13'					
					13'-14'					
*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.						*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.				

1. Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 3. Subtidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVC-824

Notes:

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-10.6
1'-2'	1	Potential DMMO	1*	Design El	-12
2'-3'			1*	Distances to:	
3'-4'	1		1*	Design	1.4
4'-5'			1*	OD	3.4
5'-6'	1		1*	OD - 2'	5.40
6'-7'			1*	OD - 4'	7.40
7'-8'			1*		
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

POBI-SVC-825

Notes:

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-15
1'-2'	1	Potential DMMO	1*	Design El	-13
2'-3'			1*	Distances to:	
3'-4'	1		1*	Design	-2
4'-5'			1	OD	0
5'-6'			1	OD - 2'	2.00
6'-7'			1	OD - 4'	4.00
7'-8'			1		
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

POBI-SVC-826

Notes:

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-12.5
1'-2'	1	Potential DMMO	1*	Design El	-12
2'-3'			1*	Distances to:	
3'-4'	1		1*	Design	-0.5
4'-5'			1*	OD	1.5
5'-6'			1*	OD - 2'	3.50
6'-7'				OD - 4'	5.50
7'-8'					
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

POBI-SVC-827

Notes:

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-6.2
1'-2'	1			Design El	*
2'-3'	1			Distances to:	
3'-4'			1	Design	*
4'-5'			1	OD	*
5'-6'			1	OD - 2'	*
6'-7'			1	OD - 4'	*
7'-8'			1		
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

* Sample location outside of marina and navigation channel.

[1.] Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 3. Subtidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVC-828						POBI-SVC-829				
Notes:						Notes: No bathy data available.				
Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
			Mudline El	-16.2	0-1'				Mudline El	-
1	Potential DMMO	1*	Design El	-13	1'-2'	1			Design El	*
1		1*	Distances to:		2'-3'	1			Distances to:	
		1	Design	-3.2	3'-4'			1	Design	*
		1	OD	-1.2	4'-5'			1	OD	*
		1	OD - 2'	0.80	5'-6'			1	OD - 2'	*
		1	OD - 4'	2.80	6'-7'			1	OD - 4'	*
		1			7'-8'			1		
					8'-9'					
					9-10'					
					10'-11'					
					11'-12'					
					12'-13'					
					13'-14'					
*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.						* Sample location outside of marina and navigation channel.				

POBI-SVC-830						POBI-SVC-831				
Notes:						Notes:				
Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
			Mudline El	-16.1	0-1'				Mudline El	-7.6
1	Potential DMMO	1*	Design El	-13	1'-2'	1			Design El	*
1		1*	Distances to:		2'-3'	1			Distances to:	
		1	Design	-3.1	3'-4'			1	Design	*
		1	OD	-1.1	4'-5'			1	OD	*
		1	OD - 2'	0.90	5'-6'			1	OD - 2'	*
		1	OD - 4'	2.90	6'-7'			1	OD - 4'	*
		1			7'-8'			1		
					8'-9'					
					9-10'					
					10'-11'					
					11'-12'					
					12'-13'					
					13'-14'					
*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.						* Sample location outside of marina and navigation channel.				

[1.] Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 3. Subtidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVC-832						POBI-SVC-833				
Notes: No bathy data available.						Notes:				
Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
			Mudline El	-	0-1'				Mudline El	-15.6
1			Design El	*	1'-2'	1	Potential DMMO	1*	Design El	-13
1			Distances to:		2'-3'			1*	Distances to:	
		1	Design	*	3'-4'	1		1*	Design	-2.6
		1	OD	*	4'-5'			1	OD	-0.6
		1	OD - 2'	*	5'-6'			1	OD - 2'	1.40
		1	OD - 4'	*	6'-7'			1	OD - 4'	3.40
		1			7'-8'			1		
					8'-9'					
					9-10'					
					10'-11'					
					11'-12'					
					12'-13'					
					13'-14'					
* Sample location outside of marina and navigation channel.						* Sample location outside of marina and navigation channel.				

POBI-SVC-834						POBI-SVC-835				
Notes:						Notes: No bathy data available.				
Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
			Mudline El	-14	0-1'				Mudline El	-
1	Potential DMMO	1*	Design El	-13	1'-2'	1			Design El	*
		1*	Distances to:		2'-3'	1			Distances to:	
1		1*	Design	-1	3'-4'			1	Design	*
		1*	OD	1	4'-5'			1	OD	*
		1	OD - 2'	3.00	5'-6'			1	OD - 2'	*
		1	OD - 4'	5.00	6'-7'			1	OD - 4'	*
		1			7'-8'			1		
					8'-9'					
					9-10'					
					10'-11'					
					11'-12'					
					12'-13'					
					13'-14'					
*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.						* Sample location outside of marina and navigation channel.				

[1.] Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 3. Subtidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVC-836						POBI-SVC-837				
Notes:						Notes:				
Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
			Mudline El	-16.7	0-1'				Mudline El	-9.1
1	Potential DMMO	1*	Design El	-13	1'-2'	1			Design El	*
1		1*	Distances to:		2'-3'	1			Distances to:	
		1	Design	-3.7	3'-4'			1	Design	*
		1	OD	-1.7	4'-5'			1	OD	*
		1	OD - 2'	0.30	5'-6'			1	OD - 2'	*
		1	OD - 4'	2.30	6'-7'			1	OD - 4'	*
		1			7'-8'			1		
					8'-9'					
					9-10'					
					10'-11'					
					11'-12'					
					12'-13'					
					13'-14'					
*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.						* Sample location outside of marina and navigation channel.				

POBI-SVC-838						POBI-SVC-839				
Notes:						Notes:				
Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
			Mudline El	-16	0-1'				Mudline El	-15.6
1	Potential DMMO	1*	Design El	-13	1'-2'	1	Potential DMMO	1*	Design El	-13
1		1*	Distances to:		2'-3'			1*	Distances to:	
		1	Design	-3	3'-4'	1		1*	Design	-2.6
		1	OD	-1	4'-5'			1	OD	-0.6
		1	OD - 2'	1.00	5'-6'			1	OD - 2'	1.4
		1	OD - 4'	3.00	6'-7'			1	OD - 4'	3.4
		1			7'-8'			1		
					8'-9'					
					9-10'					
					10'-11'					
					11'-12'					
					12'-13'					
					13'-14'					
*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.						*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.				

1. Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 3. Subtidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVC-840

Notes:

Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML
			Mudline El	-14.7	0-1'
1	Potential DMMO	1*	Design El	-13	1'-2'
		1*	Distances to:		2'-3'
1		1*	Design	-1.7	3'-4'
		1*	OD	0.3	4'-5'
		1	OD - 2'	2.30	5'-6'
		1	OD - 4'	4.30	6'-7'
		1			7'-8'
					8'-9'
					9-10'
					10'-11'
					11'-12'
					12'-13'
					13'-14'

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

POBI-SVC-841

Notes: No bathy data available.

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-
1'-2'	1			Design El	*
2'-3'	1			Distances to:	
3'-4'			1	Design	*
4'-5'			1	OD	*
5'-6'			1	OD - 2'	*
6'-7'			1	OD - 4'	*
7'-8'			1		
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

* Sample location outside of marina and navigation channel.

POBI-SVC-842

Notes:

Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML
			Mudline El	-10	0-1'
1			Design El	*	1'-2'
1			Distances to:		2'-3'
		1	Design	*	3'-4'
		1	OD	*	4'-5'
		1	OD - 2'	*	5'-6'
		1	OD - 4'	*	6'-7'
		1			7'-8'
					8'-9'
					9-10'
					10'-11'
					11'-12'
					12'-13'
					13'-14'

* Sample location outside of marina and navigation channel.

POBI-SVC-843

Notes:

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-8
1'-2'	1			Design El	*
2'-3'	1			Distances to:	
3'-4'			1	Design	*
4'-5'			1	OD	*
5'-6'			1	OD - 2'	*
6'-7'			1	OD - 4'	*
7'-8'			1		
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

* Sample location outside of marina and navigation channel.

[1] Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 3. Subtidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVC-844

Notes:

Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML
			Mudline El	-16.1	0-1'
1	Potential DMMO	1*	Design El	-13	1'-2'
1		1*	Distances to:		2'-3'
		1	Design	-3.1	3'-4'
		1	OD	-1.1	4'-5'
		1	OD - 2'	0.9	5'-6'
		1	OD - 4'	2.9	6'-7'
		1			7'-8'
					8'-9'
					9-10'
					10'-11'
					11'-12'
					12'-13'
					13'-14'

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

POBI-SVC-845

Notes:

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-15.5
1'-2'	1	Potential DMMO	1*	Design El	-13
2'-3'			1*	Distances to:	
3'-4'	1		1*	Design	-2.5
4'-5'			1	OD	-0.5
5'-6'			1	OD - 2'	1.5
6'-7'			1	OD - 4'	3.5
7'-8'			1		
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

POBI-SVC-846

Notes:

Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML
			Mudline El	-16.3	0-1'
1	Potential DMMO	1*	Design El	-13	1'-2'
1		1*	Distances to:		2'-3'
		1	Design	-3.3	3'-4'
		1	OD	-1.3	4'-5'
		1	OD - 2'	0.7	5'-6'
		1	OD - 4'	2.7	6'-7'
		1			7'-8'
					8'-9'
					9-10'
					10'-11'
					11'-12'
					12'-13'
					13'-14'

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

POBI-SVC-847

Notes:

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-15.8
1'-2'	1	Potential DMMO	1*	Design El	-13
2'-3'	1		1*	Distances to:	
3'-4'			1*	Design	-2.8
4'-5'			1	OD	-0.8
5'-6'			1	OD - 2'	1.2
6'-7'			1	OD - 4'	3.2
7'-8'			1		
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

[1] Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 3. Subtidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVC-848					
Notes: ML EL -10.8'					
Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML
			Mudline El	-10.8	0-1'
1			Design El	*	1'-2'
1			Distances to:		2'-3'
		1	Design	*	3'-4'
		1	OD	*	4'-5'
		1	OD - 2'	*	5'-6'
		1	OD - 4'	*	6'-7'
		1			7'-8'
					8'-9'
					9-10'
					10'-11'
					11'-12'
					12'-13'
					13'-14'

* Sample location outside of marina and navigation channel.

POBI-SVC-849					
Notes: ML El -8.7'					
Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-
1'-2'	1			Design El	*
2'-3'	1			Distances to:	
3'-4'			1	Design	*
4'-5'			1	OD	*
5'-6'			1	OD - 2'	*
6'-7'			1	OD - 4'	*
7'-8'			1		
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

* Sample location outside of marina and navigation channel.

POBI-SVC-850					
Notes:					
Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML
			Mudline El	-16	0-1'
1	Potential DMMO	1*	Design El	-13	1'-2'
1		1*	Distances to:		2'-3'
		1	Design	-3	3'-4'
		1	OD	-1	4'-5'
		1	OD - 2'	1	5'-6'
		1	OD - 4'	3	6'-7'
		1			7'-8'
					8'-9'
					9-10'
					10'-11'
					11'-12'
					12'-13'
					13'-14'

POBI-SVC-851					
Notes:					
Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-15.9
1'-2'	1	Potential DMMO	1*	Design El	-13
2'-3'	1		1*	Distances to:	
3'-4'			1*	Design	-2.9
4'-5'			1	OD	-0.9
5'-6'			1	OD - 2'	1.1
6'-7'			1	OD - 4'	3.1
7'-8'			1		
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.

1. Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 3. Subtidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVC-852						POBI-SVC-853				
Notes:						Notes:				
Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
			Mudline El	-15.8	0-1'				Mudline El	-16.6
1	Potential DMMO	1*	Design El	-13	1'-2'	1	Potential DMMO	1*	Design El	-13
1		1*	Distances to:		2'-3'	1		1*	Distances to:	
		1*	Design	-2.8	3'-4'			1	Design	-3.6
		1	OD	-0.8	4'-5'			1	OD	-1.6
		1	OD - 2'	1.2	5'-6'			1	OD - 2'	0.4
		1	OD - 4'	3.2	6'-7'			1	OD - 4'	2.4
		1			7'-8'			1		
					8'-9'					
					9-10'					
					10'-11'					
					11'-12'					
					12'-13'					
					13'-14'					
*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.						*Ammonia and Sulfide samples to be collected for each DMMO interval. Remaining material to be archived.				

POBI-SVC-854						POBI-SVC-855				
Notes:						Notes: No bathy data available				
Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
			Mudline El	-14.3	0-1'				Mudline El	-
1			Design El	*	1'-2'	1			Design El	*
1			Distances to:		2'-3'	1			Distances to:	
		1	Design	*	3'-4'			1	Design	*
		1	OD	*	4'-5'			1	OD	*
		1	OD - 2'	*	5'-6'			1	OD - 2'	*
		1	OD - 4'	*	6'-7'			1	OD - 4'	*
		1			7'-8'			1		
					8'-9'					
					9-10'					
					10'-11'					
					11'-12'					
					12'-13'					
					13'-14'					
* Sample location outside of marina and navigation channel.						* Sample location outside of marina and navigation channel.				

[1] Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 3. Subtidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVC-856

Notes: No bathy data available

Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML
			Mudline El	-	0-1'
1			Design El	*	1'-2'
1			Distances to:		2'-3'
		1	Design	*	3'-4'
		1	OD	*	4'-5'
		1	OD - 2'	*	5'-6'
		1	OD - 4'	*	6'-7'
		1			7'-8'
					8'-9'
					9-10'
					10'-11'
					11'-12'
					12'-13'
					13'-14'

POBI-SVC-857

Notes: No bathy data available

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-
1'-2'	1			Design El	*
2'-3'	1			Distances to:	
3'-4'			1	Design	*
4'-5'			1	OD	*
5'-6'			1	OD - 2'	*
6'-7'			1	OD - 4'	*
7'-8'			1		
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

* Sample location outside of marina and navigation channel.

POBI-SVC-858

Notes: No bathy data available

Primary	Z-layer	Archive[1]	Elevation Information (MLLW)		Depth Below ML
			Mudline El	-	0-1'
1			Design El	*	1'-2'
1			Distances to:		2'-3'
		1	Design	*	3'-4'
		1	OD	*	4'-5'
		1	OD - 2'	*	5'-6'
		1	OD - 4'	*	6'-7'
		1			7'-8'
					8'-9'
					9-10'
					10'-11'
					11'-12'
					12'-13'
					13'-14'

* Sample location outside of marina and navigation channel.

POBI-SVC-859

Notes: No bathy data available

Depth Below ML	Primary	Z-layer	Archive[1]	Elevation Information (MLLW)	
0-1'				Mudline El	-
1'-2'	1			Design El	*
2'-3'	1			Distances to:	
3'-4'			1	Design	*
4'-5'			1	OD	*
5'-6'			1	OD - 2'	*
6'-7'			1	OD - 4'	*
7'-8'			1		
8'-9'					
9-10'					
10'-11'					
11'-12'					
12'-13'					
13'-14'					

* Sample location outside of marina and navigation channel.

[1.] Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 4. Intertidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVCI-400					POBI-SVCI-401			
Notes: POBI-SC-50 exceedances up to 13' below ML					Notes: POBI-SC-50 exceedances up to 13' below ML; nearest prev core BI-C18 below CUL at 1-2'			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1		1		0-1.5'	1			
			1	1.5'-2.5'	1			
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
1				4.5'-5.5'				1
			1	5.5'-6.5'	1			
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
			1	8.5'-9.5'				1
			1	9.5'-10.5'				1
			1	10.5'-11.5'				1
			1	11.5'-12.5'				1
			1	12.5'-13.5'				1
			1	13.5'-14.5'				1
			1	14.5'-15.5'				1
			1	15.5'-16.5'				1

POBI-SVCI-402					POBI-SVCI-403			
Notes: POBI-SC-50 exceedances up to 13' below ML					Notes: POBI-SC-50 exceedances up to 13' below ML			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1				0-1.5'	1		1	
			1	1.5'-2.5'				1
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'	1			
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
1				7.5'-8.5'				1
			1	8.5'-9.5'				1
			1	9.5'-10.5'				1
			1	10.5'-11.5'				1
			1	11.5'-12.5'				1
1				12.5'-13.5'				1
			1	13.5'-14.5'				1
			1	14.5'-15.5'				1
			1	15.5'-16.5'				1

1. Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

FINAL

Table 4. Intertidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVCI-404					POBI-SVCI-405			
Notes: POBI-SC-50 exceedances up to 13' below ML; nearest prev core BI-C18 below CUL at 1-2'					Notes: Prev sample POBI-SC-49 exceedances at 11.5' below ML			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1		1		0-1.5'	1			
			1	1.5'-2.5'				1
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
1				5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
			1	8.5'-9.5'				1
			1	9.5'-10.5'				1
			1	10.5'-11.5'	1			
			1	11.5'-12.5'				1
			1	12.5'-13.5'				1
			1	13.5'-14.5'				1
			1	14.5'-15.5'				1
			1	15.5'-16.5'				1

POBI-SVCI-406					POBI-SVCI-407			
Notes: Prev sample BI-C18 below D/F CUL at 1-2'					Notes: Prev sample POBI-SC-49 exceedances at 11.5' below ML			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1				0-1.5'	1			
1				1.5'-2.5'				1
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
			1	8.5'-9.5'				1
			1	9.5'-10.5'				1
			1	10.5'-11.5'	1			
			1	11.5'-12.5'				1
			1	12.5'-13.5'				1
			1	13.5'-14.5'				1
			1	14.5'-15.5'				1
			1	15.5'-16.5'				1

1. Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 4. Intertidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVCI-408					POBI-SVCI-409			
Notes: Prev sample BI-C18 below D/F CUL at 1-2'					Notes: Prev sample POBI-SC-49 exceedances at 11.5' below ML			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1		1		0-1.5'	1			
1				1.5'-2.5'				1
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
				8.5'-9.5'				1
				9.5'-10.5'				1
				10.5'-11.5'	1			
				11.5'-12.5'				1
				12.5'-13.5'				1
				13.5'-14.5'				1
				14.5'-15.5'				1
				15.5'-16.5'				1

POBI-SVCI-410					POBI-SVCI-411			
Notes: Prev POBI-SC-48 below D/F CUL at 1-2'					Notes: Prev sample POBI-SC-49 exceedances at 11.5' below ML			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1		1		0-1.5'	1			
1				1.5'-2.5'				1
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
				8.5'-9.5'				1
				9.5'-10.5'				1
				10.5'-11.5'	1			
				11.5'-12.5'				1
				12.5'-13.5'				1
				13.5'-14.5'				1
				14.5'-15.5'				1
				15.5'-16.5'				1

1. Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 4. Intertidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVCI-412					POBI-SVCI-413			
Notes: Prev sample POBI-SC-49 exceedances at 11.5' below ML					Notes: Prev sample BI-C18 below D/F CUL at 1-2'			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1				0-1.5'	1			
			1	1.5'-2.5'	1			
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
			1	8.5'-9.5'				
			1	9.5'-10.5'				
1				10.5'-11.5'				
			1	11.5'-12.5'				
			1	12.5'-13.5'				
			1	13.5'-14.5'				
			1	14.5'-15.5'				
			1	15.5'-16.5'				

POBI-SVCI-414					POBI-SVCI-415			
Notes: Prev sample CP-28S below D/F CUL at 1-2'					Notes: Prev sample CP-28S below D/F CUL at 1-2'			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1		1		0-1.5'	1		1	
1				1.5'-2.5'	1			
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
				8.5'-9.5'				
				9.5'-10.5'				
				10.5'-11.5'				
				11.5'-12.5'				
				12.5'-13.5'				
				13.5'-14.5'				
				14.5'-15.5'				
				15.5'-16.5'				

1. Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

POBI-SVCI-416					POBI-SVCI-417			
Notes: Prev sample CP-28S below D/F CUL at 1-2'					Notes: Prev sample CP-28S below D/F CUL at 1-2'			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1		1		0-1.5'	1		1	
1				1.5'-2.5'	1			
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
				8.5'-9.5'				
				9.5'-10.5'				
				10.5'-11.5'				
				11.5'-12.5'				
				12.5'-13.5'				
				13.5'-14.5'				
				14.5'-15.5'				
				15.5'-16.5'				

POBI-SVCI-418					POBI-SVCI-419			
Notes: Prev sample CP-28S below D/F CUL at 1-2'					Notes: Prev sample CP-28S below D/F CUL at 1-2'			
Primary	Z-layer	Benthic/Source	Archive[1]	Depth Below ML	Primary	Z-layer	Benthic/Source	Archive[1]
1		1		0-1.5'	1		1	
1				1.5'-2.5'	1			
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
				8.5'-9.5'				
				9.5'-10.5'				
				10.5'-11.5'				
				11.5'-12.5'				
				12.5'-13.5'				
				13.5'-14.5'				
				14.5'-15.5'				
				15.5'-16.5'				

1. Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 4. Intertidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVCI-420					POBI-SVCI-421			
Notes: Prev sample CP-28S below D/F CUL at 1-2'					Notes: Prev sample CP-28S below D/F CUL at 1-2'			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1		1		0-1.5'	1		1	
1				1.5'-2.5'	1			
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
				8.5'-9.5'				
				9.5'-10.5'				
				10.5'-11.5'				
				11.5'-12.5'				
				12.5'-13.5'				
				13.5'-14.5'				
				14.5'-15.5'				
				15.5'-16.5'				

POBI-SVCI-422					POBI-SVCI-423			
Notes: Prev sample POBI-SC-33 below D/F CUL at 1-2'					Notes: Prev sample POBI-SC-33 below D/F CUL at 1-2'			
Primary	Z-layer	Benthic/Source	Archive[1]	Depth Below ML	Primary	Z-layer	Benthic/Source	Archive[1]
1		1		0-1.5'	1		1	
1				1.5'-2.5'	1			
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
				8.5'-9.5'				
				9.5'-10.5'				
				10.5'-11.5'				
				11.5'-12.5'				
				12.5'-13.5'				
				13.5'-14.5'				
				14.5'-15.5'				
				15.5'-16.5'				

1. Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 4. Intertidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVCI-424					POBI-SVCI-425			
Notes: Prev sample POBI-SC-33 below D/F CUL at 1-2'					Notes: Prev sample POBI-SC-33 below D/F CUL at 1-2'			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1		1		0-1.5'	1		1	
1				1.5'-2.5'	1			
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
				8.5'-9.5'				
				9.5'-10.5'				
				10.5'-11.5'				
				11.5'-12.5'				
				12.5'-13.5'				
				13.5'-14.5'				
				14.5'-15.5'				
				15.5'-16.5'				

POBI-SVCI-426					POBI-SVCI-427			
Notes: Prev sample POBI-SC-33 below D/F CUL at 1-2'					Notes: Prev sample POBI-SC-33 below D/F CUL at 1-2'			
Primary	Z-layer	Benthic/Source	Archive[1]	Depth Below ML	Primary	Z-layer	Benthic/Source	Archive[1]
1		1		0-1.5'	1		1	
1				1.5'-2.5'	1			
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
				8.5'-9.5'				
				9.5'-10.5'				
				10.5'-11.5'				
				11.5'-12.5'				
				12.5'-13.5'				
				13.5'-14.5'				
				14.5'-15.5'				
				15.5'-16.5'				

1. Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 4. Intertidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVCI-428					POBI-SVCI-429			
Notes: Prev sample POBI-SC-33 below D/F CUL at 1-2'					Notes: Prev sample POBI-SC-33 below D/F CUL at 1-2'			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1				0-1.5'	1			
1				1.5'-2.5'	1			
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
				8.5'-9.5'				
				9.5'-10.5'				
				10.5'-11.5'				
				11.5'-12.5'				
				12.5'-13.5'				
				13.5'-14.5'				
				14.5'-15.5'				
				15.5'-16.5'				

POBI-SVCI-430					POBI-SVCI-431			
Notes: Prev sample POBI-SC-33 below D/F CUL at 1-2'					Notes: Prev sample POBI-SC-33 below D/F CUL at 1-2'			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1				0-1.5'	1			
1				1.5'-2.5'	1			
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
				8.5'-9.5'				
				9.5'-10.5'				
				10.5'-11.5'				
				11.5'-12.5'				
				12.5'-13.5'				
				13.5'-14.5'				
				14.5'-15.5'				
				15.5'-16.5'				

1. Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 4. Intertidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVCI-432					POBI-SVCI-433			
Notes: Prev sample POBI-SC-33 below D/F CUL at 1-2'					Notes: Limited data available in area			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1				0-1.5'	1			
1				1.5'-2.5'	1			
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
				8.5'-9.5'				
				9.5'-10.5'				
				10.5'-11.5'				
				11.5'-12.5'				
				12.5'-13.5'				
				13.5'-14.5'				
				14.5'-15.5'				
				15.5'-16.5'				

POBI-SVCI-434					POBI-SVCI-435			
Notes: Limited data available in area					Notes: Limited data available in area			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1				0-1.5'	1			
1				1.5'-2.5'	1			
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
				8.5'-9.5'				
				9.5'-10.5'				
				10.5'-11.5'				
				11.5'-12.5'				
				12.5'-13.5'				
				13.5'-14.5'				
				14.5'-15.5'				
				15.5'-16.5'				

1. Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 4. Intertidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVCI-435					POBI-SVCI-437			
Notes: Limited data available in area					Notes: Limited data available in area			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1				0-1.5'	1			
1				1.5'-2.5'	1			
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
				8.5'-9.5'				
				9.5'-10.5'				
				10.5'-11.5'				
				11.5'-12.5'				
				12.5'-13.5'				
				13.5'-14.5'				
				14.5'-15.5'				
				15.5'-16.5'				

POBI-SVCI-438					POBI-SVCI-439			
Notes: Limited data available in area					Notes: Limited data available in area			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1				0-1.5'	1			
1				1.5'-2.5'	1			
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
				8.5'-9.5'				
				9.5'-10.5'				
				10.5'-11.5'				
				11.5'-12.5'				
				12.5'-13.5'				
				13.5'-14.5'				
				14.5'-15.5'				
				15.5'-16.5'				

1. Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 4. Intertidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVCI-440					POBI-SVCI-441			
Notes: No previous subsurface data					Notes: No previous subsurface data			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1				0-1.5'	1			
1				1.5'-2.5'	1			
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
				8.5'-9.5'				
				9.5'-10.5'				
				10.5'-11.5'				
				11.5'-12.5'				
				12.5'-13.5'				
				13.5'-14.5'				
				14.5'-15.5'				
				15.5'-16.5'				

POBI-SVCI-442					POBI-SVCI-443			
Notes: No previous subsurface data					Notes: No previous subsurface data			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1				0-1.5'	1			
1				1.5'-2.5'	1			
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
				8.5'-9.5'				
				9.5'-10.5'				
				10.5'-11.5'				
				11.5'-12.5'				
				12.5'-13.5'				
				13.5'-14.5'				
				14.5'-15.5'				
				15.5'-16.5'				

1. Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

Table 4. Intertidal Sediment Vibracore Planned Analysis and Archiving
Port of Olympia Budd Inlet Sediment Site

POBI-SVCI-444					POBI-SVCI-445			
Notes: No previous subsurface data					Notes: No previous subsurface data			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1				0-1.5'	1			
1				1.5'-2.5'	1			
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
				8.5'-9.5'				
				9.5'-10.5'				
				10.5'-11.5'				
				11.5'-12.5'				
				12.5'-13.5'				
				13.5'-14.5'				
				14.5'-15.5'				
				15.5'-16.5'				

POBI-SVCI-446					POBI-SVCI-447			
Notes: No previous subsurface data					Notes: No previous subsurface data			
Primary	Z-layer	SMS Benthic/Source Control	Archive[1]	Depth Below ML	Primary	Z-layer	SMS Benthic/Source Control	Archive[1]
1				0-1.5'	1			
1				1.5'-2.5'	1			
			1	2.5'-3.5'				1
			1	3.5'-4.5'				1
			1	4.5'-5.5'				1
			1	5.5'-6.5'				1
			1	6.5'-7.5'				1
			1	7.5'-8.5'				1
				8.5'-9.5'				
				9.5'-10.5'				
				10.5'-11.5'				
				11.5'-12.5'				
				12.5'-13.5'				
				13.5'-14.5'				
				14.5'-15.5'				
				15.5'-16.5'				

1. Ammonia and Sulfide samples to be collected if wood waste is present in sample interval.

ATTACHMENT A

Sampling and Analysis Plan/Quality Assurance Project Plan

Sediment Sampling and Analysis Plan and Quality Assurance Project Plan Port of Olympia Budd Inlet Cleanup Site Olympia, Washington

January 31, 2024

Prepared for

Port of Olympia
915 Washington Street NE
Olympia, Washington 98501

Prepared by

Dalton, Olmsted & Fuglevand
1001 SW Klickitat Way
Suite 200B
Seattle, Washington, 98134

DALTON OLMSTED FUGLEVAND

The Budd Inlet Team

Sediment Sampling and Analysis Plan
and Quality Assurance Project Plan
Port of Olympia Budd Inlet Sediments Cleanup Site
Olympia, Washington

January 31, 2024

The Budd Inlet Team

Sediment Sampling and Analysis Plan and Quality Assurance Project Plan

Port of Olympia Budd Inlet Cleanup Site

Agreed Order Number DE 6083

by Dalton, Olmsted, and Fuglevand Team

Published January 2024

TABLE OF CONTENTS

FIGURES

TABLES

ATTACHMENTS

LIST OF ABBREVIATIONS AND ACRONYMS

%R	percent recovery
°C	degrees Celsius
AO	Agreed Order
ASTM	ASTM International
Cascade Pole	Cascade Pole Inc McFarland cleanup site
CCV	continuing calibration verification
CLP	Contract Laboratory Program
cm	centimeter
COC	chain of custody
cPAH	carcinogenic polycyclic aromatic hydrocarbon
D/F	dioxin and furan
DGPS	differential global positioning system
DL	detection limit
DMMO	Dredged Material Management Office
DMMP	Dredged Material Management Program
DNR	Department of Natural Resources
DOF	Dalton Olmsted & Fuglevand
DQO	data quality objective
DUP	duplicate
Ecology	Washington State Department of Ecology
EDD	electronic data deliverable
EIM	Environmental Information Management System
EPA	US Environmental Protection Agency
ft	feet/foot
GC	geochronological core
GC/MS	gas chromatograph/mass spectrometer
HASP	Health and Safety Plan
HARN	High Accuracy Reference Network
HDPE	high-density polyethylene
l_A	incremental length of sediment acquired in the core tube
l_P	incremental penetration of the core tube below mudline
IAP	Interim Action Plan
ICP	inductively coupled plasma
ID	identification
Initiative	Puget Sound Initiative
Landau	Landau Associates, Inc.

