January 2024
Port Gamble Integrated Cleanup and Habitat Restoration

ANCHOR QEA

Engineering Design Report

Prepared for Washington State Department of Ecology; Port Gamble Natural Resource Trustees; OPG Port Gamble LLC; Pope Resources; and OPG Properties LLC

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ABBREVIATIONS

µg/kg	micrograms per kilogram
Bay	Port Gamble Bay
bgs	below ground surface
BMP	best management practice
CAP	Cleanup Action Plan
CD	Consent Decree
CoC	chemicals of concern
Companies	OPG Port Gamble LLC; Pope Resources; and OPG Properties LLC
cPAH	carcinogenic polycyclic aromatic hydrocarbon
cy	cubic yards
d_{50}	median particle size
Ecology	Washington State Department of Ecology
EDR	Engineering Design Report
EPA	U.S. Environmental Protection Agency
H:V	horizontal to vertical
H_2S	hydrogen sulfide
MAF	Model Airplane Field Limited Purpose Landfill
mg/kg	milligrams per kilogram
Mill Site	former Port Gamble sawmill site
MLLW	mean lower low water
MTCA	Model Toxics Control Act
ng/kg	nanograms per kilogram
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRD	Natural Resource Damage
PDI	pre-design investigation
PGST	Port Gamble S'Klallam Tribe
RI/FS	Remedial Investigation/Feasibility Study
SOW	Statement of Work
SWPPP	stormwater pollution prevention plan
TEQ	toxicity equivalency quotient
TESC	temporary erosion and sediment control
USACE	U.S. Army Corps of Engineers
WAC	Washington Administrative Code

1 Introduction

This Engineering Design Report (EDR) describes the approach and criteria for the design of integrated cleanup and habitat restoration actions in upland and nearshore aquatic areas of the former Port Gamble Mill sawmill site located in Port Gamble, Kitsap County, Washington. Integrated cleanup and habitat restoration actions in Port Gamble will be implemented concurrently to achieve efficiencies and maximize protection.

Aquatic cleanup actions in Port Gamble Bay (Bay) are set forth in the Bay Cleanup Action Plan (Bay CAP; Ecology 2013), and in accordance with Washington State Model Toxics Control Act (MTCA) Consent Decree (CD) 13-2-02720-0 between OPG Port Gamble LLC; Pope Resources, a Delaware Limited Partnership; and OPG Properties LLC (collectively, the Companies) and the Washington State Department of Ecology (Ecology). Similarly, upland cleanup actions at the former Port Gamble sawmill site (Mill Site) are set forth in the Mill Site uplands CAP (Ecology 2020), and in accordance with MTCA CD 20-0-01674-18 between the Companies and Ecology. Finally, habitat restoration actions are set forth in the Bay Habitat Restoration Statement of Work (SOW; Anchor QEA 2023), and in accordance with the pending Natural Resource Damage (NRD) CD between the Companies and the Port Gamble S'Klallam Tribe (PGST); the Suquamish Tribe; the Skokomish Indian Tribe; the Jamestown S'Klallam Tribe; the Lower Elwha Klallam Tribe; the U.S. Department of the Interior; and Ecology (collectively, the Natural Resource Trustees).

This EDR presents a narrative discussion of performance standards, Bay and Mill Site cleanup remedy designs, NRD restoration designs, and how integrated cleanup and restoration actions will meet professional engineering standards of practice and regulatory requirements. Cleanup and restoration actions described in this EDR will be performed by the Companies under Ecology and Natural Resource Trustee oversight, consistent with the requirements of the three CDs referenced above, and with permitting requirements. Bay and Mill Site characterization data are on file at Ecology headquarters located at 300 Desmond Drive, Lacey, Washington.

1.1 Project Vicinity

The Bay is in Kitsap County and encompasses more than 2 square miles of subtidal and shallow intertidal habitat just south of the Strait of Juan de Fuca (Figure 1). The Bay and surrounding areas support diverse aquatic and upland habitats, as well as resources for fishing, shellfish harvesting, and other aquatic uses. The area surrounding the Bay remains largely rural in nature, though more than 100 acres of the basin are currently in commercial land use, largely in the Gamble Creek watershed.

The PGST Reservation is located on the eastern shoreline of the Bay. Members from the PGST Reservation and other tribes use the Bay for shellfish harvesting, fishing, and other resources. The

Mill Site is located on a sand spit that was filled to create the upland area for the former sawmill in the northwest portion of the Bay. The former sawmill operated from 1853 to 1995.

Cleanup of the Bay, including nearshore aquatic areas adjacent to the Mill Site, was completed in 2017 (Anchor QEA 2018; see Section 1.2). Upland areas of the Mill Site are currently vacant and covered with areas of hardscape (asphalt and concrete pavement; concrete footings) and gravel.

1.2 Cleanup and Restoration Objectives

The objectives of Bay and Mill Site cleanup and restoration actions, as set forth in the three CDs referenced above, are described in this section.

1.2.1 Bay Cleanup

In accordance with the Bay CAP and CD, between September 2015 and January 2017 the Companies successfully completed the in-water construction phase of the Bay cleanup project with Ecology oversight (Anchor QEA 2018). Construction activities were implemented in accordance with the Ecology-approved remedial designs (Anchor QEA 2015a), project technical specifications and construction drawings, and associated permitting requirements. The Companies and Ecology coordinated on appropriate modifications to the design as necessitated by field conditions to meet Ecology's overall objectives for Bay cleanup. Construction activities included the following:

- Removal and off-site landfill disposal of 8,592 decayed piling, nearly all of which were creosote treated; 99.9% of the piles were successfully removed without breaking.
- Removal and off-site landfill disposal of 110,000 cubic yards (cy) of wood debris and sediment.
- Removal and off-site landfill disposal of 1.3 acres of overwater and derelict structures.
- Improvement of 3,485 linear feet of shoreline.
- Placement of clean engineered caps over 13 acres of the Bay.
- Placement of clean sand layers over 79 acres of the Bay to manage residuals and reduce sediment toxicity.

Post-construction monitoring documented the integrity and protectiveness of engineered caps placed in the Bay (Ecology 2022). Newer sediments continue to accrete on the surface of the caps. Localized zones of erosion were proactively repaired by the Companies shortly after completion of construction by placing larger armor stone materials. Recent monitoring verified that all caps remain stable and protective.