LIST OF ABBREVIATIONS AND ACRONYMS (CONTINUED)

LCS........ laboratory control sample
LOTT........ LOTT Cleanup Water Alliance
m/s........ meters per second
MDL........ method detection limit
MLLW........ mean lower low water
MQO........ measurement quality objective
MRL........ method report limit
MS........ matrix spike
MSD........ matrix spike duplicate
MTCA........ Model Toxics Control Act
NAD83........ North American Datum of 1983
NAPL........ light non-aqueous phase liquid
NOAA........ National Oceanic Atmospheric Administration
PCB........ polychlorinated biphenyl
PCP........ pentachlorophenol
PM........ project manager
PMA........ Port Management Agreement
POBI........ Port of Olympia Budd Inlet
Port........ Port of Olympia
PQL........ practical quantitation limits
Project........ Budd Inlet Cleanup Site Project
PSEP........ Puget Sound Estuary Program
QA/QC........ quality assurance/quality control
QAPP........ Quality Assurance Project Plan
RCRA........ Resource Conservation and Recovery Act
RL........ reporting limit
RPD........ relative percent difference
SAP........ Sampling and Analysis Plan
SB........ sediment bulk
SC........ sediment core
SCUM........ Sediment Cleanup User's Manual
SG........ surface grab
Site........ Budd Inlet Cleanup Site
SMS........ Sediment Management Standards
SOP........ standard of practice
SRM........ standard reference material
ST........ station
SVC........ sediment vibracore in subtidal area

LIST OF ABBREVIATIONS AND ACRONYMS (CONTINUED)

SVCI ....sediment vibracore in intertidal area
TCLP .... toxicity characteristic leaching procedure
TEQ.. toxicity equivalency quotientTOC
....total organic carbon
TVS ....total volatile solids
USACE... US Army Corps of Engineers
V-SAM .... vibracore sediment acquisition monitoring
WAC .... Washington Administrative Code

This page intentionally left blank.

1.0 INTRODUCTION

This Sampling and Analysis Plan and Quality Assurance Project Plan (SAP/QAPP) has been prepared to support work being performed under Agreed Order (AO) No. DE 6083 (Ecology 2008), and its subsequent two amendments (Ecology 2012; Ecology 2023), between the Port of Olympia (Port) and the Washington State Department of Ecology (Ecology), to support the Budd Inlet Sediments cleanup site project (Project).

This SAP/QAPP presents the data quality objectives, laboratory activities, core processing procedures, field sampling procedures, and field quality assurance/quality control (QA/QC) procedures to be implemented during field sampling activities and laboratory analyses in support of sediment chemistry data gathering efforts for Sub-Area 1 in the Budd Inlet Sediments cleanup site (Site). This SAP/QAPP was developed in accordance with Ecology's *Sediment Cleanup User's Manual (SCUM)* (Ecology 2021) and Ecology's *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies* (Ecology 2016a). This SAP/QAPP meets the requirements of Washington Administrative Code (WAC) 173-340-820, in the Model Toxics Control Act (MTCA); and WAC 173-204-600, in the Sediment Management Standards (SMS). Updates to this SAP/QAPP will be communicated to Ecology and addressed as addenda throughout the course of sediment chemistry data gathering efforts for Sub-Area 1.

A Health and Safety Plan (HASP) for support of field sampling activities has been prepared and submitted to Ecology with this SAP/QAPP. HASP addenda will also be developed, if appropriate, depending on future field investigation requirements. A HASP Addenda may be required if field activities or conditions substantially change from what is described in this SAP.

2.0 PROJECT AND SITE DESCRIPTION

The following sections include a description of the Project as defined by the AO and for the Budd Inlet Cleanup Site.

2.1 Project Description

Under the Puget Sound Initiative (Initiative), Ecology identified Budd Inlet as a high priority cleanup area that required focused sediment cleanup primarily due to elevated dioxin and furan (D/F) concentrations in sediment (Ecology 2008). As part of the Initiative, Ecology issued AOs to property owners to investigate and clean up contaminated sites within Budd Inlet. Ecology and the Port entered into AO No. DE 6083 in 2008 to complete a pilot remedial dredging action in a portion of the Port's berthing area (completed in 2009). In 2012, the AO was amended to require the Port to evaluate a larger area, identified as the Study Area, and address contaminated sediment in the vicinity of the Port Peninsula (Ecology 2012). The AO was recently amended a second time (effective June 9, 2023) requiring the Port to prepare public review draft and final versions of the Interim Action Plan (IAP), prepare a pre-remedial design data gaps memorandum and investigation work plan, perform the pre-remedial design investigation and reporting, and develop engineering design and permitting documents for the interim action (Ecology 2023).

The Port is currently working with Ecology oversight to develop, design, and permit, Budd Inlet sediment remediation, such that remedial work is complete prior to the potential upcoming removal of the Capitol Lake dam. Removal of the dam is expected to significantly increase the sediment load into Budd Inlet. If the new sediment from Capitol Lake enters Budd Inlet prior to remediation, the total volume of sediment to remediate in Budd Inlet would likely increase because the new sediment could not be differentiated from the impacted sediment in a cost-effective manner.

2.2 Site Description

The Port's Marine Terminal facility is located in the northern portion of the City of Olympia on a peninsula within Budd Inlet, which is a small embayment in southern Puget Sound (Figure 2-1). Budd Inlet is divided into West Bay and East Bay at the southernmost portion. The filling of tidelands in the late 1800s and 1900s created the Port Peninsula, the West Bay and East Bay of Budd Inlet, and part of the downtown area of Olympia.

The Marine Terminal is approximately 66 acres and provides approximately 2,500 linear feet (ft) of wharf (Berths 1, 2, and 3) and 76,000 square ft of warehousing. Current upland use immediately adjacent to the berths and turning basin include log storage yards, cargo storage yards, and loading docks. A former log pond/marina area is present in the northwestern corner of the peninsula, defined by a dilapidated external pier running north parallel to the peninsula, outlining a shallower submerged area.

Summaries of West Bay and East Bay are provided below.

2.2.1 West Bay

The Olympia Harbor federal navigation channel extends into Budd Inlet's West Bay and widens into a turning basin near its southern end, adjacent to the Port's Marine Terminal berthing area. This portion of the navigation channel is a deep draft channel (federally authorized depth -30 mean lower low water [MLLW]), primarily providing access to the Marine Terminal for oceangoing vessels. The Port manages the harbor area under a Port Management Agreement (PMA) with the Washington Department of Natural Resources (DNR). Along the Marine Terminal, the harbor area is mostly defined as a 54-feet-wide swath that extends from the south end of the Marine Terminal to beyond the north end. This narrow swath extends from the face of the Port's Marine Terminal landward and includes the underpier area of the Marine Terminal. Waterward of the Marine Terminal, the berthing area abuts the federal turning basin.

Additional features within the West Bay include separate Ecology cleanup sites, a boat basin, marinas, and waterfront shops and restaurants. Within West Bay, five contaminated sites previously or currently under separate AOs with Ecology are located along the shoreline: West Bay Marina; Hardel Mutual Plywood; BMT Northwest aka Reliable Steel; Solid Wood, Inc.; and Industrial Petroleum Distributors. The area south of the Marine Terminal includes a boat basin, waterfront shops and restaurants, and marinas. Three marinas are currently present: Fiddlehead, Martin, and the Olympia Yacht Club.

South of West Bay, the Deschutes River drains into Capitol Lake, in an area that was once an estuary where freshwater from the Deschutes River intermingled with salt water from Budd Inlet. The lake was created in 1951, as a reflection pond for the State Capitol, by installing an earthen dam and an approximately 82-ft-wide tide gate with spillways across the mouth of the Deschutes River under the 5th Avenue Bridge in Olympia (USGS 2006). The flow of freshwater into West Bay is controlled by gated discharges from Capitol Lake. The Washington State Department of Enterprise Services is planning future removal of the Capitol Lake dam and returning the lake to an estuary. If implemented, this change is expected to increase future sediment transport and deposition into Budd Inlet, and West Bay in particular, likely increasing future dredging needs.

2.2.2 East Bay

The eastern portion of the federally authorized navigation channel runs from the north of the Port Peninsula and extends into the East Bay of Budd Inlet. This is a shallow draft channel (federally authorized depth -12 and -13 MLLW) generally for recreational vessels accessing Swantown Marina and Boatworks. The primary commercial facilities in East Bay are operated by the Port and include Swantown Marina and Swantown Boatworks, located on the eastern side of the peninsula. The federal navigation channel also extends to the boat launch ramp located just north of Swantown Marina. Swantown Marina (referred to as East Bay Marina prior to 1995) has been in operation since 1983, is owned and operated by the Port, and maintains slips for approximately 700 vessels. Swantown Boatworks provides vessel service, haul out, and a vessel storage facility. Prior to construction of the Marina, East Bay was historically used for log storage.

Two Sites under AOs with Ecology are located on the Port Peninsula adjacent to East Bay: The Cascade Pole Inc McFarland cleanup site (Cascade Pole; located on the north end of the peninsula) and the East Bay Redevelopment site (located on the southern portion of the peninsula). The Port has been addressing contamination at Cascade Pole since 1990. The previous cleanup activities at Cascade Pole include several interim actions to remove and contain contamination, both on the uplands (groundwater and soil) and in the sediments. The Port continues to operate, maintain, and monitor a groundwater pump-and-treat system as an interim action under a separate AO with Ecology. Long-term monitoring as part of the Cascade Pole sediment cleanup is ongoing under an Agreed Order with Ecology. The historical activities at East Bay Redevelopment site caused soil contamination. At the East Bay Redevelopment site the Port has been conducting upland soil investigations and cleanup actions under separate MTCA AOs with Ecology since 2007. The Port, along with the City of Olympia and LOTT Cleanup Water Alliance (LOTT), worked with Ecology to implement the Cleanup Action Plan for the site. Remediation included removal of some soil contamination hot spots. Remaining impacted soil were covered with a cap of clean soil, pavement, or buildings.

Moxlie Creek originates from an artesian spring approximately 1.5 miles south of Budd Inlet. It flows into East Bay through a mile-long culvert that receives stormwater flows from urban areas, including road runoff from city streets and state and federal highways, before discharging at the southern end of East Bay (Anchor QEA 2012a). East Bay was placed on the 303(d) impaired water body list for polychlorinated biphenyls (PCBs), based on the results of mussel shellfish tissue samples collected in 1995 from the culvert at the mouth of Moxlie Creek. D/F and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) were added to the East Bay 303(d) listing due to bent-nosed clam tissue concentrations measured in 2007 (Ecology 2016b).

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The specific roles, activities, and responsibilities of Project participants are described in Table 1. Before field work commences, Project participants listed in Table 1 will receive a copy of the final approved SAP/QAPP. The Port has the primary responsibility for managing the work completed at the Site. Ecology will be notified in writing of changes to Table 1.

Table 1. Project Team Roles and Responsibilities

Title/Role	Name	Organization	Responsibilities
Port Project Manager	Jon Wolf	Port	Manages the Project for Port of Olympia.
Ecology Project Manager	Sandy Smith	Ecology	Oversees the Project on behalf of the Washington State Department of Ecology.
Consultant Project Managers	Rob Webb; Natasya Gray	Dalton Olmsted & Fuglevand, Inc. (DOF)	Supervises and coordinates all work for the Project. These responsibilities include Project planning and execution, scheduling, staffing, data evaluation, sample archive management, submitting data to EIM, report preparation, subcontracts, and managing deliverables.
Quality Assurance Manager	Danille Jorgensen	Landau Associates, Inc. (Landau)	Oversees and directs quality assurance reviews for the Project, including laboratory procedures and actions. Coordinates and reviews data validation. Has oversight responsibility for management and integrity of the data.
Data Validator	Kristi Schultz	Landau	Reviews laboratory analytical data and provides data validation.
Field Lead	To be determined based on scope of work—see work plan	Landau	Leads and coordinates field activities, including documentation, sampling, and sample handling. Reports directly to the Consultant Project Managers (PM).
Health and Safety Manager	Christine Kimmel	Landau	Responsible for review and implementation of the Project HASP.
Field Equipment Manager	Ken Reid	Landau	Ensures equipment is properly maintained and in good condition for Project use.
Environmental, Laboratory Project Manager(s)	To be determined based on scope of work—see work plan	Analytical Resources, LLC (Tukwila, WA) Enthalpy Analytical (El Dorado Hills, CA)	Manages laboratory analysis and reporting, including supervising in-house chain of custody and scheduling sample analyses within required holding times; oversees data review and preparation of laboratory reports and electronic data deliverables (EDDs). Holds archived samples.

4.0 SEDIMENT SAMPLE COLLECTION, PROCESSING, AND HANDLING PROCEDURES

This section describes activities, methods, and procedures that will be used to complete the sediment chemistry sampling investigation in Sub-Area 1. Sample collection and related management discussed herein include procedures relating to sediment sampling (i.e., surface grabs, cores).

The rationale for the sampling design and the design assumptions for locating and selecting environmental samples is detailed in work plan documentation and references this SAP/QAPP. Sediment sampling procedures will comply with Ecology protocols.

4.1 Sediment (Surface Grab and Subsurface Core Sampling)

Sampling methods for surface sediment (grabs) and subsurface sediment (cores) are outlined in the section that follows.

4.1.1 Station and Sample Identification and Nomenclature

Each sample location will be assigned a unique alphanumeric identifier according to the following method:

- Each location identification (ID) will be identified by *Project Name-Location Type-Location Number.*
  - The Project name will be identified by four letters: *POBI* for *Port of Olympia Budd Inlet*.
  - Location type will be identified by two to four letters: *SG for surface grabs, SVC for sediment vibracores in subtidal areas, and SVCI for sediment vibracores in intertidal areas.*
  - Location ID numbers are preassigned as shown on Figures 2-7, 2-8, and 2-9. For example, a location ID in the intertidal area would POBI-SVCI-400.

Each sample will be assigned a unique alphanumeric identifier according to the following method:

- Each sample ID will be identified by *Location ID* (as detailed above)-*Sample Depth-Sample Collection Date.*
  - Sample depth will be identified by the upper and lower sample collection depths. Surface grab depths are measured in centimeters (cm), and sediment core intervals are measured in feet. For example, a sample ID for the first surface sediment grab location will be POBI-SG-001-(0-10)-YYMMDD, and from the 1.5- to 2.5-foot interval of a subtidal vibracore will be POBI-SVC-400-(1.5-2.5)-YYMMDD.
  - Sample collection date will be identified by year, month, and day as YYMMDD (e.g., 240116 for 01/16/2024).
- A field duplicate collected from a sample will be identified by the addition of *DUP* to the sample number. A duplicate sample of the above sediment grab example would be POBI-SG-001-(0-10)-YYMMDD-DUP.

4.1.2 Station Positioning – Sediment

Horizontal positioning will be determined by the sampling vessel's onboard differential global positioning system (DGPS) using pre-programmed target coordinates for each sample location. Measured station positions will be converted to latitudinal and longitudinal coordinates to the nearest 0.01 second. The accuracy of measured and recorded horizontal coordinates is typically less than 1 meter and will be within 2 meters according to Puget Sound Estuary Program (PSEP) guidance. Northing and easting coordinates of the vessel will be updated every second and displayed directly on a computer onboard the vessel. The coordinates will then be processed in real time and stored at the time of sampling using the navigation system. Washington State Plane South Coordinates, North American Datum of 1983 (NAD83) High Accuracy Reference Network (HARN) will be used for the horizontal datum. Sample locations will be presented in both state plan and latitude-longitude formats when reported.

Tidal elevation during sampling will be determined using a tide gauge and tide board to be installed onsite for the duration of the sampling event. Prior to the start of sampling an electronic tide gauge and visual tide board will be installed at the site. These will be installed using vertical control surveyed in by a licensed surveyor. The electronic tide gauge will record water levels continuously during the sample event. The visual tide board will be used for visual observations and confirmation of the recorded tide gauge data. This water level data will be used to determine the water surface elevation at the time each sample was collected. This elevation, along with the measured depth to mudline, will be used to calculate the mudline elevation at each sample location.

A checkpoint will be used to ensure the horizontal accuracy of the sampling vessel's navigation system. This checkpoint will be located at a known fixed point accessible by the sampling vessel (such as a pier face, dock, piling, or similar structure). At the beginning and end of each day, the vessel will be stationed at the checkpoint, a DGPS reading will be taken, and the two readings will be compared. The two position readings should agree within 1 to 2 meters, per PSEP guidance.

4.1.3 Sampling Platforms

Surface and subsurface sediment will be collected from a platform appropriate for the sample collection method and sampling location. Appropriate sampling platforms may include sampling on foot (shallow locations at low tide), from existing infrastructure (docks, wharfs, etc.), small vessels operated by a qualified operator, or larger vessels specifically designed to support environmental sampling activities by a qualified operator.

4.1.4 Surface Sediment Sample Collection Method

Surface sediment samples for laboratory analyses from the 0- to 10-cm biologically active zone will be collected for grain size testing and chemical analysis. Surface samples may be collected using essentially a power grab sampler or by hand in near shore areas inaccessible by sampling vessel in accordance with PSEP (1997) and Ecology's SCUM (Ecology 2021) protocols, using a stainless-steel bowl and spoon at intertidal locations (e.g., along the shorelines of East and West Bay or mudflat area around the peninsula) during a low tide, when the sediment surface is exposed.

The grab sampler is used to collect large-volume, surface sediment samples. The sampler uses a hinged jaw assembly for sample collection. Upon contact with sediments, the jaws are drawn shut to collect the sample. In general, the grab sampler will be used to collect samples in the following manner:

- Maneuver the vessel to the sampling location using a DGPS to within 1 to 2 meters of the target sampling location.
- Using a lead line, measure and record water depth at target sampling location.
- Open the decontaminated grab sampler jaws to the deployment position.
- Draw the winch cable to the grab sampler taut and vertical.
- Lower the sampler through the water column to the bottom at a speed of approximately 0.3 meters per second (m/s).
- Close the jaws of the sampler when the sampler reaches the bottom and record the time and DGPS coordinates.
- Retrieve the sampler, raising it at approximately 0.3 m/s.
- Evaluate the retrieved sediment sample aboard the vessel against the following PSEP acceptability criteria:
  - Grab sampler is not overfilled (i.e., sediment surface is not against the top of sampler).
  - Sediment surface is relatively flat, indicating minimal disturbance or winnowing (for samples collected to characterize wood debris [if required], acceptable grab samples will allow for minor surface disturbance).
  - Overlying water is present, indicating minimal leakage.
  - Overlying water has low turbidity, indicating minimal sample disturbance.
  - Desired penetration depth is achieved.
- Siphon off overlying water and use a stainless-steel spoon to collect a 0- to 10-cm sediment layer from inside the sampler, taking care not to collect sediment in contact with the sides of the sampler. A photograph of the undisturbed intact sample in grab sampler will be taken prior to collecting sediment.
- Place the collected sediment in a stainless-steel mixing bowl and, when sufficient sample volume has been collected, samples for volatile analysis will be placed in collection jars and the remaining sediment in the stainless-steel bowl will homogenized using a stainless-steel spoon.
- Place homogenized sediment immediately into appropriate pre-labeled sample containers (see Table 2) and place immediately on ice and maintain at < 6 degrees Celsius (°C) until delivered to the appropriate analytical laboratory.

Sample Collection Forms and Daily Log notes (see examples in Attachment A) of grab samples will be maintained as samples are collected and correlated to the sampling location map. At a minimum, the following information will be included on the Sample Collection Form or Daily Log:

- Water depth to mudline surface
- Horizontal and vertical location information of each grab sample as described in Section 4.1.2
- Date and time of collection of each sediment grab sample
- Names of field supervisor and person(s) collecting and logging the sample
- Observations made during sample collection, including weather conditions, complications, ship traffic, and other details associated with the sampling effort
- Station location ID and sample ID
- Physical description in accordance with ASTM International (ASTM) procedures (ASTM D2488 and ASTM D2487—Unified Soil Classification System), including type, density, consistency, and color
- Odor (e.g., hydrogen sulfide, petroleum)
- Vegetation and debris (e.g., wood chips or fibers, paint chips, concrete, sandblast grit, and metal debris)
- Biological activity (e.g., detritus, shells, tubes, bioturbation, and live or dead organisms)
- Presence of oil sheen (Ecology 2016c)
- Any other distinguishing characteristics or features
- Any deviation from the approved sampling plan.

Sediment surface samples will also be visually inspected for the presence of wood waste as part of visual logging. If observed, wood waste surface coverage and percent by volume will be visually estimated in the field by an environmental scientist or geologist consistent with Ecology Wood Waste Cleanup (Ecology 2013). If wood waste is observed, the material will be sampled and analyzed for total volatile solids (TVS) and ammonia consistent with the Wood Waste Cleanup Guidance. The visual information, along with chemistry data, will be used to identify areas, if any, with wood waste accumulation for consideration during cleanup design.

4.1.5 Subsurface Sediment Sample Collection Method (Cores)

Subsurface sediment will be collected by obtaining sediment cores at each location using a vibracore. If vibracore is unable to achieve target depth below mudline due to obstruction (e.g. debris, wood waste, compact sand lens) and data at that location is critical to evaluation and design needs, an auger rig or other drilling technology may be used as appropriate based on conditions.

4.1.5.1 Vibracore Sampling

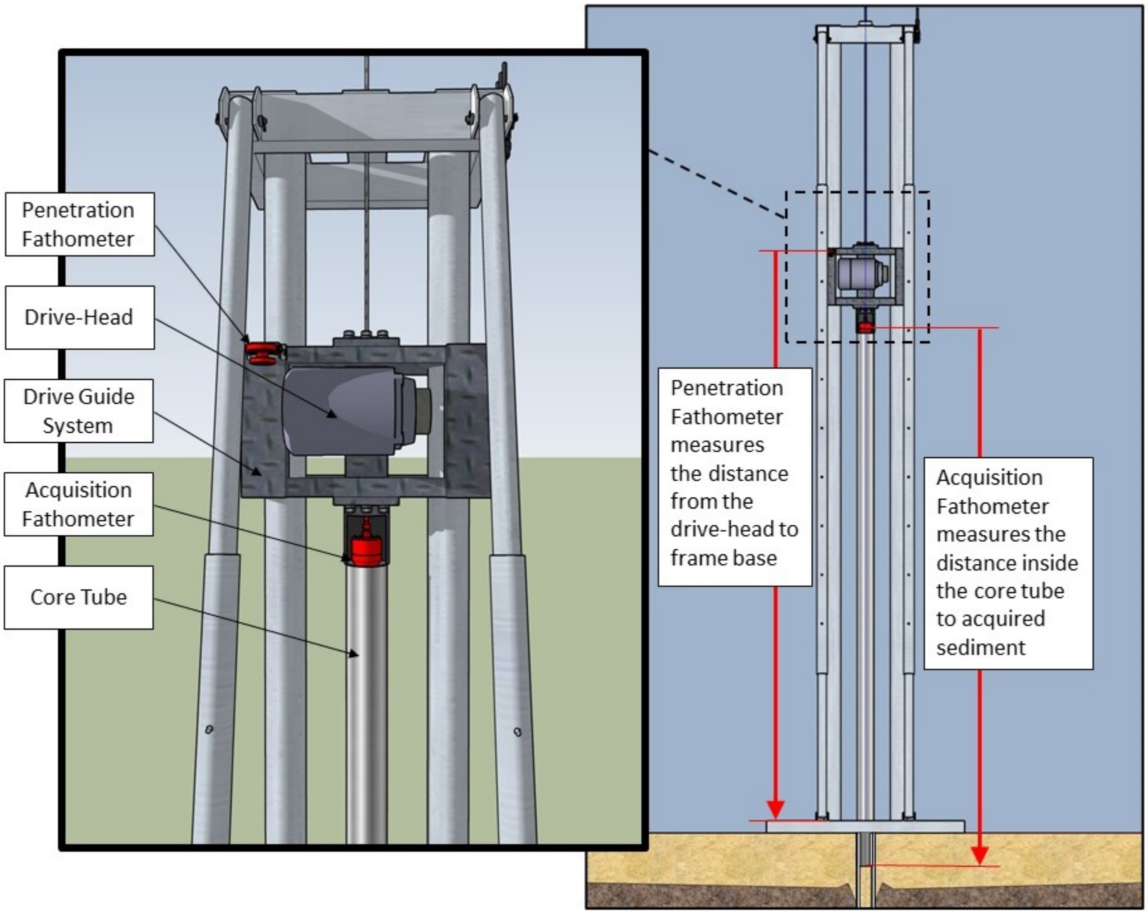
A vibracore collects a continuous profile of subsurface sediment by using a high-frequency vibrating coring device that penetrates the underlying sediments with minimal distortion. When the core tube has been advanced to full penetration or has met refusal and will not advance further, the tube is withdrawn from the sediment.

4.1.5.2 Vibracore Sediment Acquisition Monitoring

The vibracore sediment acquisition monitoring (V-SAM) coring methodology employs aluminum core tubes driven into the substrate by a high-frequency vibrating drivehead attached to the top of the core tube, the same as conventional vibracoring. The V-SAM system directly measures the length of sediment acquired in the core tube as well as the corresponding incremental distance that the core tube is advanced into the sediment. The difference between the driven distance and the core acquisition length informs the sampler of the percentage of sediment recovered (within the driven interval). For example, if driven 1 foot and 1 foot of sediment is measured inside the tube, that is a 100 percent recovery. If driven 1 foot into sediment and only 0.5 feet are measured in the core, that is a 50 percent recovery. V-SAM is typically implemented using shorter drive intervals (1- to 3-foot intervals until full core drive is achieved or refusal occurs) unlike traditional sediment coring methods that may drive the full length of the core or until refusal in one interval for subsampling sediment.

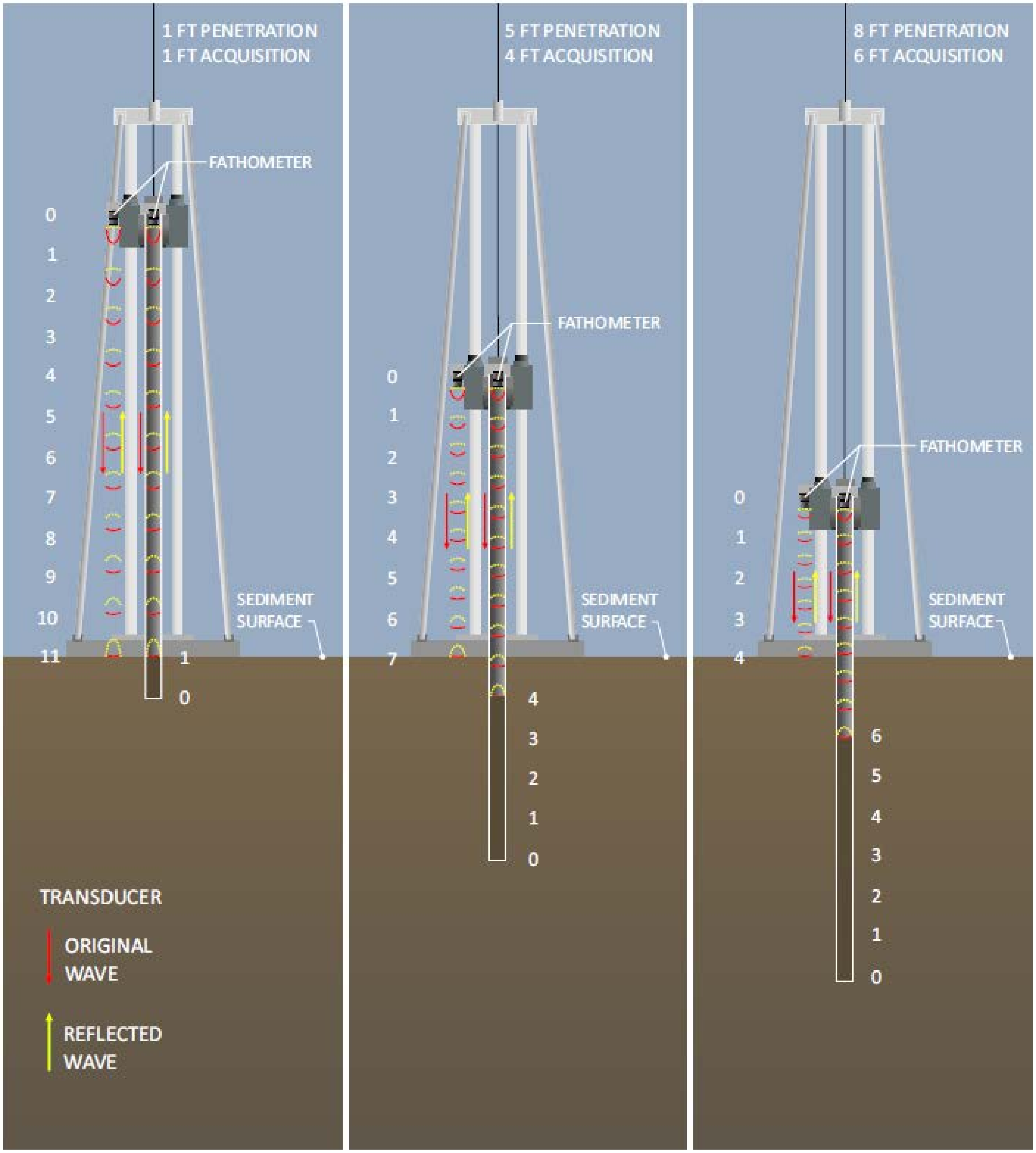
The equipment consists of a bottom-sitting vibracore A-frame configured with two specialized fathometers.

- The Penetration Fathometer, mounted on the A-frame drivehead, measures the incremental penetration of the core tube below mudline (I_P) by recording the changing distance as the drivehead advances the core and moves closer to the sediment bed. This is the distance the core has been driven below the mudline.
- The Acquisition Fathometer, located at the top of and inside the core tube, measures the incremental length of sediment acquired in the core tube (I_A) by recording the distance to the top of the sediment as the core is advanced into the sediment bed during driving. This is the length of sediment core inside the tube.



Marine Sampling System's V-SAM Vibracoring System

Recording and comparing the measures of l_P and l_A during vibracoring is referred to as *V-SAM*.