Post-construction chemical and biological monitoring has also verified that cleanup actions successfully reduced toxicity risks to benthic organisms throughout the Bay (Ecology 2022). While piling removal operations resulted in a small (0.2%) and unavoidable carcinogenic polycyclic aromatic hydrocarbon (cPAH) release to the Bay during construction, shellfish sampling revealed

protective decreases in tissue concentrations of contaminants following construction. Chemical and biological monitoring data reveal that the Bay is on track to achieve cleanup objectives. A follow-on round of monitoring will be performed in 2026 to further document the integrity of engineered caps and verify attainment of cleanup objectives, informing Ecology's next Five-Year Review of the Bay cleanup remedy scheduled for 2027.

1.2.2 Mill Site Uplands Cleanup Objectives

From 1999 through 2001, the Companies completed multiple soil and groundwater investigations in historical source areas at the Mill Site. These investigations informed a 2002 interim remedial action that included excavation of 20,460 tons of soil exceeding MTCA unrestricted use soil cleanup levels from 10 upland areas and disposal of these materials at approved off-site landfills.

Post-remediation groundwater monitoring conducted after completion of the 2002 interim action identified two additional areas of contamination that were subsequently characterized, informing a second interim action. Like the earlier action, from 2004 to 2005 the Companies excavated an additional 5,850 tons of contaminated soil from two upland areas of the Mill Site and disposed of these materials at approved off-site landfills (the Companies removed a total of 26,310 tons of contaminated soil from the Mill Site between 2002 and 2005).

Following several more years of additional post-construction groundwater monitoring, and under a 2008 Agreed Order between the Companies and Ecology, a remedial investigation/feasibility study (RI/FS) for the Mill Site was prepared and provided for public comment in 2012. Under a subsequent 2018 Agreed Order between the Companies and Ecology, additional characterization of the nature and extent of dioxins/furans over a larger study area adjacent to the Mill Site was performed, completing the supplemental RI/FS to support the Mill Site uplands CAP (Ecology 2020).

Previous soil removal actions were focused on mercury remediation and did not monitor dioxins/furans in soils of the Mill Site, particularly in the northeastern area of the former sawmill facility, as testing for dioxins/furans was not feasible at the time of these removal actions. As a result, some soils excavated during the 2004/2005 interim action contained elevated dioxin/furan concentrations and were inadvertently used as deep backfill because mercury concentrations in these soils were below the MTCA unrestricted-use soil cleanup level.

In accordance with MTCA requirements, the Companies and Ecology developed cleanup and remediation levels for CoCs remaining at the Mill Site, including dioxins/furans, cPAHs, lead, and arsenic (Ecology 2020). Protective cleanup levels were developed based on unrestricted future land

use, along with site-specific groundwater, surface water, and sediment protection requirements. The Mill Site uplands CAP identified the following objectives to complete cleanup actions:

- Protect human health by removing, or by eliminating the potential for direct contact exposure, Mill Site areas with soil concentrations exceeding 12 nanograms per kilogram (ng/kg) dioxin/furan toxicity equivalency quotient (TEQ) and/or 190 micrograms per kilogram (µg/kg) cPAH TEQ.
- Protect terrestrial ecological receptors by removing Mill Site soils with soil dioxin/furan concentrations exceeding 260 ng/kg TEQ in the top 6 feet below ground surface (bgs) and implementing institutional controls for an isolated area of subsurface soil with elevated lead concentrations.
- Protect groundwater, surface water, and sediments by removing Mill Site soils with dioxin/furan concentrations exceeding 530 ng/kg TEQ.
- Ensure that groundwater is not used as a future source of drinking water, by implementing institutional controls.

The Mill Site uplands CAP (Ecology 2020) describes specific functional requirements for cleanup. Remediation areas were subsequently refined based on sequential pre-design investigations (Appendix A.1) and are depicted in Figure 2. In addition, pre-design groundwater monitoring in the northeastern portion of the Mill Site verified compliance with groundwater cleanup levels (Appendix A.2)[1].

To support the remedy design, the Mill Site was subdivided into work zones (Section 2.3) so that remedy actions can be clearly defined in each discrete area. Final cleanup actions at the Mill Site include the following:

- Within the remedial excavation area of the Mill Site (Work Zone 1 and Work Zone 2), any surficial hardscape material (asphalt or concrete) will be excavated, processed, and disposed of at approved off-site landfills or recycling facilities, as appropriate.
- Existing hardscape in areas to be capped will be perforated as necessary prior to capping.
- Surface soil excavation will be performed in the north portion of the Mill Site (Work Zone 1); verification samples will be collected at the base of the excavation to verify that cleanup levels are achieved, and the excavation area subsequently backfilled with clean soils.
- Soil excavation in the northeast portion of the Mill Site (Work Zone 2) will extend down to approximately 18 feet bgs, as follows:
    - Soils from 0 to 5 feet bgs in Work Zone 2 will be excavated using conventional earth moving equipment without shoring or dewatering; minor benching may be required.

[1] Dioxin/furan concentrations in groundwater samples collected adjacent to the soil excavation area (MW-1, -2, and 3; Figure 2) in June and September 2022 were below the 4.4 picogram per liter TEQ cleanup level set forth in the Mill Site CAP (Ecology 2020).

  - Excavations deeper than approximately 8 feet bgs in Work Zone 2 will be dewatered as needed by pumping groundwater from within and/or adjacent to the excavation; the pumped water may be stored in tanks to remove suspended solids, and then discharged back into Mill Site groundwater via an upland infiltration basin, like earlier interim actions.
  - Consistent with Ecology-approved work plans, sufficient soil delineation data were collected in Work Zone 2 during sequential pre-design investigations (Appendix A.1), obviating the need for post-excavation confirmation sampling at depths where shoring may complicate post-excavation confirmation sampling, reducing construction complications associated with leaving the deep excavation open while waiting for post-excavation confirmatory sample results; however, verification samples will be collected at the base of the Work Zone 2 excavation to document post-removal conditions[2].
- Excavated soils will be stockpiled on site for profiling and further dewatering and/or "sparging"[3] as needed for Port Gamble Model Airplane Field Limited Purpose Landfill (MAF) disposal.
- Stockpiles with soil concentrations meeting cleanup levels (e.g., dioxin/furan concentrations less than 12 ng/kg TEQ) will be returned as backfill into the excavations, along with clean imported fill.
- Stockpiles with soil concentrations greater than cleanup levels but less than MAF suitability criteria (e.g., dioxin/furan concentrations less than 45 ng/kg TEQ) will be disposed at the MAF, if approved by the Kitsap Public Health District.
- Stockpiles with soil concentrations greater than MAF suitability criteria and any other stockpiles not approved by the Kitsap Public Health District for MAF disposal will be disposed of at an approved, off-site commercial landfill.
- As delineated by pre-design investigations (Appendix A.1), 8.3 acres in three separate areas of the Mill Site contain surface or near-surface soils with dioxin/furan levels greater than 12 ng/kg TEQ and less than 260 ng/kg TEQ; surficial hardscape material may be perforated and left in place to achieve cleanup requirements[4], and a minimum 2-foot-thick permeable soil cap will be placed over these areas.
- Restrictive covenants will be recorded to preclude future use of the shallow aquifer at the Mill Site for drinking water supply; restrictive covenants for soil caps will be recorded to ensure the integrity of the upland caps and prevent exposure to capped surficial soils.

[2] Backfilling of the Work Zone 2 excavation will occur prior to receipt of verification sampling documentation.

[3] "Sparging" refers to the application of fresh water at the former Mill Site to rinse salt from excavated sediments or soils to ensure suitability for placement at the MAF; because excavated shoreline and upland soils are relatively coarse-grained, sparging to achieve disposal criteria is anticipated to be accomplished concurrent with stockpile chemical analyses without impacting the project schedule.

[4] To concurrently restore riparian habitat functions and achieve efficiencies, surficial hardscape in additional areas of the Mill Site will be removed and capped with two feet of soil; see Section 1.2.3.

- Notice and approval from Ecology will be required for any future land use activity that is inconsistent with the restrictive covenants.
- The existing Kitsap County permitting (e.g., grading permit) process will be used as an additional administrative mechanism to further ensure that future actions at the Mill Site do not disturb capped areas.

1.2.3 Bay and Mill Site Habitat Restoration Objectives

As discussed above, integrated habitat restoration actions in Port Gamble will be implemented concurrent with the Mill Site cleanup to achieve efficiencies and maximize protection. The objectives of restoration are to restore shoreline processes and enhance habitat for benthos, forage fish, shellfish, and juvenile salmonids in the Bay. Restoration objectives include increasing the functional value of habitat for these resource species as follows:

- Increasing the amount of intertidal habitat acreage.
- Restoring shorelines in the southern portion of the former sawmill facility to more natural intertidal substrates and more gently sloped conditions supported by riparian vegetation to provide habitat for forage fish, shellfish, and juvenile salmonids.
- Restoring functional shallow subtidal habitat substrate in woody debris areas to support eelgrass meadow development in the western Bay.

The Bay EDR (Anchor QEA 2015a) presents criteria for engineering design of sediment cleanup actions in the Bay as required by the 2013 CD. Appendix M of the Bay EDR (Anchor QEA 2015b) describes one possible approach to integrate habitat restoration with cleanup requirements but allows for other options to optimize overall habitat functions and protectiveness as practicable. Restoration projects in Port Gamble are detailed in the following subsections.

1.2.3.1 Southern Mill Site Shoreline Restoration

This 9-acre project includes laying back intertidal slopes of the southern portion of the Mill Site shoreline to an average 8 horizonal to 1 vertical (8H:1V) slope (Construction Drawing CM-01). Engineering analyses included in the Bay EDR (Anchor QEA 2015a) and refined in Appendix D of this EDR have determined that 8H:1V slopes would need to have a median particle size (d_{50}) of approximately 6 inches (cobble size) to remain in place and protective over the long term (e.g., stable during a 100-year recurrence interval storm event). Consistent with Bay cleanup and habitat restoration requirements, restored intertidal caps will include the following:

- A lower layer of salvaged and imported angular cap substrate (a minimum 1-foot-thick layer of salvaged armor rock and imported angular materials with a d_{50} of approximately 6 inches).
- A middle layer of rounded beach substrate, also filling voids in the underlying armor layer.

- An upper layer of sand/gravel habitat substrate to optimize habitat functions, also filling voids in the underlying rounded cobble/gravel beach substrate layer.

Immediately upland of the restored intertidal cap will be a 30-foot-wide beach backshore area, which will be laid back at a 20H:1V slope. The two lower layers of the intertidal cap (salvaged/import angular armor and rounded beach substrate) will extend beneath the entirety of the 30-foot-wide beach backshore slope and be overlaid by 1 foot of clean sand to support beach grass plantings.

A 150-foot-wide riparian zone will be constructed upland of the beach backshore, slightly sloped toward the Bay to promote drainage. The riparian zone will consist of clean cap material and imported vegetation and plantings. Near-surface hardscape will be removed throughout the 150-foot shoreline buffer, followed by topsoil placement and native plantings.

Hardscape material (asphalt or concrete) will be processed (removed, stockpiled, and resized) on-site to be transported for disposal at an approved off-site landfills or recycling facilities, as appropriate. Additional BMPs, including containment and dust control, will be employed as necessary during the demolition of hardscape. Excavated soils will be stockpiled on site for profiling and further dewatering and/or "sparging" as needed for MAF disposal. Stockpiles with soil concentrations meeting cleanup levels (e.g., dioxin/furan concentrations less than 12 ng/kg TEQ) will be transferred to an upland placement area behind the riparian zone; existing hardscape within the upland placement area will be perforated prior to accepting material. Stockpiles with soil concentrations greater than cleanup levels but less than MAF suitability criteria (e.g., dioxin/furan concentrations less than 45 ng/kg TEQ) will be disposed at the MAF, if approved by the Kitsap Public Health District. Stockpiles with soil concentration greater than MAF suitability criteria and any other stockpiles not approved by the Kitsap Public Health District for MAF disposal will be disposed of at an approved, off-site commercial landfill.

1.2.3.2 Western Bay Nearshore Thin Layer Sand Cover

Under a separate contract, a sand cover layer will be placed over a minimum of 11 acres of lower intertidal to shallow subtidal zones (approximately -2 to -15 feet mean lower low water [MLLW]) within former log rafting areas in the western Bay to restore benthic habitat functions and concurrently provide suitable substrate in areas where eelgrass is absent or growing at very sparse densities (Construction Drawing C-09). As practicable, the sand cover will be constructed using clean dredge material from the nearby Driftwood Key navigation channel, or other similar marine source to optimize habitat functions. If a suitable marine source is not available, clean sand from an upland source will be used.

1.2.3.3 Western Bay Nearshore Eelgrass Transplanting

Eelgrass will be transplanted into western Bay areas where there is currently little or no eelgrass, including on and adjacent to the thin layer sand cover discussed above. Eelgrass transplanting will be performed following placement and consolidation of the cover, informed by monitoring and adaptive management methods patterned after those used successfully at other western Washington sites[5].

Although sand cover placement and eelgrass transplanting will occur under a separate contract, the EDR discusses both the southern Mill Site shoreline restoration activities and the western Bay nearshore thin layer sand cover habitat restoration projects with cleanup actions as described above.