Vibracoring with V-SAM

After extraction from the bed of the waterway, the core tube will be kept in an upward-oriented position, bottom checked for potential core loss, measured for penetration depth and headspace (the distance from the top of the core tube to contact with retrieved sediment), total ex-situ recovery, and sectioned into manageable lengths for transport to the core processing location. Cores will be processed as described in section 4.1.6 and samples will be submitted to the laboratory for chemical analysis.

4.1.5.3 Sample Collection Procedures

- Sediment cores will be collected using the V-SAM system and decontaminated aluminum core tube barrels. The core tube caps will be removed from the decontaminated core tubes just prior to placement into the vibracore frame. Care will be taken during sampling to avoid contact of the sample tube with potentially contaminated surfaces. Extra sample tubes will be available during sampling operations in the event of core tube breakage or contamination.

Vibracore sediment samples will be collected in the following manner:

- Maneuver the vessel to the proposed sample location.
- Secure a decontaminated core tube the length of the desired penetration depth to the vibracore assembly and deploy it from the vessel.
- Deploy the corer by winch to the mudline, where the vibracore will then be energized and advanced to the target coring depth.
- Continuously monitor and record the incremental penetration and acquisition measurements from the transducers attached to the fathometer equipment during the coring operation.
- Collect a continuous core sample to the designated coring depth or until refusal, whichever is reached first. Cores are typically advanced in 1 to 3-foot intervals.
- Measure and record the location of the core and measure the depth to sediment using a lead line or a survey tape attached to the vibracore head assembly.
- Measure and record the mechanical depth of core penetration.
- Extract the core from the sediment using the winch.
- Spray off the assembly and core barrel, while they are suspended from the A-frame, and then place them on the vessel deck.
- Remove the core tube from the vibracore assembly once on board the vessel and measure the headspace (distance from the sediment surface to the top of the core tube) to verify acquisition readings.

Conformance with the performance standard for subsurface cores collected by V-SAM will be based on the acquisition data (measures of l_P and l_A during vibracoring) and total sediment core recovery as measured *ex situ*. Acceptance criteria for sediment core samples are as follows:

- The incremental recovery percentage shall be 50 percent or greater within an increment and an average of 70 percent or greater for all intervals collected in the core. The 70 percent recovery shall be confirmed by an *ex situ* measurement of sediment within the core tube.
- Overlying water is present and the surface is intact.
- The core tube appears intact without obstruction or blocking.

- Target penetration depth is achieved unless refusal occurs after three attempts, in which case the deepest penetrating core will be sampled.

If sample acceptance criteria are not achieved, the core will be rejected, the vessel will shift no more than 20-ft from the target location and attempt to collect an acceptable core. At least three attempts to collect an acceptable core will be made for each sample location. If a core is not collected that meets acceptance criteria after three attempts, the field lead will determine if additional attempts are likely to result in a core that will meet acceptance criteria or if a core already collected will contain enough sediment for the analysis suite appropriate for the sample location. Rationale for accepting a core that does not meet acceptance criteria will be documented in the field notes.

Acceptable cores will have the extra tube cut off near the sediment surface and be capped and stored upright on the vessel. Cores longer than 6 ft in length will be cut into smaller sections (up to 4 ft long) so that they can be transported to the processing facility in a vertical position, if possible, and so they will fit in the insulated storage box on the vessel and at the processing facility.

The core tube will be labeled with the location ID and an arrow pointing to the top of core in permanent black marker. At the end of each day, or incrementally during the day, the cores will be taken to the processing facility, where they will be processed the following day.

Logs and field notes of core samples will be maintained as samples are collected and correlated to the sampling location map. The following information will be included in this log, consisting of the Core Acquisition Log and Log forms included in Attachment A:

- Mudline elevation of each core station sampled relative to MLLW
- Location of each core station as determined by DGPS
- Date and time of collection of each sediment core sample
- Names of field supervisor and person(s) collecting and logging the sample
- Observations made during sample collection, including weather conditions, complications, ship traffic, and other details associated with the sampling effort
- The sample station ID
- Core tube penetration depth
- Sediment core length (measured ex-situ)
- Acquisition data and acquisition curve including the drive interval measurements vs. interval acquisition measurements.
- Any deviation from the approved sampling plan.

4.1.6 Core Processing

Core processing will be conducted one core at a time at the processing facility. The cores will be stored cool or on ice until they can be processed in the order in which they were collected. Cores may be held for a maximum of 72 hours before processing. Core processing will be conducted by an appropriately trained environmental professional.

Cores will be cut for logging and sampling by removing the core caps and cutting the core tube longitudinally with a circular saw. The core will be split into two vertical halves with decontaminated stainless-steel spatulas. If the core was divided into sections for easier transport, this step will be repeated for each section until the entire core is extracted. The entire length of each core will be logged, even if deeper than the target sample depth. Prior to sampling, color photographs will be taken, and a sediment description of each core will be recorded on the core log. At a minimum, the following parameters will be noted:

- *In situ* sample intervals/elevations based on V-SAM measurements from the core log.
- Physical description in accordance with ASTM procedures (ASTM D2488 and ASTM D2487 – Unified Soil Classification System) including type, density, consistency, and color
- Odor (e.g., hydrogen sulfide, petroleum)
- Visual stratification, structure, and texture
- Vegetation and debris (e.g., wood chips or fibers, paint chips, concrete, sandblast grit, and metal debris)
- Biological activity (e.g., detritus, shells, tubes, bioturbation, and live or dead organisms)
- Presence of oil sheen (Ecology 2016c)
- Any other distinguishing characteristics or features.

Subsurface samples will also be visually inspected for the presence of wood waste as part of visual logging. If observed, wood waste percentage by volume will be visually estimated by the environmental scientist or geologist consistent with Ecology 2013. This information, along with chemistry data, will be used to identify areas, if any, with wood waste accumulation for consideration during cleanup design. If wood waste is observed, samples will be collected and submitted for TVS and ammonia analysis.

Starting at the mudline, the core will be sectioned into sample intervals based on the requirements of the sample design for each location. The sample design intervals may vary slightly based on sediment lithology and observations. *In situ* sample intervals will be established based on the details provided in the V-SAM core log. This method will provide the best estimate of elevations related to the vertical extent of contamination for remedial alternative evaluation and related to the post-dredge surface in the proposed maintenance dredge areas (e.g., z-samples collected for Dredged Material Management Program (DMMP) evaluation, if required). Field observations collected during core penetration and core logging may be used to supplement V-SAM core log data (or replace if V-SAM core log data is not available or due to malfunction) to identify *in situ* sample intervals.

Samples for volatile analyses will be collected directly from the sample interval before the interval is homogenized. The sampled intervals from each core will be placed in a clean stainless-steel bowl and homogenized by thoroughly mixing with stainless-steel utensils until the sediment appears uniform in color and texture. The homogenized sediment sample will be placed in the appropriate sample jars using a stainless-steel spoon and stored on ice until submitted to the identified analytical laboratory. Each jar will be firmly sealed and clearly labeled.

4.2 Field Quality-Control Samples

Field QC samples will be collected along with the sediment samples to evaluate reproducibility of field and laboratory procedures and matrix effects. Field QC sample frequency is presented in Table 4 and described below.

- Field duplicates will be collected at a frequency of 1 per 20 samples collected, from areas known or suspected to be contaminated. A field duplicate is an additional sample collected from the same sample material as the parent sample. Field duplicate samples for solid matrices will be prepared by homogenizing sufficient sample volume from each sample location. The field duplicate will be labeled as described in the appropriate sample-naming section above and analyzed for the same constituent list as the parent sample.
- Matrix spike/matrix spike duplicate (MS/MSD) samples will be collected at a frequency of 1 per sampling event per method or 1 in 20 samples processed, whichever is more frequent. For every 20 samples, additional aliquots will be collected to ensure that the laboratory has sufficient sample volume to run the MS/MSD analysis. MS/MSD samples will be identified on sample labels and the chain of custody (COC) and will retain the same sample identifier as the original sample. Field duplicates, equipment blanks, and MS/MSD samples will be documented in the field logbook and verified by the QA manager or designee.
- Equipment blanks will not be collected when dedicated sampling equipment is used. Equipment blanks will be collected if non-dedicated sampling equipment is used at a minimum frequency of one per sample collection method.
- Temperature blanks and/or an infrared thermometer will be utilized to measure sample temperatures upon receipt at the laboratory to confirm that the samples are in compliance with storage temperature requirements as listed in Table 2.
- No volatile analyses are included in the current analytical suite, and therefore trip blanks will not be utilized.

4.3 Equipment Decontamination Procedures

The decontamination procedures described below are to be used by field personnel to clean drilling, sampling, and related field equipment. Deviation from these procedures must be documented in the field records.

4.3.1 Sediment Sampling Equipment

All non-dedicated sampling equipment used (e.g., stainless-steel bowls, stainless-steel spoons, hand augers, core samplers, etc.) will be cleaned using a three-step procedure, as follows:

1. Scrub surfaces of equipment that would be in contact with the sample with brushes using an Alconox solution. If light non-aqueous phase liquid (NAPL) is encountered, methanol will be used to clean and then decontaminate equipment as described in steps 1 through 3.
2. Rinse and scrub equipment with clean tap water.
3. Rinse equipment a final time with deionized water to remove tap-water impurities.

Decontamination of the reusable sampling devices will occur between the collection of each sample.

4.3.2 Sediment Processing

Sample containers, instruments, working surfaces, technician protective gear, and other items that may come into contact with suspected contaminated sediment must meet high standards of cleanliness. All equipment and instruments used that are in direct contact with the sediment collected for analysis will be made of glass, stainless steel, or high-density polyethylene (HDPE), and will be decontaminated at the beginning of each day as well as between sampling locations. Decontamination of all items will follow PSEP protocols.

The decontamination procedure is as follows if NAPL is not encountered:

1. Perform pre-wash rinse with site water.
2. Wash with solution of laboratory-grade, non-phosphate-based soap (e.g., Alconox).
3. Rinse with site water.
4. Rinse three times with laboratory-grade distilled water.
5. Cover all decontaminated items with aluminum foil.
6. Store in clean area or closed container for next use.

The decontamination procedure is as follows if NAPL is encountered:

1. Rinse with citrus-based solvent (CitriSolv).
2. Rinse with methanol.
3. Wash in Alconox solution.
4. Rinse with site water
5. Rinse three times with laboratory-grade distilled water.
6. Cover all decontaminated items with aluminum foil.
7. Store in clean area or closed container for next use.

4.3.3 Heavy Equipment

Heavy equipment if used and in contact with contaminated sediment (e.g., the drilling rigs and the drilling equipment used downhole or that contacts material and equipment going downhole) will be cleaned using the procedures identified above or using a high-pressure steam cleaner.

4.4 Containers, Preservation, and Holding Times

The analytical lab will provide certified, pre-cleaned, US Environmental Protection Agency (EPA)-approved containers for all samples (see Table 2), with appropriate preservation in accordance with PSEP (PSEP 1997a and b), SCUM (Ecology 2021), and EPA's SW-846 Compendium (EPA 2023).

4.5 Sample Identification and Labels

Each sample will have an adhesive plastic or waterproof paper label affixed to the container and will be labeled at the time of collection. The following information will be recorded on the container label at the time of collection:

- Project name
- Sample identification
- Date and time of sample collection
- Preservative type (if required)
- Initials of the person preparing the sample.

Samples will be uniquely identified with a sample identification as described in the above sections.

4.6 Waste Management

Sediment remaining after grab sampling and minimal spilled sediment (that does not have visible oil sheen or oil droplets) on the deck of the sampling vessel will be washed overboard at the collection site prior to moving to the next sampling station. Excess sediment remaining after processing of the core tubes at the analytical laboratory will be disposed of in an appropriate manner using the procedures outlined in the specific laboratory's waste-handling plan. Remaining sediment after core processing and decontamination water generated from decontamination of non-dedicated tools will be segregated and stored in 55-gallon drums at the processing facility. Filled drums will be disposed of by the Port using a waste-management contractor. Investigation-derived waste will be disposed of at a facility permitted to accept the waste. Sediment waste will be managed in accordance with WAC 173-303-070.

Disposable sampling materials and personnel protective equipment used in sample processing, such as disposable coveralls, gloves, and paper towels, that are not visibly contaminated will be placed in heavy-duty garbage bags for disposal as municipal waste.

5.0 SAMPLE TRANSPORT AND CHAIN-OF-CUSTODY PROCEDURES

This section addresses the sampling program requirements for maintaining custody of the samples throughout the sample collection and delivery process.

5.1 Sample Custody Procedures

Samples are considered to be in one's custody if they are in the custodian's possession or view, in a secured location (under lock) with restricted access, or in a container that is secured with an official seal, such that the sample cannot be accessed without breaking the seal.

COC procedures will be followed for all samples throughout the collection, handling, and analysis process. The principal document used to track possession and transfer of samples is the COC form (see example in Attachment A). Each sample will be represented on a COC form the day it is collected. All data entries will be made using an indelible ink pen. Corrections will be made by drawing a single line through the error, writing in the correct information, and then dating and initialing the change. Blank lines or spaces on the COC form will be lined-out and dated and initialed by the individual maintaining custody.

A COC form will accompany each cooler of samples to the analytical laboratory. Each person who has or relinquishes custody of the samples will sign the COC form and ensure that the samples are not left unattended unless properly secured. Copies of all COC forms will be retained in the Project files.

5.2 Sample Delivery and Receipt Requirements

Samples submitted to the laboratory will be collected in the appropriate sample containers and preserved as specified in Table 2. The storage temperatures and maximum holding times for grain size tests and chemical analyses are also provided in Table 2. The persons transferring custody of the sample container will sign the COC form upon transfer of sample possession to the laboratory, unless the samples are shipped via commercial carriers, in which case the custody signature will be that of the individual taking possession of the samples from the carrier at its final destination. All samples will be kept on ice following collection and will be transported to the analytical lab on ice.

When the samples are delivered to the laboratory, the receiver will record the condition of the samples on a sample receipt form. COC forms will be used internally in the laboratory to track sample handling and final disposition. If containers arrive with broken custody seals, the laboratory will note this on the COC record and will immediately notify the PM or Field Lead. Core samples representing 1-ft intervals scheduled for archive will be preserved by the laboratory according to Table 2. Samples that require freezing will be frozen by the laboratory upon receipt. Sediment samples may be archived for later analysis by freezing and storing at -18 °C. Samples to be analyzed for grain size, ammonia, total sulfides, and volatile organic compounds will not be frozen. Allowance for expansion of the sample should be made to prevent breakage of the sample bottles upon freezing. The archived samples may be thawed within the maximum holding times listed in Table 2 and analyzed for the appropriate analytes. Once the laboratory work has been completed and the data report submitted by the laboratory, samples and extracts will be transferred from cold storage to a sample archiving area (as appropriate for the type of media to be handled), where they will be stored for 3 months, unless the PM provides other written instructions. Custody will be maintained in the long-term storage area and upon ultimate disposition, samples will be logged out, and the disposition recorded. Disposal will be in accordance with local, state, and federal landfill and wastewater regulations.

6.0 ANALYTICAL TESTING

The rationale for the requirements and need for chemical analytical and grain size testing will be detailed in the Work Plan for Sub-Area 1. This section includes information on target analytes, proposed analytical testing methods, and laboratory-testing information, as the information relates to the media being evaluated.

6.1 Sediment Analytical Testing

SCUM (Ecology 2021) specifies sampling and testing protocols for the chemical and physical characterization of sediment.

Chemical analysis and grain size testing will be conducted by an Ecology or NELAP accredited laboratory for the required analyses. Target analyte lists will be specified in the associated work plan. Environmental analytical laboratories performing work under this SAP/QAPP shall maintain current accreditation through Ecology's lab accreditation program or the National Environmental Laboratories Accreditation Program. Chemical and grain size testing will adhere to the most recent Ecology, PSEP, and Dredged Material Management Office (DMMO) analysis protocols and QA/QC procedures (PSEP 1986, 1997a, 1997b) and to EPA's SW-846 Compendium. Additional information on sediment analytical testing is provided in Table 3.

6.2 Laboratory Requirements and Reporting

In completing chemical and/or physical analyses for this Project, the laboratories are expected to meet the following minimum requirements:

- Adhere to the methods outlined in this SAP/QAPP, including methods referenced for each analytical procedure (Table 3).
- Deliver hard copy and electronic data as specified.
- Meet reporting requirements for deliverables.
- Meet turnaround times for deliverables.
- Implement QA/QC procedures, including measurement quality objectives (MQOs), laboratory quality control requirements, and performance evaluation testing requirements (Tables 4 and 5).
- Notify the Project QA Manager and/or PM of any QA/QC problems when they are identified, to allow for quick resolution.
- Allow laboratory and data audits to be performed, if deemed necessary.
- Maintain accreditation for the analytical methods and sample media specified in this QAPP.

Laboratory QC procedures include initial and continuing instrument calibrations, standard reference materials, laboratory control samples, matrix replicates, matrix spikes, surrogate spikes (for organic analyses), and method blanks. Table 4 lists the frequency of analysis for laboratory QC samples, and Table 5 summarizes the MQOs.

Results of the QC samples from each sample group will be reviewed by the laboratory analyst immediately after a sample group has been analyzed. The QC sample results will be evaluated to determine if control limits have been exceeded. If control limits are exceeded in the sample group, the Project QA Manager will be contacted immediately, and corrective action (e.g., method modifications followed by reprocessing the affected samples) will be initiated prior to processing a subsequent group of samples.

7.0 QUALITY ASSURANCE PROJECT PLAN

This section establishes QA objectives and functional activities associated with sediment chemistry data gathering at the Site. The methods and QA procedures described in this QAPP will be followed during throughout the course of data collection activities.

The goal of this QAPP is to ensure that data of sufficiently high quality are generated to support the data quality objectives (DQOs). This section describes project management responsibilities; sampling and analytical QA/QC procedures; assessment and oversight; and data reduction, verification, validation, and reporting. This QAPP was prepared following Ecology's SCUM and QAPP guidance documents (Ecology 2021 and 2016a). Analytical QA/QC procedures were also developed based on the protocols and quality assurance guidance of the PSEP and DMMP (PSEP 1986, 1997a, 1997b, 1997c; DMMO 2021).

Field and laboratory activities must be conducted in such a manner that the results meet specified data quality objectives and are fully defensible. Guidance for QA/QC is derived from the protocols developed for the PSEP and DMMP (PSEP 1986, 1997a, 1997b; DMMO 2021), EPA SW-846, EPA Contract Laboratory Program (EPA 2020, 2020a, 2020b), EPA Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use (EPA 2009), and the Sediment Cleanup User's Manual (SCUM) (Ecology 2021).

7.1 Data Quality Objectives and Criteria

DQOs reflect the overall degree of data quality or uncertainty that the decision-maker is willing to accept during the process. DQOs are used to ensure that generated data are scientifically valid, defensible, and of an appropriate level of quality given the intended use for the data (EPA 2000). The quality of the data is assessed by MQOs, which consist of precision, accuracy, representativeness, comparability, completeness, sensitivity, and bias.

Additional data gathering efforts at the Site will be focused on gathering the necessary level of data to inform the engineering requirements of the remedial design. Environmental and geotechnical data collection strategies will be further detailed in supporting Work Plans that will be submitted to Ecology for review and approval. Task-specific DQOs will be included in the corresponding work plan.

Data quality objectives are presented below.

<table>
<tr><th>Process</th><th>Response</th></tr>
<tr><td>Step 1:
State the problem</td><td>Additional information is needed in the East Bay Project Area (as defined in the Work Plan) to address pre-remedial design data gaps. Data will be collected to confirm nature and extent, inform clean up design through vertical delineation, and to inform source control assessment.</td></tr>
<tr><td>Step 2:
Identify the decision</td><td>Data will be collected to:
Support calculation of surface weighted average concentrations (SWAC) including cadmium, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), dioxins and furans (D/Fs), and dioxin-like PCB congeners via collection of surface sediment (0-10 centimeter [cm]) data.
Support calculation of intertidal SWACs including cadmium, cPAHs, and D/Fs dioxin-like PCB congeners via collection of surface sediment data (0-45 cm) data in intertidal areas.
Support determination of the depth of contamination within areas proposed for remedial dredging within the Draft Alternatives Memorandum currently under review by Ecology.
Support initial source control assessment.
Support initial dredge material management assessment.</td></tr>
<tr><td>Step 3:
Identify the inputs to the decision</td><td>Surface and subsurface sediment samples will be collected from both intertidal and subtidal areas.
Sediment samples will be analyzed as follows:
Cadmium, arsenic, mercury, cPAHs, pentachlorophenol (PCP), D/Fs, and PCB congeners. Toxicity equivalency quotients [TEQs] will be calculated for cPAHs, D/F, and PCB congeners. If wood waste is encountered, samples will also be analyzed for TVS, total sulfides, and ammonia. The full list of analytes is presented in Table 3 as the “Primary COCs” analytical suite.
Areas with dredging as a proposed remedy in the Draft Alternatives Analysis - Dredged Material Management Office (DMMO) suite of chemicals in sediments anticipated to be exposed by dredging, the Z-layer. The full list of analytes is presented in Table 3 as the “Z-Layer” analytical suite.
Near outfalls and other potential source areas: Washington sediment management standards (SMS) marine list of chemicals. The full list of analytes is presented in Table 3 as the “Source Control” analytical suite.</td></tr>
<tr><td>Step 4:
Define the study boundaries</td><td>Geographic: Budd Inlet Sediments Cleanup Site Sub-Area 1, Sub-Area 2, and Sub-Area 3
Time frame: Jan 2024 through completion of design
Sample type: Surface and subsurface sediment</td></tr>
<tr><td>Step 5:
Develop a decision rule</td><td>Details for this focused investigational suite are described by location and depth interval in Tables 2 and 3 of the Work Plan for Sub-Area 1. Existing</td></tr>
</table>

Process	Response
	sediment data have been used as guidance in developing the planned analytical suite and analysis program. Archived core samples representing 1-ft intervals will be sequentially analyzed, as needed, to delineate the depth of contamination at each coring location. Not all 1-ft core intervals will be analyzed. Additional details and rationale for the planned sampling are as follows: • Chemicals identified for testing are based on those previously identified as chemicals of concern (COCs) for the Study Area in the Investigation Report (Anchor 2016b) and data gaps identified in cooperation with Ecology. • Surface sediment samples collected throughout Sub Area 1 will be used to update the East Bay Project Area–specific SWACs. Samples will be analyzed for cadmium, D/Fs, PCBs, and cPAHs. • Intertidal surface sediment samples collected throughout the intertidal portions of the East Bay Project Area will be used to update the East Bay Project Area–specific intertidal SWACs. Samples to be analyzed will include cadmium, D/Fs, PCBs, and cPAHs. • Within areas where the identified preferred remedial action is dredging, based on the Draft Alternatives Memorandum (DOF et al. 2023, currently under review by Ecology), samples will be collected with a focus on identifying the depth of contamination, and the sediment quality, of the sediment surface anticipated to be exposed by dredging (i.e., the Z-layer). Samples will be used to design the remedial action in these areas. Samples used to identify the depth of contamination will be analyzed for cadmium, D/Fs, PCBs, and cPAHs. Z-layer samples will be analyzed for the anticipated need for data consistent with those required under the Dredged Material Management Program (DMMP) suite of chemicals. • •In areas near outfalls, surface and subsurface sediment samples will be collected to evaluate potential previous and ongoing sources of contamination and the effectiveness of source control. Additionally, these data will support development of potential remedial alternatives for these areas, as needed. Samples will be analyzed for the SMS marine suite of chemicals. • •In areas immediately adjacent to the federal navigation channel in East Bay, samples will be collected to evaluate potential contamination and the depth of contamination, if present. These data will be used in design of the remedial action and dredging within the federally authorized channel to reduce potential for recontamination and redistribution following dredging. These samples will be analyzed for cadmium, D/Fs, PCBs, and cPAHs.
Step 6: Specify performance or acceptance criteria	Regulatory limits for metals and PAHs are presented in Table 3. Chemical analysis shall be performed by an Ecology accredited laboratory. Performance and acceptance criteria are presented in Tables 4, 5, and 6 including the following quality control considerations: Data quality indicators for laboratory analyses (precision, accuracy, representativeness, completeness, and comparability) Laboratory quality control

Process	Response
	Field quality control samples.
Step 7: Develop the detailed plan for obtaining data	The sample design is presented in Section 5 of this SAP/QAPP.

7.2 Measurement Quality Objectives

MQOs are described in the following sections and are summarized in Table 5.

7.2.1 Precision

Precision is the ability of an analytical method or instrument to reproduce its own measurement. It is a measure of the variability, or random error, in sampling, sample handling, and laboratory analysis that includes the following:

- Repeatability: The random error associated with measurements made by a single test operator on identical aliquots of test material in a given laboratory, with the same apparatus, under constant operating conditions
- Reproducibility**:** The random error associated with measurements made by different test operators, in different laboratories, using the same method but different equipment to analyze identical samples of test material.

In the laboratory, *within-batch* precision is measured using replicate sample or QC analyses and is expressed as the relative percent difference (RPD) between the measurements. The batch-to-batch precision is determined from the variance observed in the analysis of standard solutions or laboratory control samples from multiple analytical batches. Precision measurements can be affected by the nearness of a chemical concentration to the method detection limit (MDL), where the percent error increases.

Field precision will be evaluated by the collection of field duplicates for chemistry samples at a frequency of 1 in 20 samples. Field duplicate precision will be screened against an RPD of 50 percent for solid samples.

The equation used to express precision is as follows:

$$\text{Relative Percent Difference} = [(\text{ABS}\ (R1 - R2)) / ((R1 + R2) / 2)] \times 100$$

Where:

ABS = Absolute difference between values (meaning no negative values)

MS = Matrix Spike

MSD = Matrix Spike Duplicate

R1 = Measured concentration for MS or duplicate #1

R2 = Measured concentration for MSD or duplicate #2

7.2.2 Accuracy and Bias

Accuracy is a measure of the closeness of an individual measurement (or an average of multiple measurements) to the true or expected value. Accuracy is determined by calculating the mean value of results from ongoing analyses of laboratory-fortified blanks, standard reference materials, and standard solutions. Laboratory-fortified (i.e., matrix-spiked) samples are also measured; this indicates the accuracy or bias in the actual sample matrix.

Accuracy is expressed as percent recovery (%R) of the measured value, relative to the true or expected value. If a measurement process produces results whose mean is not the true or expected value, the process is said to be biased. Bias is the systematic error either inherent in a method of analysis (e.g., extraction efficiencies) or caused by an artifact of the measurement system (e.g., contamination). Analytical laboratories use several QC measures to infer analytical bias, including systematic analysis of method blanks, and laboratory control samples. Because bias can be positive or negative, and because several types of bias can occur simultaneously, either the net, or total, bias can be evaluated in a measurement.

Laboratory accuracy will be evaluated against quantitative matrix spike and surrogate spike recovery performance criteria provided by the laboratory. Accuracy can be expressed as a percentage of the true or reference value, or as a %R in those analyses where reference materials are not available and spiked samples are analyzed. The equation used to express accuracy is as follows:

$$\text{Percent Recovery} = [(\text{SSR} - \text{SR}) / \text{SA}] \times 100$$

Where:

SSR = Spiked sample result

SR = Sample result

SA = Spike added

7.2.3 Representativeness

Representativeness expresses the degree to which data accurately and precisely represent an environmental condition. Field representativeness will be controlled by adherence to sample collection procedures outlined in Section 4.0 of this SAP/QAPP.

7.2.4 Comparability

Comparability expresses the confidence with which one dataset can be evaluated in relation to another dataset. For this program, comparability of data will be established through the use of standard analytical methodologies and reporting formats, and of common traceable calibration and reference materials.

7.2.5 Completeness

Completeness is a measure of the amount of data that is determined to be valid in proportion to the amount of data collected. As listed in SCUM, the equation for completeness is as follows:

$$C = \frac{\text{(Number of valid results)}}{\text{(Number of samples taken)}} \times 100$$

Percent analytical completeness will be calculated as follows:

$$C = \frac{\text{(Number of valid results)}}{\text{(Total number of results)}} \times 100$$

The DQO for analytical completeness for this project is 95 percent. Data that have been qualified as estimated because the QC criteria were not met will be considered valid for the purpose of assessing completeness. Data that have been qualified as rejected will not be considered valid for the purpose of assessing completeness.

7.2.6 Sensitivity

Analytical sensitivities must be consistent with or lower than the regulated criteria values in order to demonstrate compliance with this SAP/QAPP. If reporting limits lower than criteria are not achievable during analysis, the QA Manager will work with the laboratory to ensure that, if at all possible, re-analyses are performed and reporting limits lower than criteria are achieved.

The MDL is defined as the minimum concentration at which a given target analyte can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. Laboratory MDLs have been used to evaluate the method sensitivity or applicability prior to the acceptance of a method for this program. Laboratory RLs are defined as the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions for that particular method.

The sample practical quantitation limits (PQLs) will be reported by the laboratory and will take into account any factors relating to the sample analysis that might decrease or increase the reporting limit (e.g., dilution factor, percent moisture, sample volume, sparge volume). In the event that the PQL are elevated for a sample due to matrix interferences and subsequent dilution or reduction in the sample aliquot, causing criteria to be exceeded, the data will be evaluated by the Project PM and/or data validator (as appropriate) and the laboratory to determine if an alternative course of action is required or possible. If this situation cannot be resolved readily, Ecology will be contacted to discuss an acceptable resolution. Analytical results that fall between the RL and MDL/PQL shall be reported. The resulting value shall be flagged as estimated (J).

7.3 Laboratory Quality Control

Laboratory QC procedures may include initial and continuing instrument calibrations, standard reference materials, laboratory control samples, matrix replicates, MS, surrogate spikes (for organic analyses), and method blanks. Results of the QC samples from each sample group will be reviewed by the analyst immediately after a sample group has been analyzed. The QC sample results will then be evaluated to determine if control limits have been exceeded. If control limits are exceeded in the sample group, the QA Manager will be contacted immediately, and corrective action (e.g., method modifications followed by reprocessing the affected samples) will be initiated prior to processing a subsequent group of samples. Laboratory QC sample are discussed below; frequency and MQOs are presented in Tables 4 and 5.

7.3.1 Laboratory Instrument Calibration

An initial calibration will be performed on each laboratory instrument to be used prior to the start of the project, after each major interruption to the analytical instrument, and when any ongoing calibration does not meet method control criteria. Calibration verification will be analyzed following each initial calibration and will meet method criteria prior to analysis of samples. Continuing calibration verifications (CCV) will be performed daily prior to any sample analysis to track instrument performance. The frequency of CCVs varies with method. For gas chromatograph/mass spectrometer (GC/MS) methods, one CCV will be analyzed every 12 hours. For GC/MS, metals, and inorganic methods, one CCV will be analyzed for every 10 field samples, or daily, whichever is specified in the method. If the ongoing continuing calibration is out of control, the analysis must come to a halt until the source of the control failure is eliminated or reduced to meet control specifications. All Project samples analyzed while instrument calibration was out of control will be reanalyzed.

Instrument blanks or continuing calibration blanks provide information on the stability of the baseline established. Continuing calibration blanks will be analyzed immediately prior to, or immediately following, CCV at the instrument for each type of applicable analysis.

7.3.2 Laboratory Duplicates and Replicates

Analytical duplicates provide information on the precision of the analysis and are useful in assessing potential sample heterogeneity. Analytical duplicates and replicates are subsamples of the original sample that are prepared and analyzed as a separate sample.

7.3.3 Matrix Spikes/Matrix Spike Duplicates

Analysis of MS samples provides information on the extraction efficiency of the method on the sample matrix. By performing duplicate MS analyses, information on the precision of the method is also provided for organic analyses.

7.3.4 Method Blanks

Method blanks are analyzed to assess possible laboratory contamination at all stages of sample preparation and analysis. The method blank for all analyses must be less than the method report limit (MRL) of any single target analyte or compound. If a laboratory method blank exceeds this criterion for any analyte or compound, then the laboratory shall follow corrective action procedures in accordance with the analytical method and laboratory Quality Systems Manual SOPs.

7.3.5 Laboratory Control Samples

Laboratory control samples (LCS) are analyzed to assess possible laboratory bias at all stages of sample preparation and analysis. The LCS is a matrix-dependent spiked sample prepared at the time of sample extraction along with the preparation of sample and the MSs. The LCS will provide information on the precision of the analytical process, and when analyzed in duplicate, will provide accuracy information as well.

7.3.6 Standard Reference Materials

Standard reference materials (SRMs) are analyzed to assess possible matrix affects at all stages of sample preparation and analysis. The SRM is a matrix-matched sample that is carried through all aspects of preparation and analysis as a field sample and has a known concentration of target analytes. Puget Sound SRM are used for D/F and PCB analyses.

7.4 Data Management

7.4.1 Data Recording and Reporting

Field data and observations will be recorded on waterproof paper kept in field notebooks. Qualified staff will transfer information contained in field notebooks to Excel spreadsheets (or alternate software) after they return from the field. Data entries will be independently verified for accuracy by another member of the Project team. Field and laboratory data for the Project will be uploaded to Ecology's Environmental Information Management (EIM) System per the schedule in the AO, which is within 90 calendar days following receipt of all pre-validated laboratory data.

Laboratory results, including QC data, will be submitted electronically. The electronic formats will include a PDF file of the laboratory report and an EDD in Project-specified format. The laboratory PM shall ensure that the EDD matches the laboratory hard copy data report. This data review must be completed before deliverables are reported by the laboratory. Raw and final data will be stored electronically, with regularly scheduled backups performed and maintained at the laboratory. The laboratories will prepare a detailed laboratory data package documenting all activities associated with the sample analyses.

7.4.2 Laboratory Data Deliverables

Environmental analytical laboratories performing work under this SAP/QAPP will provide full (Stage 4) analytical reports, with CLP equivalent forms. Required analytical report elements are presented in Table 6. Laboratories will also provide Electronic Data Deliverables (EDDs) in both EIM and the project EDD format.

Table 6. Data Package Elements

Data Package Element	Stage 4
Chain of custody documentation, sample receipt, and condition documentation	X
Sample summary or equivalent, method summary or equivalent	X
Sample results (with date, units, RLs, and/or DLs)	X
Laboratory data qualifier definitions	X
Method/laboratory blank results	X
Sample surrogate results	X
Field QC results	X
Laboratory control sample results, matrix spike results, duplicate and/or matrix spike duplicate results, post-digestion spike sample results	X

Data Package Element	Stage 4
ICP serial dilution results	X
Standard reference material	X
Tuning results summary	X
Initial calibration results, continuing calibration results	X
Internal standard results	X
QC surrogate results	X
Secondary column results	X
Endrin/DDT breakdown results	X
Instrument blanks	X
Analytical sequences	X
Initial and continuing calibration verification results	X
Calibration blank results	X
Instrument detection limits	X
ICP interference check sample results	X
ICP/mass spectrometry internal standard areas	X
ICP interelement correction factors, ICP linear ranges, ICP serial dilution results	X
Analysis run logs, extraction logs, preparation logs	X
Raw data	X
System performance checks (e.g., chromatography, instrument sensitivity drift, baseline shifts, negative absorbances)	X
Mass spectral identifications, target compound identifications	X
Retention time windows	X
Tentatively identified compounds (if applicable)	X

Abbreviations:
DDT = dichlorodiphenyltrichloroethane
DL = detection limit
ICP = inductively coupled plasma
RL = reporting limits
QC = quality control
SRM = standard reference material

7.5 Data Validation and Verification

Sample collection forms and field notes will be reviewed by the PM or designee and placed in the electronic Project files. Field data will be entered into an Excel spreadsheet (or alternate software) and verified to determine that entered data are correct and without omissions and errors.

Environmental analytical data generated under this SAP/QAPP will undergo EPA Stage 2B data validation. If serious deficiencies are noted during data validation, or if the intended use of the data changes from what is presented in this QAPP, then the Port may choose to have a Stage 4 data validation performed on specific datasets. Data validation will be performed in accordance with National Functional Guidelines (EPA 2020, 2020a, 2020b), SCUM, *Dredged Material Evaluation and Disposal Procedures User Manual* (DMMO 2021), and Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use (EPA 2009).

During EPA Stage 2B (SCUM QA1) data validation, the results of all sample-related and instrument QC forms are evaluated and used to assess and qualify sample results. Stage 2B data validation is performed primarily from information contained on sample result forms and sample related QC summary forms, including calibration information, and sample receipt information. Information contained on the forms is used to verify that QC samples were analyzed with the correct analytes at the proper frequency and concentration and that the QC was met. Raw data is not reviewed during the Stage 2B data validation process.

EPA Stage 4 (SCUM QA2) includes the Stage 2B validation elements, with the addition of an examination of sample and QC raw data and instrument printouts to check for technical, calculation, analyte identification, analyte quantitation, and transcription or reduction errors. At a minimum 10% of reported results on summary forms should be confirmed by recalculation.

Data validation findings, including qualification of data in accordance with the EPA National Functional Guidelines and a tabular summary of qualifiers and qualified data will be overseen by the QA Manager, who will conduct final review and confirmation of the validity of the data. A copy of the data validation report will be submitted by the QA Manager and will be presented as an appendix to the appropriate report. Data will be labeled according to EPA 2009. Data labels will be included with all reported data.

Laboratory data, which will be electronically provided and loaded into the database, will undergo a 10 percent check against the laboratory hard copy data. If errors are discovered, a 100 percent QC check will be performed and the findings will be communicated to the laboratory for resolution. Data will be validated or reviewed manually, and qualifiers, if assigned, will be entered manually. The accuracy of all manually entered data will be verified by a second party. Data tables will be exported from an EQuIS database to Microsoft Excel tables based on the requirements for reporting and data management and use.

8.0 REFERENCES

Anchor QEA, 2012a. *Budd Inlet Sediment Site Work Plan*. Prepared by Anchor QEA for Port of Olympia. October.

ASTM. 2017. Annual Book of ASTM Standards. In: *Soil and Rock (I).* West Conshohocken, PA: ASTM International.

Dalton, Olmstead & Fuglevand; Grette Associates; WestLand Engineering & Environmental Services, Inc.; Maul Foster & Alongi, Inc.; Crete Consulting, Inc., Moffat & Nichol; Thomas Architecture Studios; Landau Associates, Inc. 2023. Draft *Revised Identification and Evaluation of Interim Action Alternatives Memorandum, Budd Inlet Sediment Site, Olympia, Washington*. May 19.

DMMO. 2021. *Dredged Material Evaluation and Disposal Procedures User's Manual*. Prepared by US Army Corps of Engineers, Seattle District; US Environmental Protection Agency, Region 10; Washington Department of Natural Resources; Washington Department of Ecology. Dredged Material Management Office. July.

Ecology. 2008. Agreed Order No. DE 6083. Washington State Department of Ecology. October 2008.

Ecology. 2012. First Amendment to the Agreed Order No. DE 6083. Washington State Department of Ecology. February 2012.

Ecology 2013. Wood Waste Cleanup Identifying, Assessing, and Remediating Wood Waste in Marine and Freshwater Environments Guidance for Implementing the Cleanup Provisions of the Sediment Management Standards, Chapter 173-204 WAC. Washington State Department of Ecology. September.

Ecology. 2016a. Originally published in July 2004 and updated in December 2016. *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies*. Publication No. 04-03-030. Environmental Assessment Program, Washington State Department of Ecology. Manchester, Washington.

Ecology. 2016b. Washington State Water Quality Atlas. Washington State Department of Ecology. https://fortress.wa.gov/ecy/waterqualityatlas/map.aspx?CustomMap=y&RT=0&Layers=23,29&Filters=n,n,n,n. Accessed November 10, 2016.

Ecology. 2016c. Guidance for Remediation of Petroleum Contaminated Sites, Publication No. 10-09-057, Revised June 2016.

Ecology. 2021. *Sediment Cleanup User's Manual (SCUM)*. Third Revision. Publication No. 12-09-057. Washington State Department of Ecology. December.

Ecology. 2023. Second Amendment to Agreed Order No. DE 6083. Washington State Department of Ecology. June 9.

EPA. 2000. Guidance for Data Quality Assessment, Practical Methods for Data Analysis, EPA QA/G-9, QA00 Update. US Environmental Protection Agency. July.

EPA. 2009. *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use*. US Environmental Protection Agency, Office of Solid Waste and Emergency Response. EPA 540-R-08-005. January.

EPA. 2020. *National Functional Guidelines for Organic Superfund Methods Data Review*. US Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. EPA 540-R-2017-002. January.

EPA. 2020a. *National Functional Guidelines for Inorganic Superfund Methods Data Review*. US Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. EPA 542-R-20-006. November.

EPA. 2020b. *National Functional Guidelines for High Resolutions Superfund Methods Data Review*. US Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. EPA 542-R-20-007. November.

EPA. 2023. *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium (SW-846).* US Environmental Protection Agency. June 21.

PSEP. 1986. *Recommended protocols for measuring conventional sediment variables in Puget Sound. Final Report*. Prepared for US Environmental Protection Agency, Seattle, WA.

PSEP. 1997. Recommended Guidelines for Sampling Marine Sediment, Water Column, and Tissue in Puget Sound, April 1997. Prepared for the US Environmental Protection Agency Region 10, and the Puget Sound Water Quality Authority. Puget Sound Water Quality Authority, Olympia, Washington.

PSEP. 1997a. *Puget Sound Estuary Program: Recommended Guidelines for Measuring Metals Compounds in Puget Sound Sediment and Tissue Samples*. Prepared for the US Environmental Protection Agency Region 10, and the Puget Sound Water Quality Authority. Puget Sound Water Quality Authority, Olympia, Washington.

PSEP. 1997b. *Puget Sound Estuary Program: Recommended Protocols for Measuring Organics in Puget Sound Sediment and Tissue Samples*. Prepared for the US Environmental Protection Agency Region 10, and the Puget Sound Water Quality Authority. Puget Sound Water Quality Authority, Olympia, Washington.

USACE. 2021. *Dredged Material Evaluation and Disposal Procedures User Manual.* US Army Corps of Engineers. July.

USGS. 2006. *Deschutes Estuary Feasibility Study – Hydrodynamics and Sediment Transport Modeling. Final Report.* Available at: http://www.ga.wa.gov/CLAMP/HSTA.pdf. US Geological Survey.

Washington State Legislature. Washington Administrative Code Title 173. Ecology, Department of, Chapter 173-160. Minimum Standards for Construction and Maintenance of Wells. Last updated March 3, 2023.

Notes

1. **Horizontal Datum: Washington State Plane South, NAD83.**
2. **Background imagery: Google Earth Pro, 07/25/2022.**
3. **Source: Anchor QEA, Figure 2-3.**

Legend

- Project Area
- Federal Navigation Channel
- Port Management Area (PMA)
- Mean Higher High Waterline (MHHW)

N

0 600 1200
Scale in Feet

DOF DALTON OLMSTED FUGLEVAND
The Budd Inlet Team

PORT of OLYMPIA
Budd Inlet - Olympia, WA
SAP/QAPP

Budd Inlet Sub-Area 1
Project Area

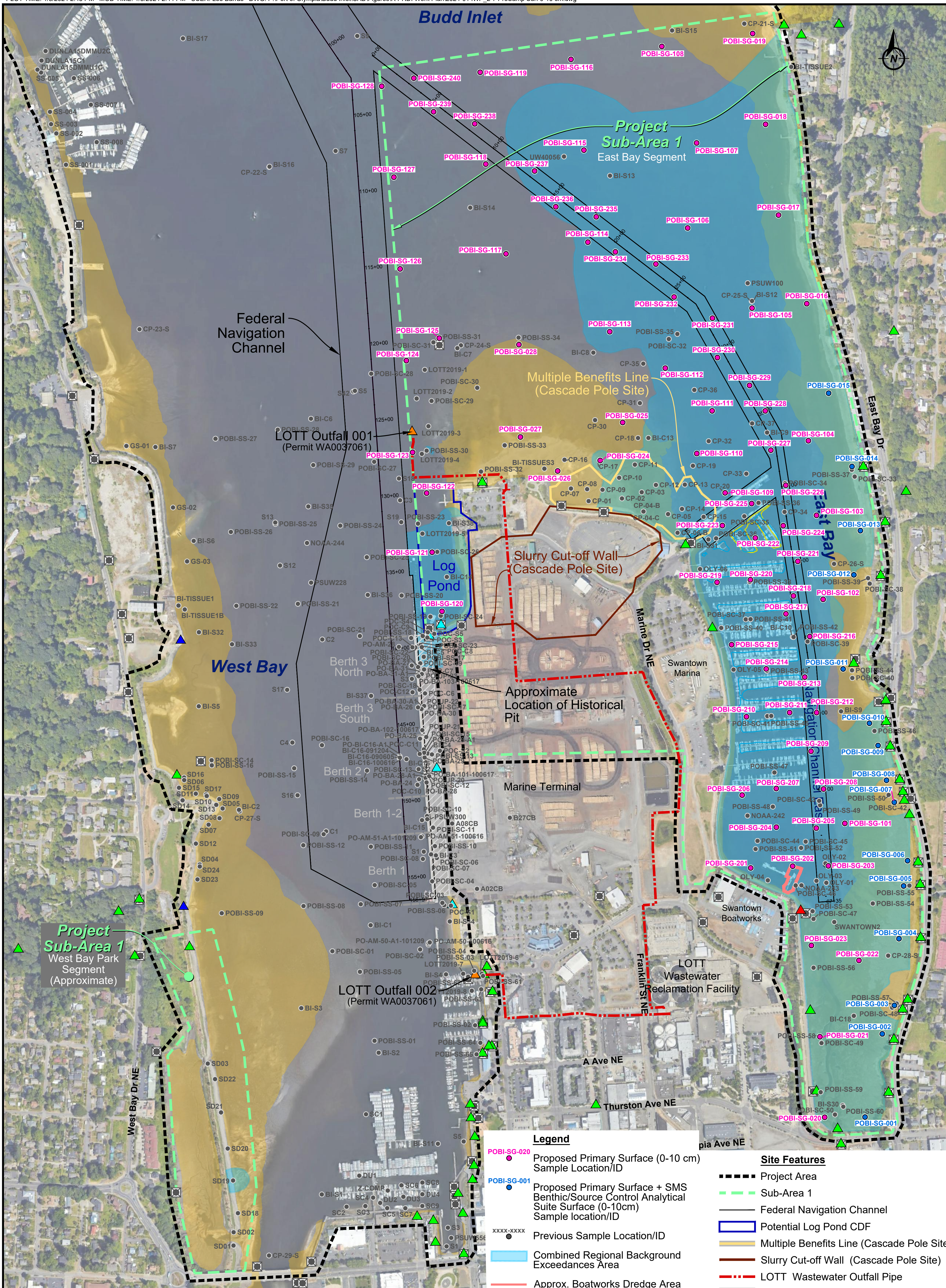
Figure
2-1

January 30, 2024

Grette Associates LLC ENVIRONMENTAL CONSULTANTS
WestLand 100% EMPLOYEE OWNED Engineering & Environmental Services, Inc.
MAUL FOSTER ALONGI
CRETE CONSULTING, INC.
moffatt & nichol
FAS
LANDAU ASSOCIATES

This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.
PLOT TIME: 9/15/2023 4:36 PM MOD TIME: 9/15/2023 4:35 PM USER: Lee Barras DWG: P:\Port of Olympia\Budd Inlet\CAD\Figures\2023 SAP-QAAP\2023-09-15 POBI-SAPQAPP Project Area.dwg

This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.
PLOT TIME: 1/5/2024 2:45 PM MOD TIME: 1/5/2024 2:44 PM USER: Lee Barras DWG: P:\Port of Olympia\Budd Inlet\CAD\Figures\R PRDI Work Plan\2024-01 IWP_2-7 ProSamp Surf 0-10 cm.dwg



Legend

- POBI-SG-020 — Proposed Primary Surface (0-10 cm) Sample Location/ID
- POBI-SG-001 — Proposed Primary Surface + SMS Benthic/Source Control Analytical Suite Surface (0-10cm) Sample location/ID
- xxxx-xxxx — Previous Sample Location/ID
- Combined Regional Background Exceedances Area
- Approx. Boatworks Dredge Area 2013/2014 (See note 1)
- Berth Delineation

Site Features

- Project Area
- Sub-Area 1
- Federal Navigation Channel
- Potential Log Pond CDF
- Multiple Benefits Line (Cascade Pole Site)
- Slurry Cut-off Wall (Cascade Pole Site)
- LOTT Wastewater Outfall Pipe
- Intertidal Sediments Area

Outfalls

- City of Olympia Stormwater Outfall
- LOTT Wastewater/CSO Outfall
- Industrial Outfall (Boatyard General Permit)
- Industrial Stormwater Outfall (NPDES General Permit)
- Historical Outfall (~2013)

Source: City of Olympia and Thurston County GIS - November 2023

0 600
Scale in Feet

Notes

1. Boatworks 2013 dredging permitted for 3,000 cy (JARPA NWS-2012-1098). Dredging reported to have occurred in late 2013 or early 2014 per November 29, 2013 Article in Dredging Today "Port of Olympia Dredging Project Starts (USA)".
2. Background imagery: Google Earth Pro, 07/25/2022.

DOF DALTON OLMSTED FUGLEVAND
The Budd Inlet Team

PORT of OLYMPIA
Budd Inlet - Olympia, WA
Project Sub-Area 1 Pre-Remedial Design Investigation Work Plan

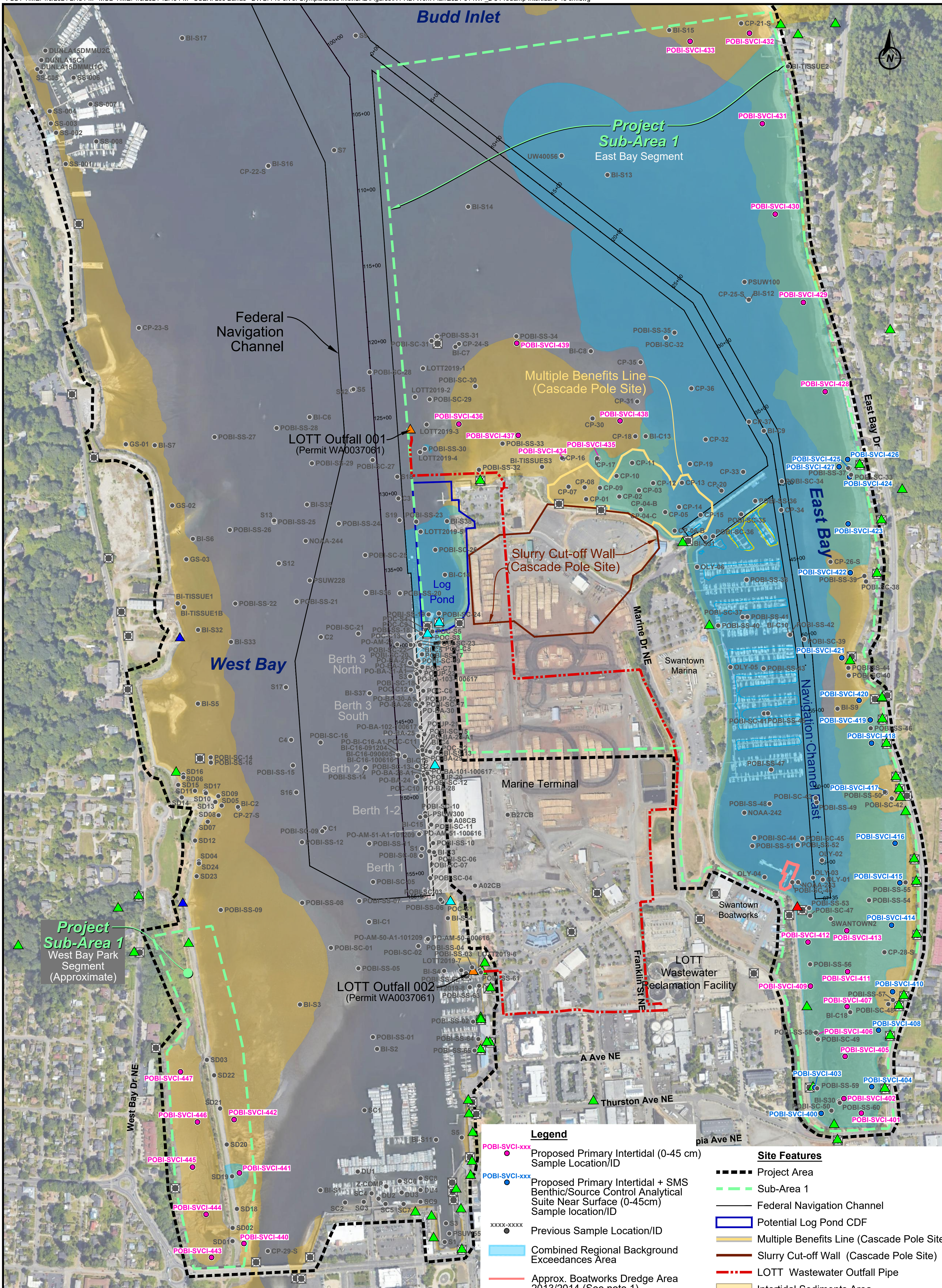
Proposed Surface (0-10 cm) Sediment Sample Locations

Figure 2-7

January 4, 2024

Grette Associates Environmental Consultants | WestLand | Maul Foster Alongi | CRETE Consulting | moffatt & nichol | IAS | LANDAU ASSOCIATES

PLOT TIME: 1/5/2024 2:45 PM MOD TIME: 1/5/2024 12:49 PM USER: Lee Barras DWG: P:\Port of Olympia\Budd Inlet\CAD\Figures\R PRDI Work Plan\2024-01 IWP_2-8 ProSamp Intertidal 0-45 cm.dwg



Outfalls

- City of Olympia Stormwater Outfall
- LOTT Wastewater/CSO Outfall
- Industrial Outfall (Boatyard General Permit)
- Industrial Stormwater Outfall (NPDES General Permit)
- Historical Outfall (~2013)

Source: City of Olympia and Thurston County GIS - November 2023

0 600
Scale in Feet

Notes

1. Boatworks 2013 dredging permitted for 3,000 cy (JARPA NWS-2012-1098). Dredging reported to have occurred in late 2013 or early 2014 per November 29, 2013 Article in Dredging Today "Port of Olympia Dredging Project Starts (USA)".
2. Background imagery: Google Earth Pro, 07/25/2022.

DOF DALTON OLMSTED FUGLEVAND
The Budd Inlet Team

PORT of OLYMPIA
Budd Inlet - Olympia, WA
Project Sub-Area 1 Pre-Remedial Design Investigation Work Plan

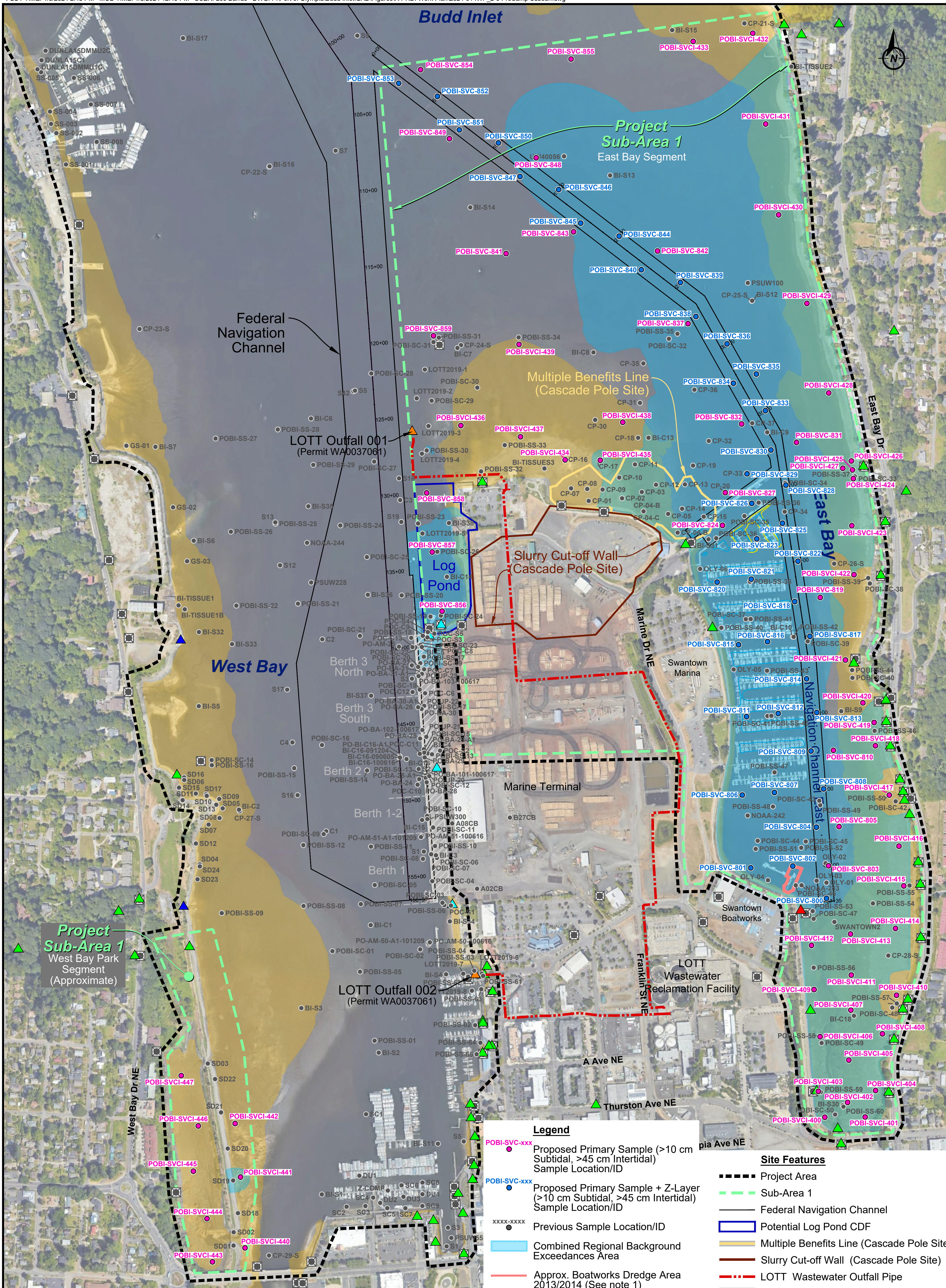
Proposed Intertidal Surface (0-45 cm) Sediment Sample Locations

Figure 2-8

January 4, 2024

Grette Associates ENVIRONMENTAL CONSULTANTS | WestLand | MAUL FOSTER ALONGI | CRETE | moffatt & nichol | LANDAU ASSOCIATES

This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.
PLOT TIME: 1/5/2024 2:45 PM MOD TIME: 1/5/2024 12:49 PM USER: Lee Barras DWG: P:\Port of Olympia\Budd Inlet\CAD\Figures\R PRDI Work Plan\2024-01 IWP_2-9 ProSamp Subsurf.dwg



Legend

- POBI-SVC-xxx — Proposed Primary Sample (>10 cm Subtidal, >45 cm Intertidal) Sample Location/ID
- POBI-SVC-xxx — Proposed Primary Sample + Z-Layer (>10 cm Subtidal, >45 cm Intertidal) Sample Location/ID
- xxxx-xxxx — Previous Sample Location/ID
- Combined Regional Background Exceedances Area
- Approx. Boatworks Dredge Area 2013/2014 (See note 1)
- Berth Delineation

Site Features

- Project Area
- Sub-Area 1
- Federal Navigation Channel
- Potential Log Pond CDF
- Multiple Benefits Line (Cascade Pole Site)
- Slurry Cut-off Wall (Cascade Pole Site)
- LOTT Wastewater Outfall Pipe
- Intertidal Sediments Area

Outfalls

- City of Olympia Stormwater Outfall
- LOTT Wastewater/CSO Outfall
- Industrial Outfall (Boatyard General Permit)
- Industrial Stormwater Outfall (NPDES General Permit)
- Historical Outfall (~2013)

Source: City of Olympia and Thurston County GIS - November 2023

0 600
Scale in Feet

Notes

1. Boatworks 2013 dredging permitted for 3,000 cy (JARPA NWS-2012-1098). Dredging reported to have occurred in late 2013 or early 2014 per November 29, 2013 Article in Dredging Today "Port of Olympia Dredging Project Starts (USA)".
2. Background imagery: Google Earth Pro, 07/25/2022.