1.3 Report Organization

This EDR is organized following MTCA requirements, as detailed in Washington Administrative Code (WAC) 173-340-400, and includes the following sections:

- Section 2 summarizes the background overall design requirements.
- Section 3 summarizes design criteria used in the engineering analysis of the cleanup remedy and habitat restoration.
- Section 4 summarizes anticipated construction sequencing approaches, excavation methods, best management practices, and material management and placement designs.
- Section 5 describes site preparation and staging designs.
- Section 6 describes cleanup design elements.
- Section 7 describes habitat restoration design elements.
- Section 8 summarizes the anticipated implementation schedule for the project.
- Section 9 provides a list of references used to prepare this EDR.

The following appendices provide supporting technical evaluations for this EDR:

- Appendix A: Pre-Design Investigation Data
- Appendix B: Cultural Resource Investigation Reports
- Appendix C: Driftwood Key Sediment Suitability
- Appendix D: Coastal Engineering Design Criteria
- Appendix E: Construction Drawings
- Appendix F: Construction Specifications
- Appendix G: Construction Quality Assurance Plan
- Appendix H: Water Quality Monitoring Plan
- Appendix I: Monitoring and Maintenance Plan
- Appendix J: Engineer's Cost Estimate

[5] Eelgrass transplanting details are described in Anchor QEA (2023).

2 Design Background

This section summarizes overall design requirements. The sources of data used in the design are described, as well as coordination with potential redevelopment actions at the Mill Site.

2.1 Site Characteristics

This section describes site characteristics relevant to the engineering design of cleanup and habitat restoration actions, including the project physical setting, tidal conditions, groundwater, cultural resources, and recent biological surveys.

2.1.1 Physical Setting

Soil stratigraphy at the Mill Site is consistent with regional geologic conditions and with the expansion and development history. Fill materials are present across the Mill Site from the ground surface to depths varying between 2 and 15 feet bgs. The fill material consists of well graded to poorly graded sand and gravel with some debris (i.e., brick, wood, and concrete). Native material underlies the fill material and consists of well graded to poorly graded sand with some gravel and shell fragments, deposited in nearshore marine and glaciofluvial environments.

Most of the Mill Site shoreline is currently armored with engineered caps constructed as part of the 2015 to 2017 Bay cleanup (Anchor QEA 2018). Intertidal caps were designed to provide chemical isolation and stability on the upper portion of the intertidal slopes with relatively steep (3H:1V) slopes. Armor rock was sized to withstand erosive forces on the 3H:1V slope (i.e., larger than what would be protective for flatter slopes). These existing caps are shown in Figure 2. Where restoration areas overlap with existing caps, caps will be replaced as detailed in this EDR. The current layout of the engineered caps constructed on the intertidal shoreline slopes is generally depicted by the survey contours shown on Construction Drawing G-02.1; detailed as-built information is available in the Season 1 and Season 2 Cleanup Action Report (Anchor QEA 2016, 2018a). Additional descriptions of soil conditions at the Mill Site can be found in the Mill Site uplands CAP (Ecology 2020) and supporting documents.

All storm drains at the Mill Site have been temporarily plugged and all storm drains leading to the Bay are permanently abandoned. An existing storm drain in the northern Mill Site will be improved or replaced by the Companies as part of a separate project. During the 2015 to 2017 cleanup action, hardscape areas were perforated with a concrete breaker to facilitate stormwater infiltration. While significant ponding of water onsite occurs during storm events, currently there is no observable surface water/stormwater runoff from the Mill Site into the Bay; all surface water infiltrates into the underlying shallow groundwater system prior to transport to the Bay.

A National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit obtained for the 2015 to 2017 cleanup action remains active, though the Mill Site is stabilized and there are no ongoing construction activities.

The Mill Site is currently zoned as Rural Historic Town Waterfront according to the Kitsap County Zoning map. Adjacent properties to the west and south are zoned as Rural Historic Town Commercial and Rural Historic Town Residential.

The Mill Site shoreline is classified as Urban Conservancy under the Shoreline Management Act Guidelines (WAC 173-26-211[2][a]) by the Kitsap County Department of Community Development. A portion of the Mill Site is within a High-Risk Area Zone designated area on the Federal Emergency Management Agency Flood Map (Kitsap County 2020). Plans to raise the grade of the mill site to protect future development against flooding are clarified in the Port Gamble EIS and County-approved redevelopment plan. As discussed in Section 7, erosion controls have been integrated into this EDR, including within beach backshore areas.

2.1.2 Surface Water Hydrology and Tidal Conditions

The Bay has mudline elevations ranging from approximately +10 to -65 feet MLLW; typical mudline elevations in the center of the Bay range from -30 to -40 feet MLLW. The Bay is oriented with its long axis directed generally north to south and is approximately 2.9 miles long and 0.9 mile wide at its maximum dimensions. Due to the long north/south fetch distance, wind-generated waves on the order of 1 to 3 feet occur during storms with recurrence intervals ranging from 50 to 100 years (Anchor QEA 2015a).

Table 1 summarizes tidal datum elevations within the Bay based on National Oceanic and Atmospheric Administration Station 9445016 at Foulweather Bluff, located approximately 6 miles north of Port Gamble. Elevations are presented relative to the MLLW vertical datum.

Tidal currents in the Bay range from negligible to greater than 2 feet per second in the main tidal (and federal navigation) channel between Point Julia and the Mill Site (Parametrix 2002).

There are five year-round streams that discharge into the Bay. Little Boston Creek is the nearest freshwater input and discharges to the Bay's eastern shore. Other perennial streams include Gamble Creek at the head of the Bay, Martha John Creek near South Gamble Marsh, Little Sluglum (Middle) Creek on the eastern shore, and Ladine DeCouteau Creek south of the Mill Site. South Gamble Marsh, on the southeastern shoreline of the Bay, is a low-lying wetland fed by Miller Lake. A small lake, now filled, was located on the bluff west of the Teekalet spit during the early historical period (NWAA 2012).

Table 1
Tidal Datums – Port Gamble

Datum	Elevation in feet MLLW
Mean Higher High Water	10.0[1]
Mean High Water	9.2
Mean Tide Level	5.9
Mean Sea Level	5.9
Mean Low Water	2.7
North American Vertical Datum of 1988 (NAVD88)	--[2]
Mean Lower Low Water (MLLW)	0.0

Notes:

1. An elevation of 10.3 MLLW is used for Mean Higher High Water at the site.
2. The conversion from NAVD88 to MLLW provided by the official site survey from David Evans and Associated, Inc. is -2.34 feet (MLLW is lower in elevation than NAVD88); based on National Oceanic and Atmospheric Administration Station 9445016.