DOF DALTON OLMSTED FUGLEVAND
The Budd Inlet Team

PORT of OLYMPIA
Budd Inlet - Olympia, WA
Project Sub-Area 1 Pre-Remedial Design Investigation Work Plan

Proposed Subsurface (>10 cm Subtidal, >45 cm Intertidal) Sample Locations

Figure 2-9

January 5, 2024

Grette Associates ENVIRONMENTAL CONSULTANTS · WestLand · MAUL FOSTER ALONGI · CRETE · moffatt & nichol · LANDAU ASSOCIATES

Table 2
Sample Containers, Preservatives, and Holding Times - Sediment
Port of Olympia Budd Inlet Sediment Site SAP/QAPP
Olympia, Washington

Parameter and Analytical Method	Container Size and Type (a)	Minimum Sample Size (b)	Holding Time	Preservative (c)	Laboratory
SVOCs/SVOC - cPAHs by EPA 8270E	8-oz glass jar	50-100g	14 days until extraction	Cool to 4°C ± 2°C	AR
			1 year until extraction	Freeze/-18°C	
			40 days after extraction	Cool to 4°C ± 2°C	
SVOCs/SVOC - cPAHs by EPA 8270E SIM	8-oz glass jar	100g	14 days until extraction	Cool to 4°C ± 2°C	AR
			1 year until extraction	Freeze/-18°C	
			40 days after extraction	Cool to 4°C ± 2°C	
Butyl tins by EPA 8270E SIM	8-oz glass jar	100g	14 days until extraction	Cool to 4°C ± 2°C	AR
			1 year until extraction	Freeze/-18°C	
			40 days after extraction	Cool to 4°C ± 2°C	
Organochlorine Pesticides by EPA 8081B	8-oz glass jar	50-100g	14 days until extraction	Cool to 4°C ± 2°C	AR
			1 year until extraction	Freeze/-18°C	
			40 days after extraction	Cool to 4°C ± 2°C	
PCBs - Aroclors by EPA 8082A	8-oz glass jar	50-100g	14 days until extraction	Cool to 4°C ± 2°C	AR
			1 year until extraction	Freeze/-18°C	
			40 days after extraction	Cool to 4°C ± 2°C	
PCBs - Congeners by EPA 1668C	8-oz glass jar	50-100g	14 days until extraction	Cool to 4°C ± 2°C	EA
			1 year until extraction	Freeze/-18°C	
			40 days after extraction	Cool to 4°C ± 2°C	
Dioxins and Furans by EPA 1613	8-oz amber glass jar	30g	14 days until extraction	Cool to 4°C ± 2°C	AR
			1 year until extraction	Freeze -18°C	
			40 days after extraction	Cool to 4°C ± 2°C	
Metals by EPA 6020B/EPA 6020 UCT-KED	4-oz glass jar	50g	6 months	Cool to 4°C ± 2°C	AR
			2 years	Freeze -18°C	
Mercury by EPA 7471B	4-oz glass jar	1g	28 days for Hg	Cool to 4°C ± 2°C	AR
			1 year	Freeze -18°C (d)	

Table 2
Sample Containers, Preservatives, and Holding Times - Sediment
Port of Olympia Budd Inlet Sediment Site SAP/QAPP
Olympia, Washington

Parameter and Analytical Method	Container Size and Type (a)	Minimum Sample Size (b)	Holding Time	Preservative (c)	Laboratory
Total Organic Carbon by EPA 9060A	8-oz glass jar	25g	28 days	Cool to 4°C ± 2°C	AR
			6 months	Freeze -18°C	
Total Volatile Solids by PSEP 1986	8-oz glass jar	50g	28 days	Cool to 4°C ± 2°C	AR
			6 months	Freeze -18°C	
Grain Size by PSEP-PS	4-oz glass jar	50g	6 months	Cool to 4°C ± 2°C	AR
Total Solids by SM 2540 G-97	8-oz glass jar	50g	14 days	Cool to 4°C ± 2°C	AR
			6 months	Freeze -18°C	
Ammonia by SM 4500-NH3	4-oz glass jar	25g	7 days	Cool to 4°C ± 2°C	AR
Total Sulfides by SM 4500-S2	4-oz glass jar	50g	7 days	Cool to 4°C ± 2°C, Zinc Acetate, no headspace	AR
Archive	8 or 16-oz glass jar[c]	location specific	14 days until extraction	Cool to 4°C ± 2°C	AR, EA
			1 year until extraction	Freeze -18°C	

Notes:

a) All sample containers will have lids with Teflon® inserts
b) Based on analytical suite and minimum sample size, methods may be combined into one sample container.
c) Thermal preservation based on SCUM Table 4-7.
d) Samples will be analyzed for mercury before freezing

Acronyms/Abbreviations:

°C = degrees Celsius
oz = ounce
g = gram
AR = Analytical Resources
EA = Enthalpy
PSEP = Puget Sound Estuary Protocols

Table 3
Analyte List, Analytical Methods, and Reporting Limits
Port of Olympia Budd Inlet Sediment Site SAP/QAPP
Olympia, Washington

Parameter Group	Parameter Type	Method	Parameter	MDL (a)	RL/PQL (a)	Units	Screening level (d)	Analytical Suite		
								Primary COCs (e)	Z Layer (f)	Source Control (g)
Conventionals	Conventionals	SM 4500-NH3 H-97	Ammonia	--	0.400	mg/kg	--	X	X	X
Conventionals	Conventionals	PSEP-PS	Grain Size	--	--	--	--	X	X	X
Conventionals	Conventionals	EPA 9060A	Total Organic Carbon	--	0.0200	%	--	X	X	X
Conventionals	Conventionals	SM 2540 G-97	Total Solids	--	0.04000	%	--	X	X	X
Conventionals	Conventionals	SM 4500-S2 D-00	Total Sulfides	--	1.00	mg/kg	--	X	X	X
Conventionals	Conventionals	PSEP 1986	Total Volatile Solids	0.01000	0.01000	%	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	1,2,3,4,6,7,8-HpCDD	0.56	2.50	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	1,2,3,4,6,7,8-HpCDF	0.21	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	1,2,3,4,7,8,9-HpCDF	0.24	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	1,2,3,4,7,8-HxCDD	0.17	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	1,2,3,4,7,8-HxCDF	0.28	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	1,2,3,6,7,8-HxCDD	0.18	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	1,2,3,6,7,8-HxCDF	0.2	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	1,2,3,7,8,9-HxCDD	0.22	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	1,2,3,7,8,9-HxCDF	0.19	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	1,2,3,7,8-PeCDD	0.17	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	1,2,3,7,8-PeCDF	0.24	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	2,3,4,6,7,8-HxCDF	0.17	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	2,3,4,7,8-PeCDF	0.22	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	2,3,7,8-TCDD	0.15	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	2,3,7,8-TCDF	0.058	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	OCDD	4.6	10.0	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	OCDF	1.1	2.50	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B - calc	Dioxin Furan TEQ	--	--	ng/kg	5	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	Total HpCDD	--	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	Total HpCDF	--	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	Total HxCDD	--	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	Total HxCDF	--	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	Total PeCDD	--	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	Total PeCDF	--	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	Total TCDD	--	1.00	ng/kg	--	X	X	X
Dioxin Furan	Dioxins Furans	EPA 1613B	Total TCDF	--	1.00	ng/kg	--	X	X	X
Metals	Metals	EPA 6020B	Antimony	0.102	0.200	mg/kg	150		X	
Metals	Metals	EPA 6020B UCT-KED	Arsenic	0.038	0.200	mg/kg	11	X	X	X
Metals	Metals	EPA 6020B UCT-KED	Cadmium	0.03	0.100	mg/kg	0.8	X	X	X
Metals	Metals	EPA 6020B	Chromium	0.26	0.500	mg/kg	260		X	X
Metals	Metals	EPA 6020B UCT-KED	Copper	0.174	0.500	mg/kg	390		X	X
Metals	Metals	EPA 6020B	Lead	0.052	0.100	mg/kg	450		X	X
Metals	Metals	EPA 7471B	Mercury	0.00525	0.0250	mg/kg	0.2	X	X	X
Metals	Metals	EPA 6020B UCT-KED	Selenium	0.18	0.500	mg/kg	3		X	
Metals	Metals	EPA 6020B UCT-KED	Silver	0.022	0.200	mg/kg	6.1		X	X
Metals	Metals	EPA 6020B UCT-KED	Zinc	2.92	6.00	mg/kg	410		X	X
Organochlorine Pesticides	Organochlorine Pesticides	EPA 8081B	4,4-DDD	0.32	1.00	µg/kg	16		X	
Organochlorine Pesticides	Organochlorine Pesticides	EPA 8081B	4,4-DDE	0.135	1.00	µg/kg	9		X	
Organochlorine Pesticides	Organochlorine Pesticides	EPA 8081B	4,4-DDT	0.325	1.00	µg/kg	12		X	
Organochlorine Pesticides	Organochlorine Pesticides	EPA 8081B - calc	Total DDD, DDE, DDT	--	--	µg/kg	50		X	
Organochlorine Pesticides	Organochlorine Pesticides	EPA 8081B	Aldrin	0.369	0.500	µg/kg	9.5		X	
Organochlorine Pesticides	Organochlorine Pesticides	EPA 8081B	cis-Chlordane (alpha-chlordane)	0.111	0.500	µg/kg	(h)		X	
Organochlorine Pesticides	Organochlorine Pesticides	EPA 8081B	Dieldrin	0.115	1.00	µg/kg	1.9		X	
Organochlorine Pesticides	Organochlorine Pesticides	EPA 8081B	Heptachlor	0.0464	0.500	µg/kg	1.5		X	

Table 3
Analyte List, Analytical Methods, and Reporting Limits
Port of Olympia Budd Inlet Sediment Site SAP/QAPP
Olympia, Washington

Parameter Group	Parameter Type	Method	Parameter		MDL (a)	RL/PQL (a)	Units	Screening level (d)	Analytical Suite		
									Primary COCs (e)	Z Layer (f)	Source Control (g)
Organochlorine Pesticides	Organochlorine Pesticides	EPA 8081B	trans-Chlordane (beta-Chlordane)		0.327	0.500	µg/kg	(h)		X	
SVOCs	Chlorinated Hydrocarbons	EPA 8270E SIM	1,2,4-Trichlorobenzene	(b)	2.68	5.00	µg/kg	31		X	X
SVOCs	Chlorinated Hydrocarbons	EPA 8270E SIM	1,2-Dichlorobenzene	(b)	0.740	5.00	µg/kg	35		X	X
SVOCs	Chlorinated Hydrocarbons	EPA 8270E SIM	1,4-Dichlorobenzene	(b)	0.600	5.00	µg/kg	110		X	X
SVOCs	Chlorinated Hydrocarbons	EPA 8270E SIM	Hexachlorobenzene	(b)	0.700	5.00	µg/kg	22		X	X
SVOCs	Miscellaneous Extractables	EPA 8270E SIM	Benzoic acid	(b)	13.4	100	µg/kg	650		X	X
SVOCs	Miscellaneous Extractables	EPA 8270E SIM	Benzyl Alcohol	(b)	2.48	20.0	µg/kg	57		X	X
SVOCs	Miscellaneous Extractables	EPA 8270E SIM	Dibenzofuran	(b)	1.38	5.00	µg/kg	540		X	X
SVOCs	Miscellaneous Extractables	EPA 8270E SIM	Hexachlorobutadiene	(b)	0.72	5.00	µg/kg	11		X	X
SVOCs	Miscellaneous Extractables	EPA 8270E SIM	N-Nitrosodiphenylamine	(b)	3.05	25	µg/kg	28		X	X
SVOCs	PAHs	EPA 8270E SIM	2-Methylnaphthalene	(b)	1.10	5.00	µg/kg	670		X	X
SVOCs	PAHs	EPA 8270E SIM	Acenaphthene	(b)	0.571	5.00	µg/kg	500		X	X
SVOCs	PAHs	EPA 8270E SIM	Acenaphthylene	(b)	1.08	5.00	µg/kg	1300		X	X
SVOCs	PAHs	EPA 8270E SIM	Anthracene	(b)	0.871	5.00	µg/kg	960		X	X
SVOCs	cPAHs	EPA 8270E SIM	Benzo(a)anthracene	(b)	0.824	5.00	µg/kg	1300	X	X	X
SVOCs	cPAHs	EPA 8270E SIM	Benzo(a)pyrene	(b)	0.614	5.00	µg/kg	1600	X	X	X
SVOCs	cPAHs	EPA 8270E SIM	Benzo(b)fluoranthene		1.37	5.00	µg/kg	3200	X	X	X
SVOCs	PAHs	EPA 8270E SIM	Benzo(g,h,i)perylene	(b)	1.06	5.00	µg/kg	670		X	X
SVOCs	PAHs	EPA 8270E SIM	Benzo(j)fluoranthene		0.68	5.00	µg/kg	3200		X	X
SVOCs	cPAHs	EPA 8270E SIM	Benzo(k)fluoranthene		0.76	5.00	µg/kg	3200	X	X	X
SVOCs	cPAHs	EPA 8270E SIM	Chrysene	(b)	1.05	5.00	µg/kg	1400	X	X	X
SVOCs	cPAHs	EPA 8270E SIM	Dibenzo(a,h)anthracene	(b)	0.891	5.00	µg/kg	230	X	X	X
SVOCs	PAHs	EPA 8270E SIM	Fluoranthene	(b)	0.470	5.00	µg/kg	1700		X	X
SVOCs	PAHs	EPA 8270E SIM	Fluorene	(b)	0.631	5.00	µg/kg	540		X	X
SVOCs	cPAHs	EPA 8270E SIM	Indeno(1,2,3-cd)pyrene	(b)	1.05	5.00	µg/kg	600	X	X	X
SVOCs	PAHs	EPA 8270E SIM	Naphthalene	(b)	1.28	5.00	µg/kg	2100		X	X
SVOCs	PAHs	EPA 8270E SIM	Phenanthrene	(b)	0.718	5.00	µg/kg	1500		X	X
SVOCs	PAHs	EPA 8270E SIM	Pyrene	(b)	0.626	5.00	µg/kg	2600		X	X
SVOCs	cPAHs	EPA 8270 - calc	cPAH TEQ		--	--	µg/kg	21	X		
SVOCs	PAHs	EPA 8270 - calc	HPAHs, Total		--	--	µg/kg	12000		X	X
SVOCs	PAHs	EPA 8270 - calc	LPAHs, Total		--	--	µg/kg	5200		X	X
SVOCs	Phenols	EPA 8270E SIM	2,4-Dimethylphenol	(b)	2.17	20.0	µg/kg	29		X	X
SVOCs	Phenols	EPA 8270E SIM	2-Methylphenol	(b)	1.10	5.00	µg/kg	63		X	X
SVOCs	Phenols	EPA 8270E SIM	4-Methylphenol	(b)	0.88	5.00	µg/kg	670		X	X
SVOCs	Phenols	EPA 8270E SIM	Pentachlorophenol	(b)	2.13	20	µg/kg	100 (i)	X	X	X
SVOCs	Phenols	EPA 8270E SIM	Phenol	(b)	2.23	5.00	µg/kg	420		X	X
SVOCs	Phthalates	EPA 8270E	bis(2-Ethylhexyl)phthalate		5.46	50.0	µg/kg	1300		X	X
SVOCs	Phthalates	EPA 8270E SIM	Butylbenzylphthalate	(b)	0.68	5.00	µg/kg	63		X	X
SVOCs	Phthalates	EPA 8270E SIM	Diethyl phthalate	(b)	4.81	20.0	µg/kg	200		X	X
SVOCs	Phthalates	EPA 8270E SIM	Dimethylphthalate	(b)	1.00	5.00	µg/kg	71		X	X
SVOCs	Phthalates	EPA 8270E	Di-n-Butylphthalate		5.61	20.0	µg/kg	1400		X	X
SVOCs	Phthalates	EPA 8270E	Di-n-Octylphthalate		4.39	20.0	µg/kg	6200		X	X
SVOCs - Butyltins	Butyltins	EPA 8270E SIM	Tributyltin Ion		0.45	3.86	µg/kg	73		X	
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',4,4',5,5'-Heptachlorobiphenyl (PCB 189)	(c)	0.585	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',4,4',5-Hexachlorobiphenyl (PCB 156)	(c)	0.874	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',4,4',5'-Hexachlorobiphenyl (PCB 157)	(c)	0.811	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',4,4'-Pentachlorobiphenyl (PCB 105)	(c)	0.656	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3',4,4',5,5'-Hexachlorobiphenyl (PCB 167)	(c)	0.788	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3',4,4',5-Pentachlorobiphenyl (PCB 106/118)	(c)	0.731	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,4,4',5-Pentachlorobiphenyl (PCB 114)	(c)	0.321	2.50	pg/g	--	X	X	X

Table 3
Analyte List, Analytical Methods, and Reporting Limits
Port of Olympia Budd Inlet Sediment Site SAP/QAPP
Olympia, Washington

Parameter Group	Parameter Type	Method	Parameter		MDL (a)	RL/PQL (a)	Units	Screening level (d)	Analytical Suite		
									Primary COCs (e)	Z Layer (f)	Source Control (g)
PCBs - Congeners	PCBs - Congeners	EPA 1668	2',3,4,4',5-Pentachlorobiphenyl (PCB 123)	(c)	1.04	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	3,3',4,4',5,5'-Hexachlorobiphenyl (PCB 169)	(c)	0.659	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	3,3',4,4',5-Pentachlorobiphenyl (PCB 126)	(c)	0.681	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	3,3',4,4'-Tetrachlorobiphenyl (PCB 77)	(c)	0.875	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	3,4,4',5- Tetrachlorobiphenyl (PCB 81)	(c)	0.703	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2-Chlorobiphenyl (PCB-1)		0.937	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	3-Chlorobiphenyl (PCB-2)		0.842	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	3-Chlorobiphenyl (PCB-3)		0.839	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2'-Dichlorobiphenyl / 2,6-Dichlorobiphenyl (PCB-4/10)		1.86	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3-Dichlorobiphenyl / 2,4'-Dichlorobiphenyl (PCB-5/8)		1.89	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3'-Dichlorobiphenyl (PCB-6)		1.13	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,4-Dichlorobiphenyl / 2,5-Dichlorobiphenyl (PCB-7/9)		1.52	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	3,3'-Dichlorobiphenyl (PCB-11)		2.97	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	3,4-Dichlorobiphenyl / 3,4'-Dichlorobiphenyl (PCB-12/13)		1.71	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	3,5-Dichlorobiphenyl (PCB-14)		0.907	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	4,4'-Dichlorobiphenyl (PCB-15)		0.759	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3-Trichlorobiphenyl / 2,4',6-Trichlorobiphenyl (PCB-16/32)		1.14	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',4-Trichlorobiphenyl (PCB-17)		0.606	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',5-Trichlorobiphenyl (PCB-18)		0.598	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',6-Trichlorobiphenyl (PCB-19)		0.444	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3'-Trichlorobiphenyl / 2,3,4-Trichlorobiphenyl / 2,3',4'-Trichlorobiphenyl (PCB-20/21/33)		2.03	7.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,4'-Trichlorobiphenyl (PCB-22)		1.25	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,5-Trichlorobiphenyl (PCB-23)		1.04	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,6-Trichlorobiphenyl / 2,3',6-Trichlorobiphenyl (PCB-24/27)		0.957	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3',4-Trichlorobiphenyl (PCB-25)		0.922	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3',5-Trichlorobiphenyl (PCB-26)		0.81	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,4,4'-Trichlorobiphenyl (PCB-28)		0.984	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,4,5-Trichlorobiphenyl (PCB-29)		0.734	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,4,6-Trichlorobiphenyl (PCB-30)		0.499	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,4',5-Trichlorobiphenyl (PCB-31)		0.855	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3',5'-Trichlorobiphenyl (PCB-34)		0.726	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	3,3',4-Trichlorobiphenyl (PCB-35)		0.68	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	3,3',5-Trichlorobiphenyl (PCB-36)		0.732	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	3,4,4'-Trichlorobiphenyl (PCB-37)		0.804	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	3,4,5-Trichlorobiphenyl (PCB-38)		0.746	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	3,4',5-Trichlorobiphenyl (PCB-39)		0.678	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3'-Tetrachlorobiphenyl (PCB-40)		0.979	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4-Tetrachlorobiphenyl / 2,3,4',6-Tetrachlorobiphenyl / 2,3',4',6-Tetrachlorobiphenyl / 2,3',5,5'-Tetrachlorobiphenyl (PCB-41/64/71/72)		1.88	10.0	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4'-Tetrachlorobiphenyl / 2,3,3',6-Tetrachlorobiphenyl (PCB-42/59)		1.43	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,5-Tetrachlorobiphenyl / 2,2',4,5'-Tetrachlorobiphenyl (PCB-43/49)		1.29	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,5'-Tetrachlorobiphenyl (PCB-44)		0.972	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,6-Tetrachlorobiphenyl (PCB-45)		0.754	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,6'-Tetrachlorobiphenyl (PCB-46)		0.656	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',4,4'-Tetrachlorobiphenyl (PCB-47)		0.829	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',4,5-Tetrachlorobiphenyl / 2,4,4',6-Tetrachlorobiphenyl (PCB-48/75)		1.12	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',4,6-Tetrachlorobiphenyl (PCB-50)		0.701	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',4,6'-Tetrachlorobiphenyl (PCB-51)		0.756	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',5,5'-Tetrachlorobiphenyl / 2,3',4,6-Tetrachlorobiphenyl (PCB-52/69)		1.23	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',5,6'-Tetrachlorobiphenyl (PCB-53)		0.852	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',6,6'-Tetrachlorobiphenyl (PCB-54)		0.735	2.50	pg/g	--	X	X	X

Table 3
Analyte List, Analytical Methods, and Reporting Limits
Port of Olympia Budd Inlet Sediment Site SAP/QAPP
Olympia, Washington

Parameter Group	Parameter Type	Method	Parameter	MDL (a)	RL/PQL (a)	Units	Screening level (d)	Analytical Suite		
								Primary COCs (e)	Z Layer (f)	Source Control (g)
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',4-Tetrachlorobiphenyl (PCB-55)	0.574	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',4'-Tetrachlorobiphenyl / 2,3,4,4'-Tetrachlorobiphenyl (PCB-56/60)	1.09	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',5-Tetrachlorobiphenyl (PCB-57)	0.746	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',5'-Tetrachlorobiphenyl (PCB-58)	0.546	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,4,5-Tetrachlorobiphenyl / 2,3',4',5-Tetrachlorobiphenyl (PCB-61/70)	1.02	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,4,6-Tetrachlorobiphenyl (PCB-62)	0.686	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,4',5-Tetrachlorobiphenyl (PCB-63)	0.676	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,5,6-Tetrachlorobiphenyl (PCB-65)	0.546	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3',4,5-Tetrachlorobiphenyl (PCB-67)	0.792	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3',4,5'-Tetrachlorobiphenyl (PCB-68)	0.783	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3',5',6-Tetrachlorobiphenyl (PCB-73)	0.791	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,4,4',5-Tetrachlorobiphenyl (PCB-74)	0.675	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3',4,4'-Tetrachlorobiphenyl / 2,3',4',5'-Tetrachlorobiphenyl (PCB-76/66)	1.12	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	3,3',4,5-Tetrachlorobiphenyl (PCB-78)	0.653	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	3,3',4,5'-Tetrachlorobiphenyl (PCB-79)	0.656	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	3,3',5,5'-Tetrachlorobiphenyl (PCB-80)	0.488	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4-Pentachlorobiphenyl (PCB-82)	0.776	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',5-Pentachlorobiphenyl (PCB-83)	0.689	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',6-Pentachlorobiphenyl / 2,2',3,5,5'-Pentachlorobiphenyl (PCB-84/92)	1.04	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,4'-Pentachlorobiphenyl / 2,3,4,5,6-Pentachlorobiphenyl (PCB-85/116)	1.12	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,5-Pentachlorobiphenyl (PCB-86)	1.11	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,5'-Pentachlorobiphenyl / 2,3,4',5,6-Pentachlorobiphenyl / 2,3',4',5',6-Pentachlorobiphenyl (PCB-87/117/125)	1.16	7.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,6-Pentachlorobiphenyl / 2,2',3,4',6-Pentachlorobiphenyl (PCB-88/91)	1.40	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,6'-Pentachlorobiphenyl (PCB-89)	0.512	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4',5-Pentachlorobiphenyl / 2,2',4,5,5'-Pentachlorobiphenyl (PCB-90/101)	0.740	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,5,6-Pentachlorobiphenyl (PCB-93)	1.30	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,5,6'-Pentachlorobiphenyl (PCB-94)	0.889	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,5',6-Pentachlorobiphenyl / 2,2',3,4',6'-Pentachlorobiphenyl / 2,2',4,5,6'-Pentachlorobiphenyl (PCB-95/98/102)	1.56	7.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,6,6'-Pentachlorobiphenyl (PCB-96)	0.700	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4',5'-Pentachlorobiphenyl (PCB-97)	0.597	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',4,4',5-Pentachlorobiphenyl (PCB-99)	0.808	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',4,4',6-Pentachlorobiphenyl (PCB-100)	0.631	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',4,5',6-Pentachlorobiphenyl (PCB-103)	0.846	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',4,6,6'-Pentachlorobiphenyl (PCB-104)	0.700	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',4',5-Pentachlorobiphenyl / 2,3,3',4,6-Pentachlorobiphenyl (PCB-107/109)	0.820	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',4,5'-Pentachlorobiphenyl / 2,3,3',5,6-Pentachlorobiphenyl (PCB-108/112)	0.952	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',4',6-Pentachlorobiphenyl (PCB-110)	0.845	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',5,5'-Pentachlorobiphenyl / 2,3,4,4',6-Pentachlorobiphenyl (PCB-111/115)	0.980	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',5',6-Pentachlorobiphenyl (PCB-113)	0.565	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3',4,4',6-Pentachlorobiphenyl (PCB-119)	0.595	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3',4,5,5'-Pentachlorobiphenyl (PCB-120)	0.562	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3',4,5',6-Pentachlorobiphenyl (PCB-121)	0.598	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',4',5'-Pentachlorobiphenyl (PCB-122)	0.772	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3',4',5,5'-Pentachlorobiphenyl (PCB-124)	0.527	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	3,3',4,5,5'-Pentachlorobiphenyl (PCB-127)	0.805	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,4'-Hexachlorobiphenyl / 2,3,3',4',5,5'-Hexachlorobiphenyl (PCB-128/162)	1.06	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,5-Hexachlorobiphenyl (PCB-129)	0.835	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,5'-Hexachlorobiphenyl (PCB-130)	0.755	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,6-Hexachlorobiphenyl / 2,2',3,3',5,5'-Hexachlorobiphenyl (PCB-131/133)	1.15	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,6'-Hexachlorobiphenyl / 2,3,3',4',5,5'-Hexachlorobiphenyl (PCB-132/161)	1.24	5.00	pg/g	--	X	X	X

Table 3
Analyte List, Analytical Methods, and Reporting Limits
Port of Olympia Budd Inlet Sediment Site SAP/QAPP
Olympia, Washington

Parameter Group	Parameter Type	Method	Parameter	MDL (a)	RL/PQL (a)	Units	Screening level (d)	Analytical Suite		
								Primary COCs (e)	Z Layer (f)	Source Control (g)
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',5,6-Hexachlorobiphenyl / 2,2',3,4,5,6'-Hexachlorobiphenyl (PCB-134/143)	1.23	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',5,6'-Hexachlorobiphenyl (PCB-135)	0.967	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',6,6'-Hexachlorobiphenyl (PCB-136)	0.626	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,4',5-Hexachlorobiphenyl (PCB-137)	0.862	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,4',5'-Hexachlorobiphenyl / 2,3,3',4',5,6-Hexachlorobiphenyl / 2,3,3',4',5',6-Hexachlorobiphenyl (PCB-138/163/164)	1.51	7.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,4',6-Hexachlorobiphenyl / 2,2',3,4',5',6-Hexachlorobiphenyl (PCB-139/149)	1.54	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,4',6'-Hexachlorobiphenyl (PCB-140)	1.20	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,5,5'-Hexachlorobiphenyl (PCB-141)	0.474	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,5,6-Hexachlorobiphenyl (PCB-142)	0.750	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,5',6-Hexachlorobiphenyl (PCB-144)	0.860	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,6,6'-Hexachlorobiphenyl (PCB-145)	0.847	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4',5,5'-Hexachlorobiphenyl / 2,3,3',5,5',6-Hexachlorobiphenyl (PCB-146/165)	1.09	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4',5,6-Hexachlorobiphenyl (PCB-147)	0.906	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4',5,6'-Hexachlorobiphenyl (PCB-148)	0.748	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4',6,6'-Hexachlorobiphenyl (PCB-150)	0.493	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,5,5',6-Hexachlorobiphenyl (PCB-151)	0.783	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,5,6,6'-Hexachlorobiphenyl (PCB-152)	0.774	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',4,4',5,5'-Hexachlorobiphenyl (PCB-153)	0.599	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',4,4',5,6'-Hexachlorobiphenyl (PCB-154)	0.838	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',4,4',6,6'-Hexachlorobiphenyl (PCB-155)	0.639	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',4,4',6-Hexachlorobiphenyl / 2,3,3',4,5,6-Hexachlorobiphenyl (PCB-158/160)	1.04	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',4,5,5'-Hexachlorobiphenyl (PCB-159)	0.497	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,4,4',5,6-Hexachlorobiphenyl (PCB-166)	0.601	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3',4,4',5',6-Hexachlorobiphenyl (PCB-168)	0.657	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,4',5-Heptachlorobiphenyl (PCB-170)	0.802	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,4',6-Heptachlorobiphenyl (PCB-171)	0.741	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,5,5'-Heptachlorobiphenyl (PCB-172)	0.698	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,5,6-Heptachlorobiphenyl (PCB-173)	0.736	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,5,6'-Heptachlorobiphenyl (PCB-174)	0.768	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,5',6-Heptachlorobiphenyl (PCB-175)	0.717	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,6,6'-Heptachlorobiphenyl (PCB-176)	0.857	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,5',6'-Heptachlorobiphenyl (PCB-177)	0.714	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',5,5',6-Heptachlorobiphenyl (PCB-178)	0.580	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',5,6,6'-Heptachlorobiphenyl (PCB-179)	0.753	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,4',5,5'-Heptachlorobiphenyl (PCB-180)	0.495	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,4',5,6-Heptachlorobiphenyl (PCB-181)	0.652	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,4',5,6'-Heptachlorobiphenyl / 2,2',3,4',5,5',6-Heptachlorobiphenyl (PCB-182/187)	1.38	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,4',5',6-Heptachlorobiphenyl (PCB-183)	0.723	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,4',6,6'-Heptachlorobiphenyl (PCB-184)	0.746	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,5,5',6-Heptachlorobiphenyl (PCB-185)	0.799	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,5,6,6'-Heptachlorobiphenyl (PCB-186)	0.625	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4',5,6,6'-Heptachlorobiphenyl (PCB-188)	0.636	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',4,4',5,6-Heptachlorobiphenyl (PCB-190)	0.712	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',4,4',5',6-Heptachlorobiphenyl (PCB-191)	0.513	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',4,5,5',6-Heptachlorobiphenyl (PCB-192)	0.553	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',4',5,5',6-Heptachlorobiphenyl (PCB-193)	0.598	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,4',5,5'-Octachlorobiphenyl (PCB-194)	0.707	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,4',5,6-Octachlorobiphenyl (PCB-195)	0.735	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,4',5,6'-Octachlorobiphenyl (PCB-196/203)	1.29	5.00	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,4',6,6'-Octachlorobiphenyl (PCB-197)	0.514	2.50	pg/g	--	X	X	X

Table 3
Analyte List, Analytical Methods, and Reporting Limits
Port of Olympia Budd Inlet Sediment Site SAP/QAPP
Olympia, Washington

Parameter Group	Parameter Type	Method	Parameter	MDL (a)	RL/PQL (a)	Units	Screening level (d)	Analytical Suite		
								Primary COCs (e)	Z Layer (f)	Source Control (g)
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,5,5',6-Octachlorobiphenyl (PCB-198)	1.05	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,5,5',6'-Octachlorobiphenyl (PCB-199)	0.999	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,5,6,6'-Octachlorobiphenyl (PCB-200)	0.649	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,5',6,6'-Octachlorobiphenyl (PCB-201)	0.786	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',5,5',6,6'-Octachlorobiphenyl (PCB-202)	0.523	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,4,4',5,6,6'-Octachlorobiphenyl (PCB-204)	0.486	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,3,3',4,4',5,5',6-Octachlorobiphenyl (PCB-205)	1.03	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl (PCB-206)	0.806	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl (PCB-207)	0.717	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl (PCB-208)	0.610	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668	Decachlorobiphenyl (PCB-209)	0.610	2.50	pg/g	--	X	X	X
PCBs - Congeners	PCBs - Congeners	EPA 1668 - Calc	Dioxin-like PCB TEQ	--	--	pg/g	0.7	X		
PCBs - Congeners	PCBs - Congeners	EPA 1668 - Calc	Total PCBs (209 congeners) (j)	--	--	µg/kg	130		X	X

Notes:

a) Laboratory limits are from Analytical Resources, Inc except for PCB - Congeners by EPA 1668C which are from Enthalpy Analytical. Limits may be updated annually based on laboratory studies. Limit updates will be submitted to Ecology for review and approval before the affected sampling activity.

b) Parameter is offered by more the one mode (e.g. EPA 8270E scan and SIM), and final mode selection may be driven by achievable reporting limits as well as the analytical suite for the sample. The mode with the lowest available reporting limits is shown.

c) Dioxin-like PCB congener.

d) Screening levels were developed to identify appropriate laboratory analytical limits, and are based on the following as indicated with shading:

1. SCUM Table 11-1 PQL
2. SCUM Table 8-1 marine criteria
3. DMMP Table 8-3 marine criteria
4. SCUM Table 10-1 natural background

e) Primary COC suite includes dioxins/furans (dioxin TEQ), cPAHs, dioxin-like PCB TEQ, pentachlorophenol, arsenic, cadmium, and mercury.

f) Z layer suite consists of the DMMP Table 8-3 marine suite.

g) Source control suite consists of 1) the Sediment Management Standards marine suite (SCUM Table 8-1) developed for protection of the benthic community and 2) primary COCs.

h) Screening level for total chlordanes (cis-chlordane plus trans-chlordane) is 2.8 µg/kg.

i) Using Option 1 SCUM (Chapter 9), a risk-based pentachlorophenol screening level in sediment defaults to the practical quantitation limit (PQL) of the analysis, which is anticipated to not be higher than 100 µg/kg for this project.

j) Total PCBs will be compared with Total PCB Aroclors-based screening level.

Acronyms/Abbreviations:

-- = not applicable
µg/kg = micrograms per kilogram
cPAH = carcinogenic polycyclic aromatic hydrocarbon
DMMP = Dredged Material Management Program
EPA = US Environmental Protection Agency
MDL = method detection limit
mg/kg = milligrams per kilogram
N/A = not applicable
ng/kg = nanograms per kilogram
pg/g = picograms per gram
PCBs = polychlorinated biphenyls
PQL = practical quantitation limit
RL = reporting limit
SIM = selected ion monitoring
SVOCs = semivolatile organic compounds
UCT-KED = universal cell technology-kinetic energy discrimination

Table 4
Quality Control Frequency
Port of Olympia Budd Inlet Sediment Site SAP/QAPP
Olympia, Washington

QC Check	Frequency
Organics	
Initial Calibration	Before sample analysis and when continuing calibration does not meet method requirements
Continuing Calibration	Method-specific
Method Blanks	One per sample batch or every 20 samples, whichever is more frequent, or when there is a change in reagents
Laboratory Replicates or Matrix Spike Duplicates	One duplicate analysis with every sample batch or every 20 samples, whichever is more frequent
Matrix Spikes	One per sample batch or every 20 samples, whichever is more frequent
Surrogate Spikes	Added to every organics sample as specified in analytical protocol
Laboratory Control Samples	One per analytical batch or every 20 samples, whichever is more frequent
Standard Reference Material	As specified in Work Plan
Field Duplicates	1 per every 20 samples
Inorganics	
Initial Calibration	Daily
Initial Calibration Verification	Immediately after initial calibration
Continuing Calibration Verification	After every 10 samples or every 2 hours, whichever is more frequent, and after the last sample
Initial and Continuing Calibration Blanks	Immediately after initial calibration, then 10% of samples or every 2 hours, whichever is more frequent, and after the last sample
ICP Interelement Interference Check Samples	At the beginning and end of each analytical sequence or twice per 8-hour shift, whichever is more frequent
Spectral Interference Check	For UCT-KED, at beginning of analytical run and every 12 hours
Method Blanks	With every sample batch or every 20 samples, whichever is more frequent
Laboratory Replicates or Matrix Spike Duplicates	One duplicate analysis with every sample batch or every 20 samples, whichever is more frequent
Matrix Spikes	With every sample batch or every 20 samples, whichever is more frequent
Field Duplicates	1 per every 20 samples
Laboratory Control Samples	One per analytical batch or every 20 samples, whichever is more frequent
Standard Reference Material	As specified in Work Plan

Table 4
Quality Control Frequency
Port of Olympia Budd Inlet Sediment Site SAP/QAPP
Olympia, Washington

High Resolution Analytical Methods	
Ongoing Precision and Recovery	1 per analytical batch (< 20 samples)
Stable-isotope- labeled compounds	Spiked into each sample for every target analyte
Sample target analyte Ion abundance ratios	All detected analytes for all samples
Method blank	One per analytical batch (<20 samples)
GC/MS Tune	At the beginning of each 12 hour shift; must start and end each analytical sequence
Initial Calibration	Initially and when continuing calibration fails
Window Defining/Column Performance Mix	Before every initial and continuing calibration
Continuing Calibration	Must start and end each analytical sequence
Confirmation of 2,3,7,8-TCDF	For all primary column detections of 2,3,7,8-TCDF
Sample data not achieving target reporting limits or method performance in presence of possibly interfering compounds	Not applicable
Sediment Reference Material	One per analytical project

Acronyms/Abbreviations:

GC/MS = gas chromatography/mass spectrometry
ICP = inductively coupled plasma
QC = quality control

Table 5
Measurement Quality Objectives
Port of Olympia Budd Inlet Sediment Site SAP/QAPP
Olympia, Washington

Parameter	Precision	Accuracy	Surrogate %R	Completeness	CRM/SRM (a)
Semivolatiles	±35% RPD	50%-150% R	Lab Limits	95%	Certified limits
Pesticides	±35% RPD	50%-150% R	Lab Limits	95%	Certified limits
PCBs	±35% RPD	50%-150% R	Lab Limits	95%	PS-SRM Advisory limits
Metals	±20% RPD	75%-125% R	NA	95%	Certified limits
Ammonia	±20% RSD	75%-125% R	NA	95%	NA
Total Sulfides	±20% RSD	75%-125% R	NA	95%	NA
Total Organic Carbon	±20% RSD	75%-125% R	NA	95%	Certified limits
Total Solids	±20% RSD	NA	NA	95%	NA
Total Volatile Solids	±20% RSD	NA	NA	95%	NA
Grain Size	±20% RSD	NA	NA	95%	NA
Tributyltin	±35% RPD	50%-150% R	Lab Limits	95%	NA
Dioxins Furans	±30% RPD	EPA 1613 limits	EPA 1613 limits	95%	PS-SRM Advisory limits

Notes:

a) Where required, as specified in Work Plan.

Acronyms/Abbreviations

CRM = certified reference material
EPA = US Environmental Protection Agency
NA = not applicable
PCB = polychlorinated biphenyl
% = percent
PS-SRM = Puget Sound Reference Material
R = recovery
RPD = relative percent difference
RSD = relative standard deviation
SRM = standard reference material

ATTACHMENT A

Example Sampling Investigation Field Forms and Logs

1. Port of Olympia Budd Inlet Surface Sediment Collection Form
2. Core Acquisition Log
3. Coring Log
4. Budd Inlet: Sediment Core Samples Tracking Form
5. Chain of Custody

Sediment Grab Location ID: ________________
Date: __________ Time: _____________

Port of Olympia Budd Inlet SURFACE SEDIMENT COLLECTION FORM

Project Name and No. : ______________________ **Weather Conditions:** ______________________

Sampling Method: ______________________ **Boat Operator/Crew:** ______________________

Tidal Data Source: ______________________ **Sample Collected by:** ______________________

SURFACE SEDIMENT GRAB SAMPLE DATA

Latitude/Northing (Y): **Longitude/Easting (X):**

Grab Attempt Time	Water Depth (ft)	Penetration Depth (cm)	Acceptable Grab * (Y/N)	Tide Level (ft)	Mudline Elevation (ft MLLW)	Percent Wood Waste	Comments

* Acceptable grab: Sampler not overfilled; sediment surface relatively flat; overlying water present and low turbidity; desired penetration depth achieved

SAMPLE DATA **Sample ID:**

Analyses Group (circle): Primary Source control Other:

Sediment Color	Secondary Sediment Type	Primary Sediment Type	Modifiers: with_____	Modifiers: trace ____	Sediment Odor	Other Characteristics or Comments:
Brown	silty	COBBLES	gravel	gravel	None	
Brown-gray	sandy (F M C)	GRAVEL	sand	sand	Slight	
Gray	gravelly	SAND (F M C)	(F M C)	(F M C)	Moderate	
Gray-brown		SILT	silt	silt	Strong	
Dark gray		CLAY	shells	shells	-H_2S	
Black			wood	wood	-Petroleum	
Olive			organics	organics		
Blue			Other:	Other:	Other:	
Red						

CORE ACQUISITION LOG

CORE ID:
Attempt: 1
PROJ. NO. Port of Olympia Budd Inlet Sediment Site

PROJECT: Budd Inlet Sub-Area 1
PROJECT LOCATION: Olympia, WA

#N/A | First Sample Interval: #N/A | Deepest Target Sample Depth: #N/A

DOF Staff: Dan Pickering
Other Staff: MSS
Time:

CORING EQUIPMENT	CORING INFORMATION			
CONTRACTOR: MSS	DATE		FIELD LOG BY :	AL
EQUIPMENT: Vibracore	START TIME	0:00	Head Space	#N/A
VESSEL:	END TIME		MECH DRIVE LENGTH, ft.	#N/A
CAPTAIN:	Weather:	overcast	ACQUISITION AFTER DRIVE, ft.	0.0
MSS Crew:	Temp:	38	ACQUISITION AFTER RETREIVAL, ft. (2)	#N/A
			LOSS ON RETRIEVAL, ft. (3)	#N/A
Note: The first foot of drive will not read accurately on the acquisition transponder due to the shoe and fingers.			Material Type end of core:	

FATHOMETERS (ft.)	
0	Water Depth
#N/A	Core Length
#N/A	Zero Depth

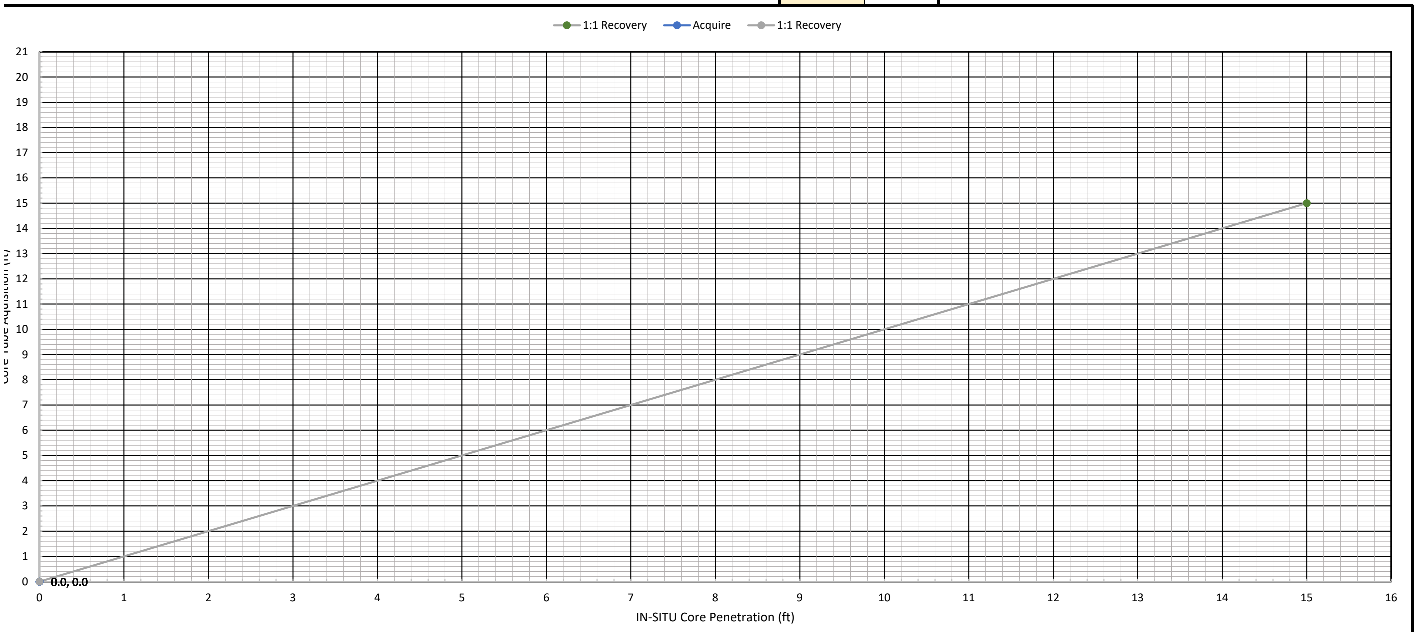
Fathometer Readings		TUBE (ft.)		Increment		Core Cut Plan (ft.)		
Depth	Acquire	Drive	Acquire	% Recover	Comment		In-Situ	Core
#N/A	#N/A	#N/A	#N/A				HS	0
		0.0	0.0	--		A	0.0	0.0
		0.0	0.0	--			1.0	0.0
		0.0	0.0	--			2.0	0.0
		0.0	0.0	--			3.0	0.0
		0.0	0.0	--			4.0	0.0
		0.0	0.0	--			5.0	0.0
		0.0	0.0	--			6.0	0.0
							7.0	0.0
							8.0	0.0
							9.0	0.0
							10.0	0.0
							11.0	0.0
							12.0	0.0
							13.0	0.0
Process core? (y/n/h/x)*							14.0	0.0
	n	*Interpolated value*					15.0	0.0
							16.0	0.0
							17.0	0.0
							18.0	0.0
							19.0	0.0

* "Accepted"/"Rejected"/"Hold for Reattempt"/"No Core Recovered"

MUDLINE ELEVATION (Datum: NAVD88)				
Water Surface Elev., ft.		0.00	Gage	
Water Surface Elev., ft.	MLLW	0.0	MLLW	
Water Depth, ft.	lead line		fathometer	
Mudline Elevation, ft.		0		0

CORE GPS LOCATION:	
East	
North	
Equip. :	On board system

Tube Segments - In-Situ Depth and Core Tube Length (ft.)				
ID#	In-Situ Depth Top	In-Situ Depth Bottom	Core Tube Length (ft) Top	Core Tube Length (ft) Bottom
A	-0.3		-0.3	0.3
B	0.0		0	0
C	0.0		0	0
				0
				0
				0.3



DALTON OLMSTED FUGLEVAND

LOG OF

Sheet __ of __

PROJECT: Port of Olympia Budd Inlet Sediment Site	COORDINATES:
LOCATION: Olympia, WA	SURFACE ELEVATION: / TOC Elev.:
DRILLING CONTRACTOR: MSS	DATE:
DRILLING EQUIPMENT:	TOTAL DEPTH OF BORING: / Ecology ID #:
DRILLING METHOD:	LOGGED BY:
SAMPLING METHOD:	RESPONSIBLE PROF.: / REG. NO.:
NOTES:	

DEPTH (feet)	SAMPLES				USCS Classification	VISUAL SOIL DESCRIPTION <u>Soil Group Name (USCS):</u> color, moisture, density/consistency, grain size, other discriptors
	Lab Sample	Sample Recovery	PID (ppm)	Sheen Test Result		
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

LANDAU ASSOCIATES

Sediment Core Location ID: ________________________
Collection Date/Time: ________________________
Wood Waste (>25%) : ☐ Yes ☐ No

BUDD INLET : SEDIMENT CORE SAMPLES TRACKING FORM

Project Name and No. : ______________________________ **Processing Date:** ______________________________

Processing Crew: ______________________________ **Start Time:** ______________________________

______________________________ **End Time:** ______________________________

SEDIMENT CORE SAMPLES*			
Depth Interval (ft)	**Sample ID**	**Analyses Group (circle)**	**Comments**
		Primary Z-layer Source Control Archive	
		Primary Z-layer Source Control Archive	
		Primary Z-layer Source Control Archive	
		Primary Z-layer Source Control Archive	
		Primary Z-layer Source Control Archive	
		Primary Z-layer Source Control Archive	
		Primary Z-layer Source Control Archive	
		Primary Z-layer Source Control Archive	
		Primary Z-layer Source Control Archive	
		Primary Z-layer Source Control Archive	
		Primary Z-layer Source Control Archive	
		Primary Z-layer Source Control Archive	
		Primary Z-layer Source Control Archive	
		Primary Z-layer Source Control Archive	
		Primary Z-layer Source Control Archive	
		Primary Z-layer Source Control Archive	
		Primary Z-layer Source Control Archive	
		Primary Z-layer Source Control Archive	

*Refer to corresponding core log for sediment sample descriptions (including USCS classification, color, moisture, density/consistency, grain size, odor, sheen, and other characteristics).

CHAIN OF COSTODY

COC ____of____

Company:	**Project Mgr:**	**Project Name:**	**Project #:**
Address:		**Phone:**	**Email:**
Sampled by:	**ANALYSIS REQUEST**		

SAMPLE ID	DATE	TIME	MATRIX	# OF CONTAINERS																						
			Sed																							
			Sed																							
			Sed																							
			Sed																							
			Sed																							
			Sed																							
			Sed																							
			Sed																							
			Sed																							
			Sed																							

REQUESTED TURN AROUND TIME (BUSINESS DAYS)				**SPECIAL INSTRUCTIONS:**
STANDARD	**1 DAY**	**2 DAY**	**3 DAY**	
	4 DAY	**5 DAY**	**10 DAY**	

RELINQUISHED BY:	**RECEIVED BY:**	**RELINQUISHED BY:**	**RECEIVED BY:**
Signature: Date:	Signature: Date:	Signature: Date:	Signature: Date:
Printed Name: Time:	Printed Name: Time:	Printed Name: Time:	Printed Name: Time:
Company:	Company:	Company:	Company:

ATTACHMENT B

Health and Safety Plan

FINAL
Health and Safety Plan for Sediment Sampling
Port of Olympia Budd Inlet Cleanup Site
Olympia, Washington

January 31, 2024

Prepared for

Port of Olympia
915 Washington Street NE
Olympia, Washington 98501

Prepared by

Dalton, Olmsted & Fuglevand
1001 SW Klickitat Way
Suite 200B
Seattle, Washington, 98134

The Budd Inlet Team

Health and Safety Plan for Sediment Sampling
Port of Olympia Budd Inlet Cleanup Site
Olympia, Washington

January 31, 2024

DALTON OLMSTED FUGLEVAND

The Budd Inlet Team

Health and Safety Plan for Sediment Sampling

Port of Olympia Budd Inlet Cleanup Site

Agreed Order Number DE 6083

by Dalton, Olmsted, and Fuglevand Team

Published January 2024

Approved by:

Signature: Christine Kimmel	Date: 1/31/24
Christine Kimmel, Health and Safety Manager, Landau Associates Inc.	
Signature:	Date:
Tasya Gray, Principal Geologist, Dalton, Olmsted, and Fuglevand, Inc.	
Signature:	Date:
Contractor's Name, Title, Organization (to be determined)	
Signature: D Fr	Date: 1/31/24
Dylan Frazer, Project Manager, Landau Associates Inc.	

TABLE OF CONTENTS

PAGE

FIGURES

TABLES

APPENDICES

LIST OF ABBREVIATIONS AND ACRONYMS

AO	Agreed Order
Cascade Pole	Cascade Pole Inc. McFarland cleanup site
COPC	Chemical of Potential Concern
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CPR	cardiopulmonary resuscitation
D/F	dioxin and furan
DNR	Department of Natural Resources
DOF	Dalton Olmsted & Fuglevand
Ecology	Washington State Department of Ecology
EDD	electronic data deliverable
eV	electronvolt
ft.	feet/foot
HASP	Health and Safety Plan
HEPA	high efficiency particulate air
IAP	Interim Action Plan
JHA	Job Hazard Assessments
Initiative	Puget Sound Initiative
Landau	Landau Associates, Inc.
LOTT	LOTT Cleanup Water Alliance
MLLW	mean lower low water
MSS	Marine Sampling Services
MTCA	Model Toxics Control Act
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PID	photoionization detector
PM	project manager
PMA	Port Management Agreement
Port	Port of Olympia
PPE	personal protective equipment
Project	Budd Inlet Sediments cleanup site Project
SCBA	self-contained breathing apparatus
Site	Budd Inlet Cleanup Site
SVOC	semivolatile organic compound
USACE	US Army Corps of Engineers
WAC	Washington Administrative Code
WISHA	Washington Industrial Safety and Health Act

This page intentionally left blank.

1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been prepared to support work being performed under Agreed Order (AO) No. DE 6083 (Ecology 2008), and its subsequent two amendments (Ecology 2012; Ecology 2023) between the Port of Olympia (Port) and the Washington State Department of Ecology (Ecology), to support the Budd Inlet Cleanup Site (Site) Project.

This HASP describes the safety and health guidelines developed to protect onsite personnel consisting of representatives of the Budd Inlet Team and subcontractors for the surface and subsurface core sediment sampling program. The HASP is specifically limited to field activities associated with the Port of Olympia Fall 2023 Sampling Event Memorandum (DOF 2023a) and the project-specific Sediment Sampling and Analysis Plan and Quality Assurance Project Plan (DOF 2024). The scope of the HASP includes the collection of sediment surface grab samples and subsurface core samples, as well as the procedures for processing sediment core samples for laboratory analysis.

This HASP meets requirements for state [Chapter 296-800 of the Washington Administrative Code (WAC)] and Washington Industrial Safety and Health Act (Chapter 49.17 RCW), along with federal [Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910 and 29 CFR 1926] safety regulations and applicable sections of US Army Corps of Engineers (USACE) safety and health requirements (EM 385-1-1 and ER 385-1-92).

The procedures and guidance contained in this HASP were based upon the best available information regarding the physical, chemical, and biological hazards known, or suspected to be, present at the Project. This HASP may not be appropriate if the work is not performed by or using the methods presently anticipated. This plan may be revised if new information becomes available or investigation activities are modified. Updates to this HASP will be addressed as addenda, when appropriate.

A hard copy of this HASP, or future addenda, will be present at all sediment surface, sediment subsurface core, and sediment processing locations. Prior to undertaking any field activities, all individuals performing field work and visitors for the sample collection or processing areas must read, understand, and comply with this plan. If any part is unclear, the individual should seek clarification from the onsite safety officer prior to commencing field work. Once the HASP has been read and understood, the individual must sign the Acknowledgement Form (Appendix A), which will then be placed in the project files. Failure to comply with the requirements of the HASP is grounds for immediate removal from the Site.

2.0 PROJECT AND SITE DESCRIPTION

The following sections include a description of the Budd Inlet Sediments cleanup site Project (Project) as defined by the AO for the Site.

2.1 Project Description

Under the Puget Sound Initiative (Initiative), Ecology identified Budd Inlet as a high priority cleanup area that required focused sediment cleanup primarily due to elevated dioxin and furan (D/F) concentrations in sediment (Ecology 2008). As part of the Initiative, Ecology issued AOs to property owners to investigate and clean up contaminated sites within Budd Inlet. Ecology and the Port entered into AO No. DE 6083 in 2008 to complete a pilot remedial dredging action in a portion of the Port's berthing area (completed in 2009). In 2012, the AO was amended to require the Port to evaluate a larger area, identified as the Study Area, and address contaminated sediment in the vicinity of the Port Peninsula (Ecology 2012). The AO was recently amended a second time (effective June 9, 2023) requiring the Port to prepare public review draft and final versions of the Interim Action Plan (IAP), prepare a pre-remedial design data gaps memorandum and investigation work plan, perform the pre-remedial design investigation and reporting, and develop engineering design and permitting documents for the interim action (Ecology 2023).

The Port is currently working with Ecology oversight to develop, design, and permit Budd Inlet sediment remediation such that remedial work is complete prior to the potential upcoming removal of the Capitol Lake dam. Removal of the dam is expected to significantly increase the sediment load into Budd Inlet. If the new sediment from Capitol Lake enters Budd Inlet prior to remediation, the total volume of sediment to remediate in Budd Inlet would likely increase because the new sediment could not be differentiated from the impacted sediment in a cost-effective manner.

2.2 Site Description

The Port's Marine Terminal facility is located in the northern portion of the City of Olympia on a peninsula within Budd Inlet, which is a small embayment in southern Puget Sound (Figure 2-1). Budd Inlet is divided into West Bay and East Bay at the southernmost portion. The filling of tidelands in the late 1800s and 1900s created the Port Peninsula, the West Bay and East Bay of Budd Inlet, and the downtown area of Olympia.

The Marine Terminal is approximately 66 acres and provides approximately 2,500 linear feet (ft) of wharf (Berths 1, 2, and 3) and 76,000 square ft of warehousing. Current upland use immediately adjacent to the berths and turning basin include log storage yards, cargo storage yards, and loading docks. A former log pond/marina area is present in the northwestern corner of the peninsula, defined by a dilapidated external pier running north parallel to the peninsula, outlining a shallower submerged area.

For the process of implementing the AO, the Budd Inlet Site has been divided into three Sub-Areas. The three Sub Areas comprise the entirety of the Budd Inlet Site, with the overall limits of the Budd Inlet Site to be determined based on future sampling and the corresponding limits of contamination. This HASP will apply to sediment chemistry sampling within Sub-Area 1.

2.2.1 West Bay

The Olympia Harbor federal navigation channel extends into Budd Inlet's West Bay and widens into a turning basin near its southern end, adjacent to the Port's Marine Terminal berthing area. This portion of the navigation channel is a deep draft channel (federally authorized depth -30 mean lower low water [MLLW]), primarily providing access to the Marine Terminal for oceangoing vessels. The Port manages the harbor area under a Port Management Agreement (PMA) with the Washington Department of Natural Resources (DNR). Along the Marine Terminal, the harbor area is mostly defined as a 54-foot-wide swath that extends from the south end of the Marine Terminal to beyond the north end. This narrow swath extends from the face of the Port's Marine Terminal landward and includes the underpier area of the Marine Terminal. Waterward of the Marine Terminal, the berthing area abuts the federal turning basin.

Additional features within the West Bay include separate Ecology cleanup sites, a boat basin, marinas, and waterfront shops and restaurants. Within West Bay, five contaminated sites previously or currently under separate AOs with Ecology are located along the shoreline: West Bay Marina; Hardel Mutual Plywood; BMT Northwest aka Reliable Steel; Solid Wood, Inc.; and Industrial Petroleum Distributors. The area south of the Marine Terminal includes a boat basin, waterfront shops and restaurants, and marinas. Three marinas are currently present: Fiddlehead, Martin, and the Olympia Yacht Club.

South of West Bay, the Deschutes River drains into Capitol Lake, in an area that was once an estuary where freshwater from the Deschutes River intermingled with salt water from Budd Inlet. The lake was created in 1951, as a reflection pond for the State Capitol, by installing an earthen dam and an approximately 82-ft-wide tide gate with spillways across the mouth of the Deschutes River under the 5^{th} Avenue Bridge in Olympia (USGS 2006). The flow of freshwater into West Bay is controlled by gated discharges from Capitol Lake. The Washington State Department of Enterprise Services is planning future removal of the Capitol Lake dam and returning the lake to an estuary. If implemented, this change is expected to increase future sediment transport and deposition into Budd Inlet, and West Bay in particular, likely increasing future dredging needs.

2.2.2 East Bay

The eastern portion of the federally authorized navigation channel runs from the north of the Port Peninsula and extends into the East Bay of Budd Inlet. This is a shallow draft channel (federally authorized depth -12 and -13 MLLW) generally for recreational vessels accessing Swantown Marina and Boatworks. The primary commercial facilities in East Bay are operated by the Port and include

Swantown Marina and Swantown Boatworks, located on the eastern side of the peninsula. The federal navigation channel also extends to the boat launch ramp located just north of Swantown Marina. Swantown Marina (referred to as East Bay Marina prior to 1995) has been in operation since 1983, is owned and operated by the Port, and maintains slips for approximately 700 vessels. Swantown Boatworks provides vessel service, haul out, and a vessel storage facility. Prior to construction of the Marina, East Bay was historically used for log storage.