Daily tidal exchange with Hood Canal (Table 1) results in a calculated average water residence time in the Bay of approximately 4 to 6 days. Because of the pronounced sill in Hood Canal south of the Bay mouth, bottom waters in the southern and middle portions of Hood Canal with seasonally low dissolved oxygen concentrations do not exchange with the Bay (Ecology 2012).

2.1.3 Hydrogeology

The depth to groundwater at the Mill Site ranges from near ground surface in areas of standing water to greater than 12 feet bgs. The *RI/FS Work Plan* (Anchor and EPI 2008) summarizes water level measurements and water level potentiometric contour maps from June 2001 through March 2007. The observed water level measurements indicate that the groundwater flow direction is towards the Bay and Hood Canal (toward the east and northeast).

Slug tests were performed on eight monitoring wells and calculated hydraulic conductivity values ranged from 6.3×10^{-5} to 1.5×10^{-3} feet/second, revealing relatively permeable subsurface soils at the Mill Site. Additional details on the slug tests and hydraulic conductivity can be found in the *Interim Report No. 2 – Pope & Talbot, Inc. Port Gamble Mill Site, Results of Phase I Groundwater and Surface Water Investigation* (Parametrix 1999).

Nearshore groundwater elevations at the Mill Site fluctuate in response to tidal influence. In June 1999, four wells and Port Gamble Bay were monitored using continuously recording transducers for a period of 72 hours. Groundwater fluctuations were highest in wells located within approximately 50 feet of the shoreline, while relatively little tidal influence was observed in wells located more than 200 feet from the shoreline. Additional details on the tidal study can be found in *Interim Report No. 2 – Pope & Talbot, Inc. Port Gamble Mill Site, Results of Phase I Groundwater and Surface Water Investigation* (Parametrix 1999).

To characterize groundwater quality in the northeastern portion of the Mill Site, in June 2022 three shallow monitoring wells were installed immediately downgradient of the prospective Mill Site excavation area containing soil concentrations greater than the 530 ng/kg dioxin/furan TEQ soil remediation level (Figure 2; see Section 2.2.2). Dioxin/furan concentrations in groundwater samples collected from all three wells in June and September 2022 were below the 4.4 picogram per liter TEQ cleanup level set forth in the Mill Site uplands CAP (Appendix A.2; Ecology 2020).

2.1.4 Cultural Resources

There are documented cultural resources in the project area. A portion of the project will occur adjacent to and within the Port Gamble National Historic Landmark District, including the truck haul route leading to and along State Route 104.

Cultural resources from the uplands cleanup and restoration areas have been addressed in detail in the *Cultural Resources Assessment, Port Gamble Bay Habitat Restoration* (Appendix B.1) and the *Cultural Resources Survey Report Addendum – Port Gamble Upland Mill Site Cleanup Action* (Anchor QEA 2019; Appendix B.2). There are no anticipated effects on cultural resources in the area from the work described in this EDR. The Bay is a Traditional Cultural Property, significant for its association with ongoing tribal cultural practices. These revolve around shellfish and finfish harvesting, both subsistence and commercial, as well as associated ceremonial practices. The integrated cleanup and restoration project design described in this EDR has been developed to minimize potential impacts to tribal uses within the Bay to the extent practicable.

2.1.5 Biological Surveys

A pre-design dive survey performed in July 2021 (Anchor QEA and Grette 2021) identified areas of the western Bay that contain habitat suitable for common eelgrass (*Zostera marina*), as evidenced by the communities thriving in approximately 4.9 acres within the primary meadow, along with a smaller northern patch of 1.7 acres (Figure 3). While eelgrass was observed outside of these two beds, the other patches observed were mostly small and sparse, typically consisting of only a few shoots. Substrate conditions within the meadow and northern patch were firmer and more consolidated than outside of these two eelgrass beds. Eelgrass distributions within the western Bay appear to be primarily correlated with a relatively narrow euphotic zone depth range (-2 to -8 feet MLLW) and with sediment conditions (e.g., relatively lower percent fines and organic content) promoting a more consolidated substrate.

2.2 Cleanup Standards

This section summarizes the basis for the Mill Site cleanup action, including development of site-specific cleanup standards and identification of locations and media requiring cleanup action evaluation.

In accordance with MTCA, cleanup standards consist of cleanup levels that are protective of human health and the environment, and the point of compliance at which the cleanup levels must be met.

2.2.1 Cleanup Levels

The cleanup level is the concentration of a CoC that is protective of human health and the environment under site-specific exposure conditions. Future land use plans for the Mill Site are currently being decided by the Companies. To minimize limitations on future land use, unrestricted land use cleanup levels have been assumed throughout the 25-acre upland Mill Site.

Based on the evaluations described in the Mill Site uplands CAP (Ecology 2013) and supporting documents, Table 2 summarizes site-specific cleanup levels that are protective of human health and the environment under an unrestricted land use scenario.

Table 2
Bay and Mill Site Cleanup/Remediation Levels

Chemical of Concern	Sediment Cleanup Level	Soil Cleanup Level	Groundwater Cleanup Level	Soil Remediation Level
Dioxin/furan TEQ	5 ng/kg	12 ng/kg	4.4 pg/L	260*/530 ng/kg
cPAH TEQ	16 µg/kg	190 µg/kg	20 ng/L	--
Lead	--	220 mg/kg	--	--
Cadmium	3 mg/kg	--	--	--
Arsenic	--	--	36 µg/L	--
Benthic Toxicity	WAC 172-204-320(3)	--	--	--

Notes: The 260 ng/kg TEQ dioxin/furan soil remediation level for protection of terrestrial ecological receptors has a conditional point of compliance from the ground surface to 6 feet bgs.

2.2.2 Remediation Levels

While the 12 ng/kg dioxin/furan TEQ soil cleanup level for unrestricted use delineates Mill Site areas triggering remedial action, under MTCA (WAC 173-340-355) remediation levels are used to identify the concentrations of CoCs at which different cleanup action components will be used (e.g., excavation or capping). Because the 2002 to 2005 interim remedial actions successfully addressed all soil CoCs except dioxin/furan TEQ, final Mill Site remedial actions are appropriately focused on soil dioxins/furans.

As discussed in the Mill Site uplands CAP (Ecology 2020) and supporting documents, protective soil remediation levels were developed consistent with MTCA requirements. Based on measured site-specific soil to biota accumulation data, the soil dioxin/furan TEQ remediation for ecological protection is 260 ng/kg (from ground surface to 6 feet bgs). Based on conservative modeling projections, the soil dioxin/furan TEQ remediation for groundwater, surface water, and sediment

protection is 530 ng/kg (all depths). Soils exceeding these remediation levels will be removed and disposed of at an approved, off-site commercial landfill.

2.3 Work Zones

This section summarizes upland and nearshore Work Zones in Port Gamble for integrated cleanup and habitat restoration actions, as follows:

- **Work Zone 1.** An approximately 0.07-acre area within the northern portion of the Mill Site delineated for excavation[6] of soils that exceed the 12 ng/kg dioxin/furan TEQ cleanup level. Soils will be excavated to clean subsurface material and confirmed via confirmation sampling. Excavated soils will be managed as described in Section 6.4 and 6.5.
- **Work Zone 2.** An approximately 3.6-acre area within the northeast portion of the Mill Site requiring an engineered cap for cleanup. The extent of Work Zone 2 is delineated by dioxin/furan TEQ levels that exceed the 12 ng/kg cleanup level. Work Zone 2 also includes a smaller 0.8-acre area containing soil concentrations exceeding 530 ng/kg dioxin/furan TEQ remediation level that will be removed and disposed of at an approved, off-site commercial landfill as described in Section 6.5.
- **Work Zone 3.** An approximately 13-acre area within the southern portion of the Mill Site extending from the base of the bluff into nearshore intertidal slopes. Work Zone 3 consists of an intertidal zone, a 30-foot-wide beach backshore, a 150-foot-wide riparian zone, and an upland placement area where integrated cleanup and restoration construction activities will occur as described in Section 2.4.
- **Work Zone 4.** An approximately 11-acre area of the western Bay (two separate areas nearly a mile south of the Mill Site) within lower intertidal to shallow subtidal zones (approximately -2 to -15 feet MLLW).
- **Work Zone 5.** An approximately 13-acre upland area to the south of the Mill Site and west of NE State Highway 104. This Work Zone includes the MAF that will be used for placing suitable excavated soils that meet MAF disposal criteria.

2.4 Integrated Cleanup and Restoration Action Overview

The major components of the Port Gamble integrated cleanup and habitat restoration action are summarized in the following subsections.

Work Zones 1 and 2. Soils in Work Zone 1 that exceed cleanup levels and soils in Work Zone 2 that exceed remediation levels will be excavated and backfilled to the original surface grade with clean material meeting cleanup levels. Excavated hardscape overlying soil removal areas will be disposed

[6] While relatively low surface soil dioxin/furan TEQ levels are present in Work Zone 1, the Companies have elected to remove the relatively small volume of contaminated soils in this area to provide a more protective remedy and to support potential future redevelopment actions.

of at an approved off-site recycling facility or commercial landfill, as appropriate. Excavated soils from Work Zones 1 and 2 will be placed into approximately 15 stockpiles on the Mill Site (approximately 1,500 cy each) for profiling and "sparging" as necessary. Locations of stockpiles within the Mill Site will be described in the contractor's work plans, to be submitted prior to construction, complying with permitting requirements and subject to Ecology approval. Based on the results of testing, Work Zone 1 and 2 soils will be: 1) placed back into the Work Zone 2 excavated cell (<12 ng/kg dioxin/furan TEQ); 2) relocated to the Work Zone 5 MAF (12 to 45 ng/kg dioxin/furan TEQ); or 3) disposed at an approved, off-site commercial landfill (>45 ng/kg dioxin/furan TEQ or >190 µg/kg cPAH TEQ). Following backfilling, the entirety of Work Zone 2, including areas with soil dioxin/furan levels exceeding the 12 ng/kg TEQ cleanup level outside of the excavation boundary will be overlain with marker geotextile and capped with 1.5 feet of clean virgin sand overlain with 0.5 feet of topsoil, followed by hydroseeding.

Work Zone 3. Intertidal slopes along approximately 1,450 lineal feet of the southern Mill Site shoreline will be partially excavated to lay back upper intertidal slopes to achieve an average slope of approximately 8H:1V with smooth tie-ins with adjacent grades. Excavation will be performed "in the dry" during low tide periods using land-based equipment. Immediately following excavation (i.e., on the same low tide cycle), intertidal caps will be reconstructed with a 1-foot-thick lower layer of salvaged and imported angular cap substrate and, a 1-foot-thick layer of rounded beach substrate. The cap will be overlain by a 1-foot-thick upper layer of sand/gravel habitat substrate.

The adjacent 30-foot-wide beach backshore will be excavated and laid back to a slope of 20H:1V and filled with 2 feet of cap material followed by 1 foot of clean sand to facilitate planting beach grass and gumweed. The 1-foot-thick salvaged and imported angular cap substrate and 1-foot-thick rounded beach substrate layers will extend beneath the clean sand.

Behind the beach backshore, within the 150-foot-wide riparian zone, areas with soil dioxin/furan levels exceeding the 12 ng/kg TEQ cleanup level will be overlain with a marker geotextile. The entire riparian area will be covered with two feet of clean sandy soil, followed by rototilling 4 inches of compost into the surface (top 1 foot of the 2-foot sandy soil layer), and placing 3 inches of mulch to create a surface suitable for tree and shrub plantings.

Subject to permitting requirements, a portion of the upland areas behind the riparian zones will be an upland placement area for excavated soils meeting cleanup levels, as shown in the Appendix E – Construction Drawings. Existing hardscape in this upland placement area will remain but be perforated prior to material being placed over it.

Excavated intertidal and nearshore soils from Work Zone 3 will be placed into approximately 18 stockpiles on the Mill Site (approximately 1,500 cy each) for profiling and "sparging" as necessary. Locations of stockpiles within the Mill Site will be described in the contractor's work plans, complying

with permitting requirements and subject to Ecology approval. Based on the results of testing, Work Zone 3 soils will be: 1) relocated to the upland placement area (soil concentrations less than Table 2 cleanup levels); 2) relocated to the Work Zone 5 MAF (e.g., <45 ng/kg dioxin/furan TEQ and <190 µg/kg cPAH TEQ) if approved by the Kitsap Public Health District; or 3) disposed at an approved, off-site commercial landfill.

The Work Zone 3 upland placement area will be overlain with 0.5 feet of topsoil, followed by hydroseeding.

Work Zone 4. Sand cover will be placed in Work Zone 4 lower intertidal to shallow subtidal zones. As practicable, clean dredge sands from the nearby Driftwood Key navigation channel or another suitable source will be used.

Work Zone 5. The surface of the MAF where contaminated soils will be disposed of will initially be prepared (i.e., cleared and grubbed), followed by material placement[7].

2.5 Existing Information Used for Design

This section summarizes existing information used in the development of this EDR.