Two sites under AOs with Ecology are located on the Port Peninsula adjacent to East Bay: The Cascade Pole Inc. McFarland cleanup site (Cascade Pole; located on the north end of the peninsula) and the East Bay Redevelopment site (located on the southern portion of the peninsula). The Port has been addressing contamination at Cascade Pole since 1990. The previous cleanup activities at Cascade Pole include several interim actions to remove and contain contamination, both on the uplands (groundwater and soil) and in the sediments. The Port continues to operate, maintain, and monitor a groundwater pump-and-treat system as an interim action under a separate AO with Ecology. Long-term monitoring as part of the Cascade Pole sediment cleanup is ongoing under an Agreed Order with Ecology. The historical activities at the East Bay Redevelopment site caused soil contamination. At the East Bay Redevelopment Site, the Port has been conducting upland soil investigations and cleanup actions under separate Model Toxics Control Act (MTCA) AOs with Ecology since 2007. The Port, along with the City of Olympia and LOTT Cleanup Water Alliance (LOTT), worked with Ecology to implement the Cleanup Action Plan for the site. Remediation included removal of some soil contamination hot spots. Remaining impacted soil was covered with caps of clean soil, pavement, or buildings.

Moxlie Creek originates from an artesian spring approximately 1.5 miles south of Budd Inlet. It flows into East Bay through a mile-long culvert that receives stormwater flows from urban areas, including road runoff from city streets and state and federal highways, before discharging at the southern end of East Bay (Anchor QEA 2012). East Bay was placed on the 303(d) impaired water body list for polychlorinated biphenyls (PCBs), based on the results of mussel shellfish tissue samples collected in 1995 from the culvert at the mouth of Moxlie Creek. D/F and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) were added to the East Bay 303(d) listing due to bent-nosed clam tissue concentrations measured in 2007 (Ecology 2016).

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The specific roles, activities, and responsibilities of Project participants are described in Table 1. Before field work commences. The Port has the primary responsibility for managing the work completed at the Site.

Table 1. Project Team Roles and Responsibilities

Title/Role	Name	Organization	Responsibilities
Port Project Manager	To be determined	Port	Manages the Project for Port of Olympia.
Ecology Project Manager	Sandy Smith	Ecology	Oversees the Project on behalf of the Washington State Department of Ecology.
USACE Project Manager	To be determined	USACE	Oversees the Project on behalf of the US Army Corps of Engineers.
Consultant Project Managers	Rob Webb; Natasya Gray	Dalton Olmsted & Fuglevand, Inc. (DOF)	Supervises and coordinates all work for the Project. These responsibilities include Project planning and execution, scheduling, staffing, data evaluation, report preparation, subcontracts, and management of deliverables.
Quality Assurance Manager	Danille Jorgensen	Landau Associates, Inc. (Landau)	Oversees and directs quality assurance reviews for the Project, including laboratory procedures and actions. Coordinates and reviews data validation. Has oversight responsibility for management and integrity of the data.
Field Lead/Site Safety Lead	To be determined based on scope of work—see relevant work plan.	Landau	Leads and coordinates field activities, including documentation, sampling, and sample handling. Conducts safety meetings and reports conditions to Landau Health and Safety Manager. Reports directly to the Consultant Project Manager (PM).
Health and Safety Manager	Christine Kimmel	Landau	Responsible for review and implementation of the Project HASP.
Field Equipment Manager	Ken Reid	Landau	Ensures equipment is properly maintained and in good condition for Project use.
Environmental, Geotechnical Laboratory Project Manager(s)	To be determined based on scope of work—see relevant work plan.	Analytical Resources, LLC Enthalpy Analytical	Manages laboratory analysis and reporting, including supervising in-house chain of custody and scheduling sample analyses within required holding times; oversees data review and preparation of laboratory reports and electronic data deliverables (EDDs).
Sampling Vessel Pilot	To be determined	Marine Sampling Services (MSS)	Responsible for the proper maintenance of the sampling vessel and equipment, and for piloting the vessel and anchoring at selected sampling locations.

4.0 PLANNED FIELD ACTIVITIES

Tasks undertaken under this site-specific HASP include the collection of sediment surface grab samples and subsurface core samples. In addition to the sediment collection efforts, the subsurface core samples will be processed onsite to identify analytical testing intervals and placement of sediment in supplied jars prior to delivery to the selected analytical testing laboratory. Job Hazard Assessments (JHA) for each of the main field tasks are provided in Appendix B of this plan.

The rationale for the sampling design and the design assumptions for locating and selecting environmental samples will be detailed in work plan documentation that will reference this HASP, when appropriate.

5.0 HAZARD ANALYSIS

This section presents the Hazard Analysis (both chemical and physical), and the steps to minimize worker exposure. The overall hazard level associated with the activities described in Section 4.0 is low to moderate for the processing area and moderate for the overwater activities.

5.1 Chemical Hazards

The chemical hazards associated with the handling and processing of sediment at the Site are summarized in Table 2. The principal Chemicals of Potential Concern (COPCs) consist of semivolatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), pesticides, PCBs, D/Fs, and metals. Many of the COPCs are identified by the National Institute for Occupational Safety and Health (NIOSH) as potential occupational carcinogens. The primary routes of exposure are inhalation, dermal contact, and oral ingestion. Inhalation risk is considered low because field personnel conducting sampling and core processing will be working in the open, and volatile vapors will quickly dissipate. Dermal contact is appropriately addressed by the required use of personal protective equipment (PPE); the minimal requirement for this project is modified Level D (see Section 7.2). Oral ingestion is prevented by the use of control zones (see Section 6.0) and controlling the generation of dust by keeping the sediment moist.

5.2 Physical Hazards

Physical hazards associated with the collection and processing of sediment samples at the Site are summarized in Table 3 and discussed below.

Sediment samples will be collected from a vessel operated by Marine Sampling Services (MSS). The onboard deployment and retrieval of large pieces of sampling equipment can result in pinch-point physical hazards. Only personnel whose presence is required will be allowed on the vessel during deployment and retrieval of the samplers. The subsurface coring equipment and surface grab samplers will be handled by two persons. A safety line may be attached to the equipment during deployment and retrieval, as necessary. If high winds or rough waters are recorded, the pilot and the Site Safety Lead will use best professional judgement to ensure safe field operations. All personnel on the vessel will wear proper PPE, along with Type II or Type V US Coast Guard-approved life vests.

Exposure to inclement weather, fatigue, and seasickness can lead to injuries or incidents during performance of sediment sampling and processing. To prevent fatigue and overexposure to inclement weather conditions, field personnel will take regular work breaks, wear weather-appropriate clothing, and keep hydrated. Extra clothing for layering will be brought onsite to accommodate changes in weather. Fatigue can be prevented by personnel conducting self-monitoring evaluations and taking appropriate action. The use of the buddy system on the vessel will allow personnel to gauge others' fatigue levels.

Slips, trips, and falls may be a hazard to field crew working on either the vessel or the sampling processing area. Personnel should keep areas clear of debris, use tools and equipment to assist with moving equipment, and wear required PPE.

6.0 SITE CONTROL ZONES

Three Site control zones will be established for sediment sampling and processing field procedures: an exclusion zone, a contamination reduction zone, and a support zone. The zones will be established to help ensure that personnel are properly protected against the hazards present where they are working and that work activities and contamination are properly confined.

6.1 Exclusion Zone

The exclusion zone is the area where contamination is known or suspected to be present and where Site activities are being conducted. Only authorized field personnel with proper training are allowed in the exclusion zone. During sediment sampling activities, the exclusion zone includes the area of the vessel in which collected sediments are handled and stored. When no sediment is on board, the entire vessel is considered the support zone.

During onsite sediment processing, the exclusion zone will be the area in which the core is extruded and selected intervals are sampled. The onsite processing area will be established in a well ventilated area away from the general public. The sediment processing exclusion zone will be isolated, with only one entry/exit location, using barrier tape and demarcation cones/candlesticks.

No eating and/or drinking will occur in the exclusion zone. No visitors are allowed in the exclusion zone. Personnel conducting work in the exclusion zone will wear appropriate PPE (see Section 7.2).

6.2 Contamination Reduction Zone

The contamination reduction zone is the transition area between the exclusion zone and the support zone, and it is where the PPE decontamination process and the transfer of samples are conducted. During sediment sampling activities, the vessel deck, except areas noted in the section above, is considered the contamination reduction zone. During sediment processing activities, the contamination reduction zone will be located at the exclusion zone exit/entry location, where containers for PPE disposal and/or decontamination will be established.

6.3 Support Zone

The support zone is where all personnel will store equipment and supplies, conduct daily tailgate meetings, and prepare for the daily activities. Visitors are allowed in the support zone. On the sampling vessel, the support zone will be located in the cabin of the vessel, or on the vessel deck when contaminated sediment is not on deck. The support zone at the sediment processing area will be established outside the contamination reduction zone.

7.0 TRAINING AND PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

7.1 Training Requirements

All personnel conducting field work associated with the sediment sampling and processing activities will provide documentation of training to meet state and federal requirements [Washington Industrial Safety and Health Act (WISHA) WAC 296-800 and OSHA (29 CFR 1910.120), respectively. Site personnel will provide documentation of acquired training prior to the start of the sampling program.

Hazardous waste Site workers are required to have 40 hours of formal health and safety training along with annual 8-hour refresher training. Auditors, or other employees whose work onsite will be for a specific task or of limited duration and whose work will not result in exposure over published exposure limits, are required to have 24 hours of health and safety training. In addition, at least one person in the exclusion zone will be certified in first aid and cardiopulmonary resuscitation (CPR), and at least one person of the onsite crew must have received hazardous waste Site supervisor training.

Personnel handling sediment sampling equipment will be part of a medical surveillance program to verify that they are physically capable of conducting the assigned work task, are approved for the use of protective equipment, will wear respiratory protection, and are not predisposed to occupationally induced diseases. Any limitation will be noted in verification letters sent by the attending physician to the employer.

Personnel handing potentially environmentally impacted sediment that may require the use of a respirator will participate in a respiratory protection program (WAC 296-800).

In addition to formal training, each team member will be briefed on Site-specific conditions during a safety meeting to be conducted at the beginning of the field program and when new members are added to the field team. In addition, a daily safety meeting will be conducted to brief all field staff prior to the start of the workday. Daily safety meeting topics will address planned activities for the day, address anticipated problems or changes in Site conditions, and inform field staff of any changes to the HASP. Site safety meetings will be conducted by the Site Safety Lead and recorded on the Daily Safety Meeting Form in Appendix A.

7.2 Personal Protective Equipment

Levels of PPE range from Level A to D, based on the type of contamination, anticipated concentration range, and planned work activity. The levels are summarized below:

- Level A requires the use of a fully encapsulated suit and full-face pressure demand self-contained breathing apparatus (SCBA) and supplies the highest level of respiratory, skin, and eye protection. Level A is not anticipated on this project and therefore the requirements are not covered in this plan.

- Level B requires maximum respiratory protection by the use of supplied air and dermal protections selected based on anticipated hazards. Level B is not anticipated on this project and therefore the requirements are not covered in this plan.
- Level C requires an air-purifying respirator that is specific to the COPCs, with dermal protection selection based on anticipated hazards. Site conditions indicate that Level C PPE may be used, based on the Air Monitoring Program shown in Table 4.
- Level D is the basic work uniform. Based on Site conditions, a Modified Level D PPE program will be selected for the Site work, as summarized below:
    - Disposable nitrile inner gloves for sampling activities
    - Leather or grip outer gloves for working with tools
    - Neoprene steel-toed, chemically resistant, impermeable outer boots
    - Hard hat (if overhead hazards are present)
    - Safety glasses or goggles when exposure to splashes or sprays are possible
    - Hearing protection (ear plugs or muffs)
    - Type III or Type V US Coast Guard-approved personal flotation devices (when working on sampling vessel)
    - High visibility safety vests.

7.3 Safety Equipment

Additional safety supplies to be kept on board the sampling vessel and in the processing area include:

- First-aid kit
- Eyewash kit
- Clean water
- Fire extinguisher (ABC type).

7.4 Safety Monitoring Program and Equipment

A site-specific safety monitoring program will be used to evaluate whether site conditions indicate a modification to the PPE level is required. To evaluate the appropriate respiratory protection, air near the breathing zone in the sampling vessel and the processing area will be monitored using a portable photoizonization detector (PID). Although all field activities in the program will be conducted in an outdoor setting, potential release of vapors upon initial sample disturbance is possible. The PID shall be equipped with a 11.7 electronvolt (eV) lamp and will be calibrated to a set standard at the start of each work shift.

The action levels to increase PPE from Modified Level D to C is summarized in Table 4.

7.5 Safety Rules

All personnel working in the field will follow the rules and procedures listed below:

- Prior to any field operations, all personnel must review and provide an acknowledgement signature to this HASP. The Site Safety Lead will provide a safety procedure orientation prior to the start of the program and for new team members and will provide daily safety meetings.
- The sampling vessel pilot shall provide safety procedures on board the vessel prior to the start of the sampling program, to establish procedures to use in onboard emergencies.
- Copies of this HASP will be available onsite during the sampling program (on the sampling vessel and at the processing area). A waterproof copy of the completed Emergency Contacts section will also be posted onsite.
- The Site Safety Lead and the vessel pilot will monitor weather conditions. A radio capable of receiving the National Weather Service frequency for the Olympia area will be on board the vessel and monitored throughout the work shift. The Site Safety Lead will have the responsibility and the authority to halt operations if conditions are deemed unsafe.
- No eating, drinking, smoking, or wearing contact lenses in the exclusion zones.
- No facial hair that would interfere with respirator fit for personnel wearing respirators.

7.6 Personal Protective Equipment Decontamination

Nitrile gloves will be disposed of between sampling events, while other disposable PPE such as Tyvek suits will be disposed in the contamination reduction zone. Non-disposal PPE (hard hats, boots, rain gear, etc.) will be decontaminated in the contamination reduction zone with a water and Alconox mix solution, which will be containerized for proper disposal.

Prior to breaks, wash hands and face to minimize potential cross contamination.

Sampling equipment decontamination procedures are defined in the draft Sediment Sampling and Analysis Plan and Quality Assurance Project Plan (DOF 2023b).

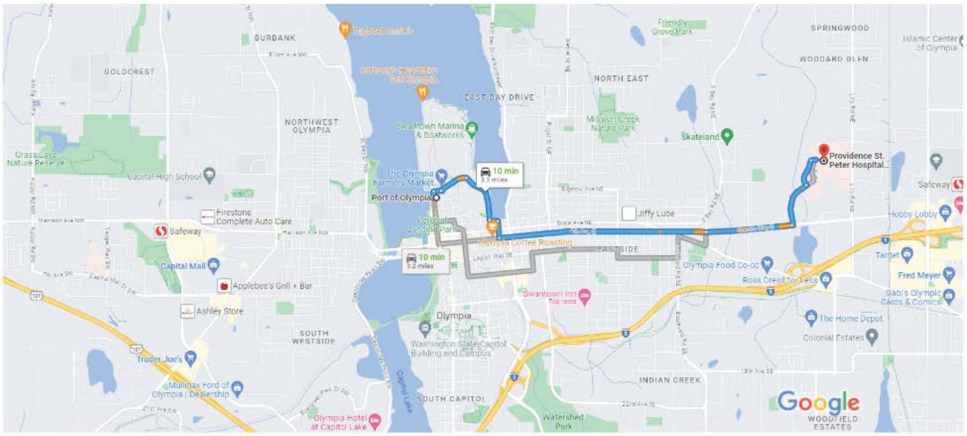
8.0 EMERGENCY PROCEDURES

In case of an emergency, the Site Safety Lead must be notified immediately. However, if the situation is life-threatening and notification of the Site Safety Lead would delay emergency response, field personnel may initiate the appropriate emergency contacts prior to notifying the Site Safety Lead. Emergency decontamination of an injured person shall be accomplished if not injurious to the person. The Site Safety Lead will initiate contacts as follows:

1) Call appropriate emergency services numbers (ambulance, fire, etc.) and provide the following information:
    a. Name and location of person reporting
    b. Location of incident
    c. Name and affiliation of injured party
    d. Description of injuries
    e. Status of medical aid effort
    f. Details on any chemical involved and description of any personnel or contaminated gear to be sent with the injured party.
    g. Temporary control measures to minimize further risk to others.
2) Call Project Manager and Landau Health and Safety Manager and provide incident data.

Emergency Contact	Telephone Number
Fire/Police/Ambulance	911
Nearest Hospital: St. Peter Hospital 413 Lilly Road NE Olympia, WA 98506	(360) 491-9480 Directions from Site to Hospital (see Section 8.1)
Poison Control Center	(800) 222-1222
National Response Center	(800) 424-8802
Landau Project Manager: Dylan Frazer	(509) 240-2018
Landau Health and Safety Manager: Christine Kimmel	(206) 786-3801

8.1 Route to St. Peter Hospital, Olympia



Map data ©2023 Google 2000 ft

Port of Olympia
606 Columbia St NW #300, Olympia, WA 98501

Take Market St NE and Marine Dr NE to 4th Ave

4 min (0.8 mi)

1. Head north on Columbia St NW toward Corky Ave NW
   233 ft
2. Columbia St NW turns right and becomes Corky Ave NW
   256 ft
3. At the traffic circle, take the 2nd exit onto Market St NE
   0.2 mi
4. Continue onto Marine Dr NE
   0.3 mi
5. Turn left onto Olympia Ave NE
   299 ft
6. Turn right onto Chestnut St SE
   0.1 mi

Continue on 4th Ave to Ensign Rd NE

5 min (2.0 mi)

7. Turn left onto 4th Ave
   1.4 mi
8. Continue onto Martin Way E
   0.6 mi

Follow Ensign Rd NE and Providence Ln NE to your destination

2 min (0.5 mi)

9. Turn left onto Ensign Rd NE
   0.3 mi
10. Turn left onto Providence Ln NE
   0.2 mi
11. Turn right
   Destination will be on the right
   180 ft

8.2 Man-Overboard Emergency Procedure

There is a potential for a man-overboard scenario while the team is working over water, either from the sampling vessel or the dock. The potential is increased when heavy equipment is being used, during stormy weather, or if the Site has debris. If a person falls overboard from the sampling vessel, all vessel engines will be stopped immediately. Floatation devices (i.e., life rings) attached to security lines will be thrown to the victim from the vessel to allow the person to be brought back on board. Steps to replace wet, cold clothes with dry, warm replacements will be made immediately after a quick first-aid review for potential injuries. No other parties shall enter the water except if the victim is unconscious or seriously injured. Rescuers must wear life preservers and will be tethered to the sampling vessel. Persons entering the water may need to be treated for cold stress.

Cold stress can also occur for workers exposed to low air temperatures, rains, and winds. In these conditions, field teams must be prepared to wear proper protective clothing and to recognize symptoms of cold stress (shivering, numbness, drowsiness, muscular weakness, and if severe enough, death). Treatment for cold stress should consist of moving the person to a dry, warm location (indoors), providing rapid but gentle rewarming, replacing wet clothing with dry, and providing warm liquids. Call in medical care at once.

9.0 REFERENCES

Anchor QEA. 2012. *Budd Inlet Sediment Site Work Plan*. Prepared by Anchor QEA for Port of Olympia. October.

DOF. 2023a. Memorandum: *Port of Olympia - Proposed East Bay Sediment Sample Location Figures, Fall 2023 Sampling Event (Agreed Order #DE-6083)*. From Rob Webb, PE and Tasya Gray, LG, Dalton, Olmstead & Fuglevand, to Rebecca Lawson, Connie Groven, and Sandy Smith, Department of Ecology. September 11.

DOF. 2024. Final: *Sediment Sampling and Analysis Plan, and Quality Assurance Project Plan, Port of Olympia Budd Inlet Cleanup Site, Olympia, Washington.* Dalton, Olmstead & Fuglevand (the Budd Inlet Team). January 31.

Ecology. 2008. Agreed Order No. DE 6083. Washington State Department of Ecology. October 2008.

Ecology. 2012. *First Amendment to the Agreed Order No. DE 6083*. Washington State Department of Ecology. February 2012.

Ecology. 2016. Washington State Water Quality Atlas. Washington State Department of Ecology. https://fortress.wa.gov/ecy/waterqualityatlas/map.aspx?CustomMap=y&RT=0&Layers=23,29&Filters=n,n,n,n. Accessed November 10, 2016.

Ecology. 2023. *Second Amendment to Agreed Order No. DE 6083*. Washington State Department of Ecology. June 9.

USGS. 2006. *Deschutes Estuary Feasibility Study – Hydrodynamics and Sediment Transport Modeling. Final Report.* Available at: HSTA.pdf (wa.gov) . US Geological Survey. October.

Notes

1. Horizontal Datum: Washington State Plane South, NAD83.
2. Background imagery: Google Earth Pro, 07/25/2022.
3. Source: Anchor QEA, Figure 2-3.

Legend

- Project Area
- Federal Navigation Channel
- Port Management Area (PMA)
- Mean Higher High Waterline (MHHW)

N

0 600 1200
Scale in Feet

DOF DALTON OLMSTED FUGLEVAND
The Budd Inlet Team

PORT of OLYMPIA
Budd Inlet - Olympia, WA
SAP/QAPP

Budd Inlet Sub-Area 1
Project Area

Figure
2-1

January 30, 2024

Grette Associates LLC ENVIRONMENTAL CONSULTANTS
WestLand 100% EMPLOYEE OWNED Engineering & Environmental Services, Inc.
MAUL FOSTER ALONGI
CRETE CONSULTING, INC.
moffatt & nichol
FAS
LANDAU ASSOCIATES

Table 2
Chemicals of Potential Concern

Contaminant	TWA (ppm)	IDLH (ppm)	Source/Quantity Characteristics	Route of Exposure	Symptoms of Acute Exposure	Instruments Used to Monitor Contaminant
SVOC (protective to naphthalene)	10	250	Bay Sediment	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes; headache, confusion, excitement, malaise, nausea, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis	PID
cPAHs (protective to benzo(a)pyrene)	0.2 mg/m^3	80 mg/m^3	Bay Sediment	Inhalation, skin and/or eye contact	Dermatitis, bronchitis (potential occupational carcinogen)	Dust Control
Pesticides (protective to heptachlor)	0.5 mg/m^3	35 mg/m^3	Bay Sediment	Inhalation, skin absorption, ingestion, skin and/or eye contact	In animals: tremor, convulsions; liver damage (potential occupational carcinogen)	Dust Control
PCBs (protective to Aroclor 1254)	0.5 mg/m^3	5 mg/m^3	Bay Sediment	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes; chloracne; liver damage; reproductive effects (potential occupational carcinogen)	Dust Control
Dioxin/furans (protective to 2,3,7,8-Tetrachlorodibenzo-p-dioxin [TCCD])	0.5 mg/m^3	500 mg/m^3	Bay Sediment	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes; allergic dermatitis, chloracne; porphyria; gastrointestinal disturbance; possible reproductive, teratogenic effects; in animals: liver, kidney damage; hemorrhage; (potential occupational carcinogen)	Dust Control
Metals (protective to arsenic)	0.010 mg/m^3	5 mg/m^3	Bay Sediment	Inhalation, skin absorption, ingestion, skin and/or eye contact	Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin (potential occupational carcinogen)	Dust Control

Abbreviations:

cPAH = carcinogenic polynuclear aromatic hydrocarbon
IDLH = Immediately Dangerous to Life and Health
mg/m^3 = milligrams per cubic meter
PCB = polycyclic biphenyl
PID = photoionization detector
ppm = parts per million
SVOC = semivolatile organic compound
TCCD = 2,3,7,8-Tetrachlorodibenzo-p-dioxin
TWA = Time Weighted Average based on a 10-hour workday during a 40-hour workweek

Table 3
Physical Hazards of Concern

Hazard	Description	Location	Procedures Used to Monitor Hazard
Sediment Sampling and Field Activities	Collect sediment, soil, water samples as necessary; perform sampling support as part of the project.	Sitewide	Wear PPE such as high-visibility clothing, safety glasses, steel-toed boots, gloves, and hard hats.
Cold Stress/Inclement Weather	Sampling activities taking place during cold weather and/or rainy and stormy conditions.	Sitewide	Wear weather-appropriate clothing such as jackets, gloves, and face coverings; drink water; take breaks as needed.
Operating and Sampling from a Boat, Dock, or Otherwise Near Water	Some sediment samples may be collected from a boat, dock, shoreline, or near water where the bay bottom may be deeper than standing depth.	Sitewide	Wear US Coast Guard-approved life jackets, have additional flotation device available with sampling team, equip whistles, and use the buddy system at all times to watch out for sampling team personnel.
Slips, Trips, and Falls	Multiple site locations may have uneven ground, steps, slopes, and slippery areas.	Sitewide	Be aware of surroundings, use caution when stepping on surfaces with these conditions, wear shoes with tread. All persons working from the boat must wear US Coast Guard-approved life jackets, have additional flotation device available with sampling team, equip whistles, know the Man Overboard response plan
Operating Power and Hand Tools	Sampling may include the use of power and/or hand tools/equipment at times.	Sitewide	Only personnel trained and familiar with tools/equipment should use it. Use appropriate power source, wear appropriate PPE such as safety glasses, face shields, and gloves.

Abbreviations:

PPE = personal protective equipment

Table 4
Air Monitoring Program

Monitoring Parameter	Reading	Level of Protection
Organic Vapors	PID reading > 15 ppm at point of operations for more than 1 minute	Establish 25-ft-diameter exclusion zone around work area; monitor worker's breathing zone
Organic Vapors	PID reading > 15 ppm in worker's breathing zone for more than 1 minute	Evacuate area or upgrade to Level C half face respirator with organic vapor/HEPA cartridge; establish contamination reduction
Organic Vapors	PID reading > 75 ppm in worker's breathing zone for more than 1 minute	Evacuate area and move upwind to allow vapors to dissipate; may resume work in Level C PPE after vapors dissipate.
Organic Vapors	PID reading > 100 ppm in worker's breathing zone for more than 1 minute OR > 300 ppm instantaneous	Evacuate area and move upwind. Notify onsite contact and Landau Associates health and safety manager.
Dust Control	If visible dust from sediment is present	Apply moisture to minimize dust. If dust persists then upgrade to Level C half face respirator with HEPA cartridge.
Explosive Vapors	LEL >10% Or <19.5% Oxygen>23%	Stop Work, verify proper grounding of equipment prior to contacting Health & Safety Manager.

Abbreviations:
ft = feet/foot
HEPA = high efficiency particulate air
PID = photoionization detector
ppm = parts per million

APPENDIX A

Health and Safety Forms

Daily Health and Safety Report

Project Name: ______________________ Project Number: ____________

Client: ______________________ Date: ____________

Field Safety Manager: ______________________ Project Manager: ____________

Safety Topics Discussed – As Reference in Project HASP (check topics covered)

- ☐ PPE and Exposure Monitoring
- ☐ Chemical of Concern
- ☐ Slip/Trips/Falls
- ☐ Traffic Control
- ☐ Drilling Safety
- ☐ Excavation Safety
- ☐ Confined Space Entry
- ☐ Hand-operated Power Tools
- ☐ Hot Work Permit Activities
- ☐ Work in Waterways
- ☐ Emergency Procedures
- ☐ ________________________

Describe planned daily activities, potential hazards, and methods to mitigate risks: ____________________

Signature of People Participating in the Daily Safety Meeting

Signature	Firm

Site Health and Safety Plan Amendments

Amendment No.______________________________

Project: Budd Inlet Sediment Characterization	Project No. 2106001
Landau Project Manager: Dylan Frazer	Landau Heath and Safety Manager: Chris Kimmel
Site Safety Lead:	Date:

Amendment Rationale:

Alternative Safeguard Procedures:

Required Changes in PPE:

_____________________________ _____________________________

Health and Safety Manager Signature Date

_____________________________ _____________________________

Project Manager Signature Effective Date

Site Health and Safety Plan
Acknowledgment Form

The project requires that all onsite personnel read and comply with this Health and Safety Plan, you be supplied with proper personal protective equipment (PPE), and that you be trained on the proper use of the provided PPE. Personnel who are not respirator-trained or medically cleared to wear a respirator will be removed from areas if the Air Monitoring Program indicates the need to don respirators. Respirators and PPE shall be provided by the consultant or contractor of which the person is an employee.

I have reviewed, understand and agree to follow the Site Health and Safety Plan for the Budd Inlet Sediment Characterization project.

Name (Print)	Signature	Affiliation	Date

APPENDIX B

Job Hazard Assessments

JOB SAFETY ASSESSMENT FORM

JOB TITLE/TASK: Sediment Sampling

PROJECT ID: Budd Inlet	PROJECT MANAGER: Dylan Frazer
DATE:09/30/2023 REVISION:	HEALTH/SAFETY MANAGER: Chris Kimmel

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE): X Reflective Clothing X Steel-toed Boots X Hard Hat (for overhead work) X Nitrile Gloves X Leather Work Gloves X Life Preserver Jacket X *Hearing protection* ____________________

JOB STEP	POTENTIAL HAZARDS	PREVENTATIVE/CORRECTIVE ACTION
Surface and Subsurface Sediment Sample Collection	Slips, Trips, Falls	Keep work area free of excess material and debris
		Remove all trip hazards by keeping materials/objects organized and out of walkways
		Keep work surfaces dry when possible
		Wear appropriate PPE including non-slip rubber boots if working on wet or slick surfaces
		Install rough work surface covers where possible
		Stay aware of footing and do not run
	Heat/Cold Stress	Take breaks as needed
		Consume adequate food/beverages
		If possible, adjust work schedule to avoid heat/cold stresses
	Man-Overboard/drowning	Have life preservers or flotation devices available for supervising personnel, vessel pilot, and sampling team members
		Use insect repellent as necessary
		Personnel on vessel required to wear personal life jacket (US Coast Guard
		Stay alert and safe distance away from biological hazards
		Be aware of conditions, leave area if inclement weather conditions present
		Use the buddy system and have clear communications.
	Pinch Points	Keep hands inside the gunnels at all times.
		Be aware of surroundings.
		Do not operate equipment with safety guards removed or altered.
	Hydraulic A-frame and Van Veen Sampler: -Pinch Points -Energized Equipment - Overhead hazards	Inspect hydraulic lines and equipment daily/weekly prior to use.
		Verify personnel are aware of potential pinch points.
		Do not stand underneath hydraulic A-frame or other overhead hazards.
		Wear a hard hat all times if there are overhead obstructions.
		Obey safety instructions from the vessel pilot
	Weather Related Illness	Be aware of high winds, rain, and fatigue. Stop work is rain/wind/temperatures conditions become too severe. Wear insulated clothing with a rain-shell as an outer layer. Bring extra cloths to change out as needed. Take breaks and monitor your self and co-worker for sighs of weather related illness.
	Lifting-Related Injuries	Avoid manual lifting of heavy objects. Use mechanical tools/methods if available or utilize buddy system.
		Use proper lifting technique, center the load, and lift with the legs (not the back)
	Chemical hazards	All personnel must have Hazwoper training (initial 40-hour and annual 8-hour refreshers)
		Modified Level D PPE required with possible upgrade to Level C based on the Air
		Exchange nitrile gloves between sampling intervals.