2.5.1 Surveys

Site surveys used in this EDR are summarized in Table 3. These surveys were conducted during separate events and with different spatial coverage, with some survey extents overlapping. To the extent that conditions changed (e.g., during Bay cleanup) following a given survey, more recent surveys in the areas of change supersede older survey information. The surveys listed in Table 3 were adjusted as needed to the project horizontal and vertical datum, and then combined in AutoCAD to create a composite surface representing the existing ground surface that is depicted in the base map used for the design.

[7] Work Zone 5 requirements are described in the MAF permit issued by Kitsap County Health District.

Table 3
Port Gamble Surveys

Date	Description and Extent	Source
July 2012	Upland topographic survey/base map	Triad Associates
March 2014	Bay-wide multi-beam bathymetric survey	Ecology
May 2018	Mill Site topographic survey	Triad Associates
March 2019	Mill Site coastal engineering survey	Anchor QEA
July 2021	Western Bay eelgrass and habitat survey	Grette Associates, LLC
June 2020	Mill Site topographic-bathymetric survey	eTrac
March 2022	Mill Site topographic survey	David Evans and Associates

2.5.2 Sampling Data

Sampling data used in this EDR are summarized below. Sampling data were collected during the RI/FS and under project-specific pre-design investigation (PDI) efforts.

2017–2018 Supplemental RI/FS: Initial delineation of the areal and vertical extent of dioxin/furan soil TEQ levels at the Mill Site is reported in the Mill Site uplands CAP (Ecology 2020) and supporting documents.

Three phases of additional Mill Site soil sampling were conducted for this EDR to delineate the excavation prism (laterally and vertically) and capping areas (laterally; Sections 6.1.2 and 6.4, respectively, and Appendix A.1):

Phase 1 (April 2021): 48 surface samples (0 to 2 feet bgs) and 85 subsurface samples (2 to 15 feet bgs) were collected via direct push sampling methods and samples were tested for dioxin/furan TEQ delineation.

Phase 2 (July 2021): To address data gaps after PDI Phase 1 an additional 11 surface (0 to 2 feet bgs) and 29 subsurface (2 to 25 feet bgs) samples were collected via direct push sampling methods.

Phase 3 (November 2021): Continued data gaps in the southern and western extents of Area 4 and the eastern extent of Area 2B necessitated a third and final PDI phase, where an additional six surface (0 to 2 bgs) and 23 subsurface (2 to 15 feet bgs) samples were collected via direct push sampling methods.

All samples were analyzed for dioxin/furan TEQ concentrations and total solids at the Analytical Resources, Inc., Tukwila, Washington, laboratory. Representative samples of materials from each lithology observed were analyzed for grain size. Samples were collected for hydraulic conductivity

testing but had hydraulic conductivity values that were too high for the laboratory to quantify, so grain size data was used during design to inform stockpile excavation dewatering requirements.

2021 NRD Pre-Design Investigations: A survey of eelgrass and habitat conditions in Work Zone 4 was performed to refine restoration designs. Sediments in Driftwood Key were also characterized to verify their suitability for beneficial reuse in Work Zone 4 (Appendix C).

2022 Dioxin/Furan Groundwater Monitoring: Three newly installed monitoring wells were sampled in June and September 2022 and analyzed for total suspended solids and dioxin/furan TEQ. Dioxin/furan TEQ concentrations were below the groundwater cleanup level in all samples (Appendix A.2).

3 Engineering Design Criteria

This section summarizes design criteria used in the engineering analysis of the cleanup remedy.

3.1 Project Datums

The horizontal datum used is Washington State Plane North Zone, North American Datum of 1983 (NAD83), measured in units of feet.

The vertical datum is National Ocean Survey MLLW; the nearest National Oceanic and Atmospheric Administration (NOAA) reference Station is No. 9445016, located 5.75 miles north of Port Gamble. Table 2 summarizes tidal elevations based on the NOAA Station No. 9445016 benchmarks. A local benchmark was referenced in developing the site-specific bathymetric and upland survey data as follows: U.S. Coast and Geodetic Survey disk stamped "BM NO.8 1966 B," located at N 317,163.38; E 1,211,002.15, with an elevation 15.24 feet NAVD88 (17.36 feet MLLW).

3.2 Chemical Isolation Design Criteria

As discussed in Section 2.1, integrated cleanup and habitat restoration actions need to meet cleanup requirements described in the Bay and Mill Site uplands CAPs (Ecology 2013, 2020). These requirements include ensuring that soil, groundwater, and sediment chemical concentrations remain protective after the southern shoreline of the Mill Site is restored.

The one-dimensional steady state model of chemical transport within sediment caps developed by Lampert and Reible (2009; see also Reible 2012) was used to ensure that the integrated cleanup and restoration action is protective, consistent with U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency (EPA) guidance (Palermo et al. 1998, EPA 2005). The Reible model has been used for protectiveness and sediment cap design evaluations at numerous Superfund and MTCA sediment cleanup sites and makes the conservative assumption that groundwater and porewater concentrations migrating into the base of the cap remain constant in perpetuity (i.e., infinite source). Sediment cleanup levels for intertidal sediments (top 2 feet) are summarized in Table 2. Using conservative input parameters (e.g., no sediment deposition or chemical degradation over time), the Bay EDR (Anchor QEA 2015a) modeling concluded that potential chemical migration from the Mill Site to Port Gamble Bay would not result in sediment concentrations exceeding cleanup levels, verifying the protectiveness of cleanup actions.

As discussed in Section 2.5.2, as part of PDI effort, groundwater samples were collected immediately adjacent to the Work Zone 2 soil excavation area containing the highest site-wide soil dioxin/furan concentrations to further characterize groundwater within this area of the Mill Site. The highest detected groundwater dioxin/furan concentration was 1.4 J TEQ pg/L, below the 4.4 pg/L TEQ cleanup level. To further ensure the protectiveness of the integrated cleanup and restoration action,

this value was input into the Reible model, along with other input parameters, estimates, and outputs from the Bay EDR (Anchor QEA 2015a), as summarized in Table 4. The model revealed that a groundwater dioxin/furan concentration of 1.4 pg/L TEQ (conservatively assumed to represent concentrations throughout the entire Mill Site) would still maintain surface (top 2 feet) sediment dioxin/furan concentrations in nearshore sediments of less than 3 ng/kg TEQ, below the 5 ng/kg TEQ sediment cleanup level (Table 2). These results provide further verification of the protectiveness of integrated cleanup and restoration actions.