JOB SAFETY ASSESSMENT FORM

JOB TITLE/TASK: Sediment Sampling

PROJECT ID: Budd Inlet	PROJECT MANAGER: Dylan Frazer
DATE:09/30/2023 REVISION:	HEALTH/SAFETY MANAGER: Chris Kimmel

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE): X Reflective Clothing X Steel-toed Boots X Hard Hat (for overhead work) X Nitrile Gloves X Leather Work Gloves X Life Preserver Jacket He*aring protection* ________________________

JOB STEP	POTENTIAL HAZARDS	PREVENTATIVE/CORRECTIVE ACTION
Transporting and Cutting Cores	Lifting-Related Injuries	Use proper lifting technique, center the load, and lift with the legs (not the back).
		Avoid manual lifting of heavy objects. Use mechanical tools/methods if available or utilize buddy system.
		Use appropriate work gloves when handling cores,
	Heat/Cold Stress	Keep area clear of debris.
		Only necessary personnel will be in the processing exclusion zone.
	Use of Small Mechanical Tools	Only operate rip saw in the designated area.
		Full face-shield and safety glasses required when cutting cores.
		No loose clothes or cords that may become caught in the blade.
		Use buddy system.
		Disconnect saw from power for blade replacement
		Inspect electrical cords and equipment condition prior to use.
	Chemical Hazards	All personnel must have Hazwoper training (initial 40-hour and annual 8-hour refreshers).
		Modified Level D PPE required with possible upgrade to Level C based on the Air Monitoring Program data.
		Exchange nitrile gloves between sampling intervals.
	Weather Related Illness	Onsite processing area will be in a well ventilated area, exposed to weather. Wear insulated clothing with a rain-shell as an outer layer. Bring extra cloths to change out as needed. Take breaks and monitor your self and co-worker for sighs of weather related illness.
Logging and Processing Sediment Samples	Chemical Hazards	All personnel must have Hazwoper training (initial 40-hour and annual 8-hour refreshers).
		Modified Level D PPE required with possible upgrade to Level C based on the Air Monitoring Program data.
		Work only on designated plastic covered table.
		Establish processing Exclusion Zone in a well ventilated area.
	Weather Related Illness	Onsite processing area will be in a well ventilated area, exposed to weather. Wear insulated clothing with a rain-shell as an outer layer. Bring extra cloths to change out as needed. Take breaks and monitor your self and co-worker for sighs of weather related illness.
Sampling Equipment Decontamination	Chemical Hazards	All personnel must have Hazwoper training (initial 40-hour and annual 8-hour refreshers).
		Modified Level D PPE required with possible upgrade to Level C based on the Air Monitoring Program data.
		Establish processing Exclusion Zone in a well ventilated area.
	Physical Hazards	Cut aluminum tube edges may be sharp; use gloves at all times during handing of tubes.
		Stack decontaminated tubes only in designated area until transport to recycling facility.
	Weather Related Illness	Onsite processing area will be in a well ventilated area, exposed to weather. Wear insulated clothing with a rain-shell as an outer layer. Bring extra cloths to change out as needed. Take breaks and monitor your self and co-worker for sighs of weather related illness.

ATTACHMENT C

Inadvertent Discovery Plan

Inadvertent Discovery Plan for the In-Water Sediment Sampling for the Budd Inlet Remediation Project, City of Olympia, Thurston County, Washington

Prepared by:

Jennifer Hushour, M.S., RPA
Tyler A. McWilliams, B.A., RA

WestLand Engineering & Environmental Services, Inc.
17901 Bothell-Everett Highway, Suite 107
Bothell, Washington 98012
(425) 371-6650

Prepared for:

Dalton, Olmsted, & Fuglevand, Inc.
2601 Cherry Avenue, Suite 300
Bremerton, WA 98310
(360) 394-7917

WestLand Project Number: 10241

June 21, 2023
Revised January 31, 2024

WestLand
100% EMPLOYEE OWNED
Engineering & Environmental Services, Inc.

STATEMENT OF CONFIDENTIALITY

Disclosure of the locations of historic properties to the public may be in violation of both federal and state laws. Applicable United States laws include, but may not be limited to, Section 304 (54 U.S.C. §307103) of the National Historic Preservation Act and the Archaeological Resources Protection Act (16 U.S.C. §470hh). Archaeological sites are protected under Washington State law (RCW 27.53) and their locations are exempt from public disclosure (RCW 42.56.300).

TABLE OF CONTENTS

Project Description

WestLand Engineering & Environmental Services, Inc. (WestLand) was hired by Dalton, Olmsted, & Fuglevand to develop an archaeological inadvertent discovery plan (IDP) for the Budd Inlet Remediation project (project). The proposed project will clean up Budd Inlet to comply with a Washington State Department of Ecology agreed order with the Port of Olympia to investigate and clean contamination in the area. The contamination has accumulated due to industries from the 1920s to the 1980s, such as plywood manufacturing, wood treatment, and factories that burned salt-laden wood. The cleanup involves dredging of the area and will also accommodate the incoming flow of sediments should the Capitol Lake Dam be removed as part of the Deschutes Estuary project. Some of the dredged material may be reused onsite for habitat creation and sea level rise measures. The current phase of the project includes in-water sediment sampling to obtain additional data to refine remedial actions and habitat restoration efforts.

This document outlines protocols and procedures to implement in the event of a discovery of archaeological materials or human remains during in-water sediment sampling.

Sampling Methods

Sampling will occur in several locations and will include surface sediment samples, intertidal sediment surface samples, and subsurface samples (in and outside of the navigation channel).

Surface sediment will be collected using a power grab sampler. A power grab uses a bottom frame and cylinder powered by either air or hydraulic pressure to close the grab. Typical penetration is based on sediment physical properties but is expected to be approximately 35 cm. Approximately 1.5 cubic feet of material will be recovered.

Subsurface sediment will be collected by obtaining sediment with cores at each location using a vibracore. The vibracore sediment coring methodology employs 4-inch aluminum core tubes driven into the substrate by a high-frequency vibrating drive head attached to the top of the core tube. Depths of subsurface samples will range between 8 and 14 feet.

Regulatory Context

As the project requires a Joint Aquatic Resources Permit Application (JARPA) from the U.S. Army Corps of Engineers (USACE), it is subject to Section 106 of the National Historic Preservation Act. Because it is partially funded by grants from the Washington State Department of Commerce (DOC) and Department of Ecology (Ecology), it is also subject to Governor's Executive Order 21-02 (GEO 21-02) which requires that cultural resources are fully considered in any state-funded project and that impacts to these cultural resources must be considered. The USACE will consult with the Washington Department of Archaeology and Historic Preservation (DAHP).

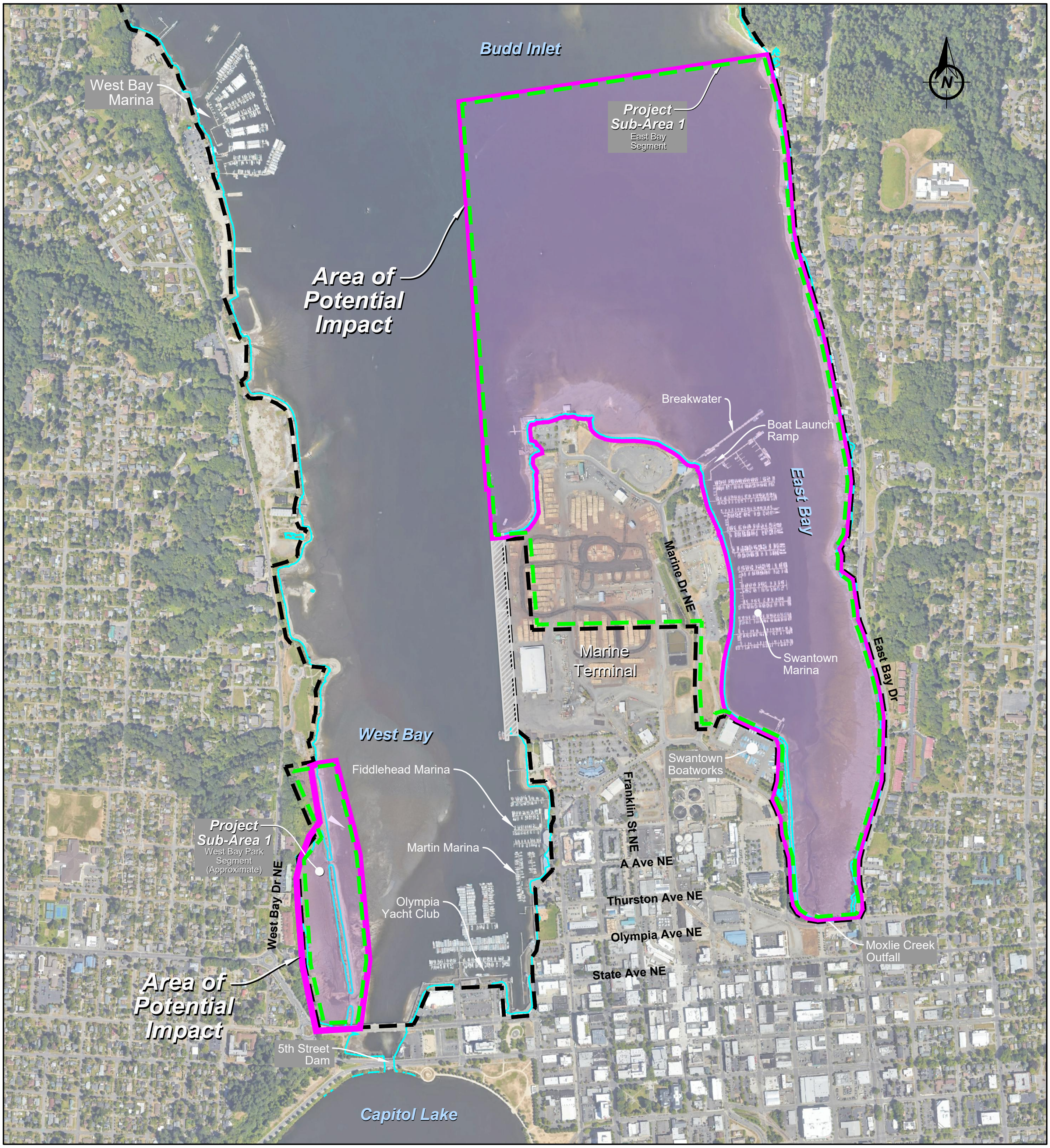
Area of Potential Effect

The project is located in Budd Inlet in the city of Olympia, Thurston County, WA. The current phase of the project includes in-water sediment sampling only and does not include any work on land including along the shoreline above the Ordinary High Water Mark (OHWM). The APE is therefore limited to the area below the OHWM (Figure 1).

According to DAHP's Washington Information System for Architectural and Archeological Records Data (WISAARD) database, the project vicinity is an area of high sensitivity for the presence of cultural resources, including precontact and historic-period archaeological sites and artifacts. Several archaeological sites have been recorded along the east and west edges of the project area near the shoreline, just outside of the current APE. These include two precontact shell midden sites, an historic creosote boom, an historic pipeline terminal, and three historic mill/industrial sites.

Tribal Consultation

The USACE has sent permit notification correspondence to the Nisqually Indian Tribe, the Squaxin Island Tribe, the Confederated Tribes of the Chehalis Reservation, the Cowlitz Indian Tribe, and the Quinault Indian Nation. To date, none of these have requested any cultural resources work for this phase other than use of this IDP.



0 600 1200
Scale in Feet

Notes

1. Background imagery: Google Earth Pro, 07/25/2022.
2. All boundaries are approximate.

Legend

- Area of Potential Effect (APE)
- Project Area
- Sub-Area 1
- Ordinary High Water Mark (OHWM)

DOF DALTON OLMSTED FUGLEVAND
The Budd Inlet Team

PORT of OLYMPIA
Budd Inlet - Olympia, WA
Project Sub-Area 1 Pre-Remedial Design Inadvertent Discovery Plan

Area of Potential Effect

Figure 1

December 1, 2023

Grette Associates LLC ENVIRONMENTAL CONSULTANTS | WestLand 100% EMPLOYEE OWNED Engineering & Environmental Services, Inc. | MAUL FOSTER ALONGI | CRETE CONSULTING, INC. | moffatt & nichol | TAS | LANDAU ASSOCIATES

PLOT TIME: 12/1/2023 11:48 AM MOD TIME: 12/1/2023 11:47 AM USER: Lee Barras DWG: P:\Port of Olympia\Budd Inlet\CAD\Figures\2023 IDP- Inadvertent Discovery Plan\2023-12-1 Budd Inlet Inadvertent Discovery Plan - IDP.dwg

Inadvertent Discovery Plan

A copy of this document will be kept on site during all sampling and at the core processing facility. It will be available to all staff conducting sampling and core processing/analysis. Additionally, Ecology has developed an instruction video about the inadvertent discovery of archaeological resources which can be viewed at https://youtu.be/ioX-4cXfbDY?si=jNZyZCE9EvAg666W.

It is recommended that all personnel working on the sampling and processing view this video.

Inadvertent Discovery Protocols for Archaeological Resources

Washington state law protects archaeological resources (RCW 27.53, 27.44, and WAC 25–48) and human remains (RCW 68.50) from disturbance or theft. Artifacts and cultural deposits might include, but are not limited to, evidence for precontact activities such as chipped stone tools, chipped stone tool debris, ground stone tools, bone and shell objects, fire-cracked or discolored rocks, concentrations of charcoal and discolored soil, or shell middens. There may also be evidence of Historic period land use or dumping (e.g., structural debris, mechanical items, or concentration of cans, bottles, or other debris). Example photographs of different artifact types are included in Appendix A.

Less commonly observed sites that may be present in the project's environment include fish weirs and wet sites. Precontact fish weirs consist of rows of wooden stakes used to guide and trap salmon. Stakes are commonly but not always composed of western red cedar and are typically placed vertically in the ground at a regular spacing of roughly 10 cm (4 in) intervals (Photo 1). Wet sites are archaeological sites that exist in saturated conditions. The saturation allows for preservation of materials that otherwise quickly decompose such as baskets, mats, and cordage (Appendix A).

The proponent will arrange for a qualified archaeologist to be available to examine inadvertent discoveries. If artifacts or cultural deposits are discovered inadvertently during ground-disturbing activities in the APE, the following steps should be implemented:

1. Construction should be immediately stopped in the area of the discovery.

2. The construction supervisor will map the location of the find with a GPS unit, mark the location (to the extent possible – this will vary depending on depth of the find and could include lath and flagging tape in shallow areas) and establish a 10-m (30-foot) buffer area around the discovery to protect the area while the find is investigated. Work may proceed in other parts of the APE, provided it will not affect the cultural discovery.

3. The on-call archaeologist will be contacted and dispatched to examine the find. The examination will be limited to what is visible from above the water/what has been removed from the water.

4. If the discovery is found to be cultural, the archaeologist will notify the proponent's project manager, who will notify the Port, the USACE, and Ecology. The USACE, as lead agency for Section 106 compliance, will carry out any necessary consultation with the DAHP, affected tribes, and other interested parties. Ecology may also choose to consult with DAHP and/or the Tribes independently.

5. The archaeologist will record all prehistoric and historic cultural material discovered during project construction on a standard DAHP archaeological site or isolate inventory form. The following procedures are usually implemented for sites on land and may not be possible for recording and investigating an in-water site. They will be implemented when possible:

    - The archaeologist will photograph site overviews, features, and artifacts and prepare stratigraphic profiles and soil/sediment descriptions for minimal subsurface exposures.

    - They will document discovery locations on scaled site plans and site location maps. Cultural features, horizons, and artifacts detected in buried sediments may require the archaeologist to conduct further evaluation using hand-dug test units.

    - They will excavate units in a controlled fashion to expose features, collect samples from undisturbed contexts, or to interpret complex stratigraphy. They may also use a test unit or trench excavation to determine if an intact occupation surface is present. They will only use test units when necessary to gather information on the nature, extent, and integrity of subsurface cultural deposits to evaluate the site's significance. They will conduct excavations using standard archaeological techniques to precisely document the location of cultural deposits, artifacts, and features.

    - The archaeologist will record spatial information, depth of excavation levels, natural and cultural stratigraphy, presence or absence of cultural material, and depth to sterile soil, regolith, or bedrock for each unit on a standard form. They will complete test excavation unit level forms, which will include plan maps for each excavation level and artifact counts and material types, number, and vertical provenience (depth below surface and stratum association where applicable) for all recovered artifacts.

    - They will draw a stratigraphic profile for at least one wall of each test excavation unit.

6. The archaeologist will screen sediments excavated for purposes of cultural resources investigation through 1/8-inch mesh, unless soil conditions warrant 1/4-inch mesh. The archaeologist will analyze, catalogue, and temporarily curate all prehistoric and historic artifacts collected from the surface and from probes and excavation units.

7. The ultimate disposition of cultural materials will be determined in consultation with the USACE, DAHP, Ecology, and the affected tribe(s). The archaeologist will assist in facilitating related communications, as needed.

8. Work may continue at the discovery location only after the process outlined in this plan is followed and the Project Lead/Organization, DAHP, any affected tribe(s), Ecology, and the USACE determine that compliance with state and federal laws is complete.

Inadvertent Discovery Plan for Burials and Human Remains

If ground-disturbing activities encounter human skeletal remains during construction, all activity will cease that may cause further disturbance to those remains. The area of the find will be secured and protected from further disturbance. The finding of human skeletal remains will be reported to the Thurston County Coroner and the Olympia Police Department immediately. The remains will not be touched, moved, or further disturbed. The county coroner will assume jurisdiction over the human skeletal remains and make a determination as to whether those remains are forensic or non-forensic. If the county coroner determines the remains are non-forensic, then they will report that finding to the DAHP, who will then take jurisdiction over the remains. The State Physical Anthropologist will determine whether the remains are Indian or non-Indian and report that finding to any appropriate cemeteries and the affected tribes. The DAHP will then handle all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains.

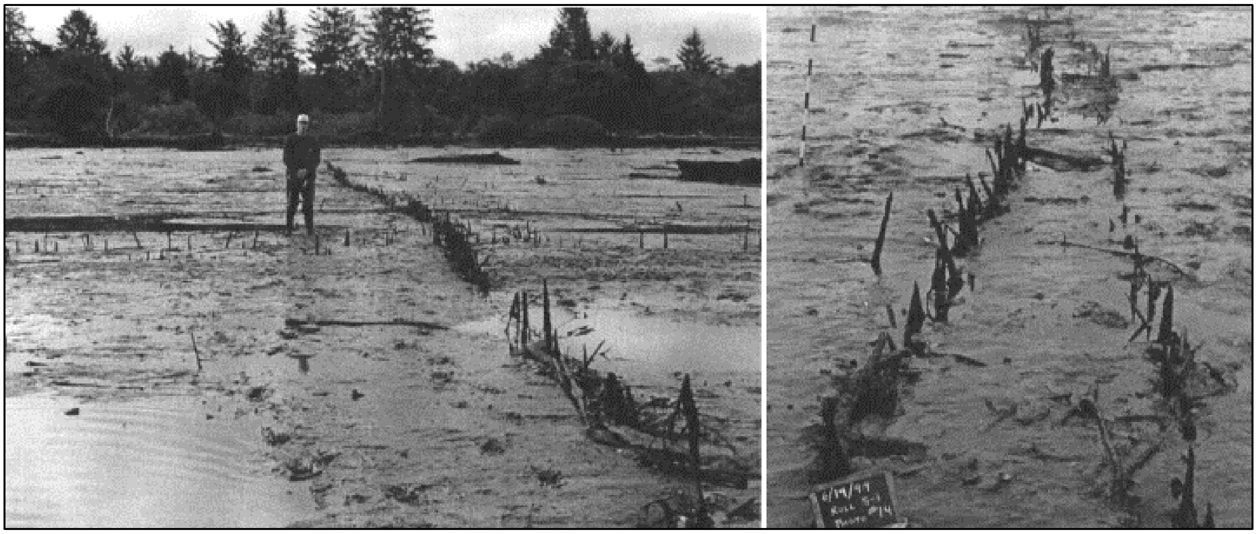


Photo 1. Examples of fish weirs.

Contact Information

<u>Port of Olympia</u>

Jonathon Wolf, Budd Inlet Project Manager
JonathonW@PortOlympia.com
(360) 528-8073

<u>Department of Ecology</u>

Sandy Smith, Cleanup Project Manager
sasm461@ECY.WA.GOV
(360) 999-9588

<u>Dalton, Olmstead & Fuglevand</u>

Rob Webb, President, Principal Engineer
rwebb@dofnw.com
(360) 908-1386

Tasya Gray, Principal Geologist
ngray@dofnw.com
(360) 394-7917

<u>Archaeologist - WestLand Engineering and Environmental Services</u>

Jennifer Hushour, Director
jhushour@westlandresources.com
(425) 371-6650

Carol Schultze, Principal Investigator
cschultze@westlandresources.com
(206) 321-4115

Washington Department of Archaeology and Historic Preservation (DAHP)

Rob Whitlam
Rob.Whitlam@dahp.wa.gov
(360) 890-2615

Washington State Physical Anthropologist

Guy Tasa, PhD.
Guy.tasa@dahp.wa.gov
(360) 790-1633

Olympia Police Department

(360) 704-2740

Thurston County Coroner

(360) 867-2140

Confederated Tribes of the Chehalis Reservation

Dan Penn, Acting THPO
Phone: 360.709.1747
dpenn@chehalistribe.org

Cowlitz Indian Tribe

Rita Asgeirsson, Cultural Resources Director
rasgeirsson@cowlitz.org
Phone: 360-575-6226

Nisqually Indian Tribe

Brad Beach, THPO
Phone: 360-456-5221 ext 1277
Cell: 360-528-1084
beach.brad@nisqually-nsn.gov

Puyallup Tribe of Indians

Brandon Reynon, Cultural Resources
3009 East Portland Avenue Tacoma, WA 98404
Phone: 253-573-7986
brandon.reynon@puyalluptribe-nsn.gov

Quinault Indian Nation

Justine James, Cultural Resources
Phone: 360-276-8215 ext. 520
jjames@quinault.org

Squaxin Island Tribe

Rhonda Foster, THPO
Phone: 360-432-3850
rfoster@squaxin.us

APPENDIX A. EXAMPLES OF ARCHAEOLOGICAL MATERIALS AND FEATURES

Implement the IDP if you see…

Chipped stone artifacts.

Examples are:

- Glass-like material.
- Angular material.
- “Unusual” material or shape for the area.
- Regularity of flaking.
- Variability of size.

Stone artifacts from Oregon.

Stone artifacts from Washington.

Biface-knife, scraper, or pre-form found in NE Washington. Thought to be a well knapped object of great antiquity. Courtesy of Methow Salmon Rec. Foundation.

Implement the IDP if you see…

Ground stone artifacts.

Examples are:

- Unusual or unnatural shapes or unusual stone.
- Striations or scratching.
- Etching, perforations, or pecking.
- Regularity in modifications.
- Variability of size, function, or complexity.

Above: Fishing Weight - credit CRITFC Treaty Fishing Rights website.

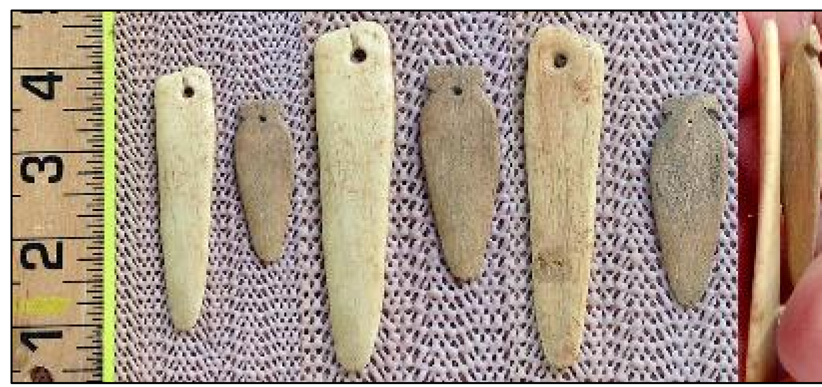
Artifacts from unknown locations (left and right images).

Implement the IDP if you see…

Bone or shell artifacts, tools, or beads.

Examples are:

- Smooth or carved materials.
- Unusual shape.
- Pointed as if used as a tool.
- Wedge shaped like a “shoehorn”.
- Variability of size.
- Beads from shell (dentalium) or tusk.



Upper Left:*Bone Awls from Oregon.*

Upper Center: *Bone Wedge from California.*

Upper Right: *Plateau dentalium choker and bracelet, from Nez Perce National Historical Park, 19th century, made using Antalis pretiosa shells Credit: Nez Perce - Nez Perce National Historical Park, NEPE 8762, Public Domain.*

Above: *Tooth Pendants. Right: Bone Pendants. Both from Oregon and Washington.*

Implement the IDP if you see…

Culturally modified trees, fiber, or wood artifacts.

Examples are:

- Trees with bark stripped or peeled, carvings, axe cuts, de-limbing, wood removal, and other human modifications.
- Fiber or wood artifacts in a wet environment.
- Variability of size, function, and complexity.

Left and Below: *Culturally modified tree and an old carving on an aspen (Courtesy of DAHP).*

Right, Top to Bottom: *Artifacts from Mud Bay, Olympia: Toy war club, two strand cedar rope, wet basketry*.

Implement the IDP if you see…

Strange, different, or interesting looking dirt, rocks, or shells.

Human activities leave traces in the ground that may or may not have artifacts associated with them. Examples are:

- “Unusual” accumulations of rock (especially fire-cracked rock).
- “Unusual” shaped accumulations of rock (such as a shape similar to a fire ring).
- Charcoal or charcoal-stained soils, burnt-looking soils, or soil that has a “layer cake” appearance.
- Accumulations of shell, bones, or artifacts. Shells may be crushed.
- Look for the “unusual” or out of place (for example, rock piles in areas with otherwise few rocks).

Shell Midden pocket in modern fill discovered in sewer trench.

Underground oven. Courtesy of DAHP.

Shell midden with fire cracked rock.

Hearth excavated near Hamilton, WA.

Implement the IDP if you see…

Historic period artifacts (historic archaeology considered older than 50 years).

Examples are:

- Agricultural or logging equipment. May include equipment, fencing, canals, spillways, chutes, derelict sawmills, tools, etc.
- Domestic items including square or wire nails, amethyst colored glass, or painted stoneware.

Left: Top to Bottom: *Willow pattern serving bowl and slip joint pocket knife discovered during Seattle Smith Cove shantytown (45-KI-1200) excavation.*

Right: *Collections of historic artifacts discovered during excavations in eastern Washington cities.*

Implement the IDP if you see…

Historic period artifacts (historic archaeology considered older than 50 years).

Examples are:

- Railway tokens, coins, and buttons.
- Spectacles, toys, clothing, and personal items.
- Items helping to understand a culture or identity.
- Food containers and dishware.

Right, from Top to Bottom: *Coins, token, spectacles and Montgomery Ward pitchfork toy discovered during Seattle Smith Cove shantytown (45-KI-1200) excavation.*

Main Image: *Dishes, bottles, workboot found at the North Shore Japanese bath house (ofuro) site, Courtesy Bob Muckle, Archaeologist, Capilano University, B.C. This is an example of an above ground resource.*

Implement the IDP if you see…

- Old munition casings – if you see ammunition of any type – ***always assume they are live and never touch or move!***
- Tin cans or glass bottles with an older manufacturer's technique – maker's mark, distinct colors such as turquoise, or an older method of opening the container.

Far Left: .303 British cartridge found by a WCC planting crew on Skagit River. Don't ever touch something like this!
Left: Maker's mark on bottom of old bottle.

Right: *Old beer can found in Oregon. ACME was owned by Olympia Brewery. Courtesy of Heather Simmons.*

Logo employed by Whithall Tatum & Co. between 1924 to 1938 (Lockhart et al. 2016).

Can opening dates, courtesy of W.M. Schroeder.

Implement the IDP if you see…

You see historic foundations or buried structures.

Examples are:

- Foundations.
- Railroad and trolley tracks.
- Remnants of structures.

Counter Clockwise, Left to Right: *Historic structure 45KI924, in WSDOT right of way for SR99 tunnel. Remnants of Smith Cove shantytown (45-KI-1200) discovered during Ecology CSO excavation, City of Spokane historic trolley tracks uncovered during stormwater project, intact foundation of historic home that survived the Great Ellensburg Fire of July 4, 1889, uncovered beneath parking lot in Ellensburg.*

Implement the IDP if you see...

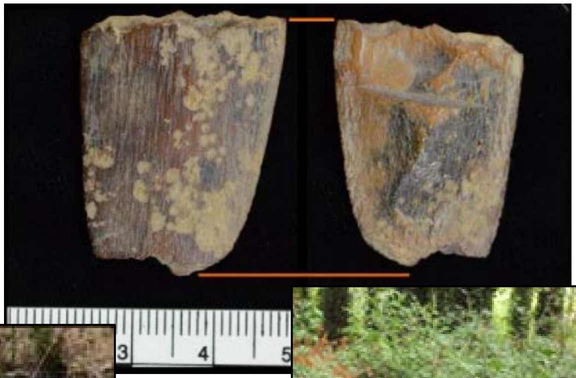
Potential human remains.

Examples are:

- Grave headstones that appear to be older than 50 years.
- Bones or bone tools--intact or in small pieces. It can be difficult to differentiate animal from human so they must be identified by an expert.
- These are all examples of animal bones and are not human.

Center: *Bone wedge tool, courtesy of Smith Cove Shantytown excavation (45KI1200).*

Other images (Top Right, Bottom Left, and Bottom) Center: Courtesy of DAHP.



Directly Above: This is a real discovery at an Ecology sewer project site.

What would you do if you found these items at a site? Who would be the first person you would call?

Hint: *Read the plan!*