Tissue monitoring data were collected within Port Gamble Bay immediately adjacent to the Mill Site during and after cleanup (Anchor QEA and Port Gamble S'Klallam Tribe 2022). The observation that post-construction dioxin/furan TEQ shellfish tissue levels adjacent to the Mill Site and in surrounding areas of the Bay are within the background range and below health advisory criteria further confirms that significant dioxin/furan partitioning along the soil-groundwater-sediment-surface water transport pathway is unlikely.

3.3 Coastal Engineering Design Criteria

Coastal engineering design criteria include the following:

- Wave conditions in the project area were based on wind hindcasting for 20-, 50-, and 100-year recurrence interval events based on wind from the NOAA station WPOW1 in West Point, Washington. The wave hindcast was completed using predicted wind speeds from 45-degree (northeast), 105-degree (west southwest), and 165-degree (south southwest) directions, which represent the most important trajectories of wave attack in the project area (Anchor QEA 2015a). Nearshore wave heights for the 100-year recurrence interval were also evaluated using a wave transformation model to optimize armor rock size for that event. Additional details regarding the wave hindcast are provided in Appendix D.
- Stable sediment and armor sizes for shoreline areas impacted by waves were calculated using guidance in the USACE (2002) *Coastal Engineering Manual* (see Appendix D for more detail).
- The impacts of predicted sea level rise for the years 2050 and 2100 on predicted wave heights and proposed stable rock sizes for remedial actions are also discussed in Appendix D.

3.4 In-Water Work Window

In-water construction activities will be performed consistent with allowable work windows established in coordination with state and federal resource agencies and tribes. Final work windows will be specified in the issued permits for the project, based on the presence of several fish species of concern.

Table 4
Steady-State Reible Model Array Worksheet

Inputs	Units	Value
Maximum Groundwater Dioxin/Furan Concentration	pg TEQ/L	1.4 J
Water Diffusivity, D_w	cm^2/s	4.3E-06
Cap Decay Rate, l_1	yr^{-1}	0
Bioturbation Layer Decay Rate, l_2	yr^{-1}	0
Colloidal Organic Carbon Concentration, r_{DOC}	mg/L	0
Darcy Velocity, *V (*positive is upwelling)	cm/yr	2,600
Depositional Velocity, V_{dep}	cm/yr	0
Bioturbation Layer Thickness, h_{bio}	cm	61
Porewater Biodiffusion Coefficient, D_{bio}^{pw}	cm^2/yr	100
Particle Biodiffusion Coefficient, D_{bio}^{p}	cm^2/yr	1
Conventional Cap placed depth	cm	61
Cap Materials -Granular (G) or Consolidated (C)		G
Porosity, e	%	0.4
Particle Density, ρ_P	g/cm^3	2.60
Organic Carbon in Surface Sediments, $f_{oc}(z)$	%	0.02%
Estimates		
Organic Carbon Partition Coefficient, log K_{oc}	log L/kg	7.20
Colloidal Organic Carbon Partition Coefficient, log K_{DOC}	log L/kg	6.83
Boundary Layer Mass Transfer Coefficient, k_{bl}	cm/hr	2.00
Dispersivity Percent of Domain length	%	50%
Dispersivity, α	cm	30.50
Effective Cap Layer Diffusion/Dispersion Coeff., D_1	cm^2/yr	78,586
Bioturbation Layer Diffusion/Dispersion Coeff., D_2	cm^2/yr	83,631
Outputs		
γ = SQRT(Pe12/4+Da)		0.939
Sherwood Number at Interface, Sh		12.8
Containment Layer Retardation Factor, R1		4,945
Bioturbation Layer Retardation Factor, R2		4,945
Effective Advective Velocity, U	cm/yr	2,600
Characteristic Reaction Time-cap layer, t decay	yr	infinity

The typical in-water work window for intertidal excavation and capping is July 16 to January 14. However, intertidal work will generally be targeted during low tide periods, in the dry to the extent practicable. In Port Gamble Bay, favorable daytime low tides occur as early as June. To accommodate appropriate tide windows that fall outside of the in-water work window, proposed conditions for extending the typical in water work window have been included in the Project permit applications so that work could begin in June as appropriate.

4 Sequencing Considerations and Remediation Technologies

This section summarizes the anticipated overall construction sequencing approach for the project and reviews the most promising technologies and best management practices (BMPs) that form the basis for the integrated cleanup and habitat restoration project design presented in this EDR.

4.1 Overall Project Sequencing

Work is anticipated to begin in June 2024. The start date will be subject to approved permits, documents, and work windows for the various elements of the work.

Work will be sequenced to ensure protectiveness and prevent the transfer of contaminated materials. The contractor will provide a construction sequencing approach in the contractor's Construction Work Plan subject to the approval by the Project Engineer based on protectiveness and prevention of contaminant transfer to various areas of the project site.

All excavated soils stockpiled on the Mill Site will remain on site pending characterization results to dictate disposal requirements (Section 2.4). Stockpiled soils excavated from beneath the groundwater table in Work Zone 2 will be sparged with fresh water to remove salinity as needed for disposal in the MAF Work Zone 5 (Section 5.2.1)[8]. Because excavated shoreline and upland soils are relatively coarse-grained, sparging to achieve MAF disposal criteria is anticipated to be accomplished relatively quickly, concurrent with stockpile chemical analyses, without impacting the project schedule.

The nearshore 6-inch sand cover placement within proposed eelgrass beds in Work Zone 4 will occur under a separate contract and will not require sequencing with this work.

4.2 Excavation Methods

All excavation activities will be performed using land-based equipment. The following subsections describe the excavation methods appropriate for each Work Zone.

4.2.1 Work Zones 1 and 2

Excavation performed in Work Zones 1 and 2 will be performed using mechanical means during normal working hours as discussed in Section 5.5. Below the groundwater table, mechanical methods will continue in the same fashion while water management measures are implemented to control groundwater, as needed. Water management methods are described in detail in Section 6.2.3.

[8] Mill Site stockpile requirements to verify suitability for disposal in the MAF are described in the MAF permit issued by Kitsap County Public Health District.

Based on data collected during PDI (Appendix A.1), contaminated soil concentrations in Work Zone 1 exceeding the 12 ng/kg TEQ dioxin/furan cleanup level are expected to extend down to approximately 1.5 feet bgs, as described in Section 6.1. Soils in Work Zone 1 will be excavated to 2 feet bgs and a 10-point composite confirmation sample will be collected from the bottom of the Work Zone 1 excavation and analyzed for dioxins/furans to confirm that soils exceeding the 12 ng/kg TEQ cleanup level have been removed in this area. While awaiting confirmation sample results, Work Zone 1 will be contained within a perimeter fence. If the dioxin/furan concentration in the verification sample exceeds 12 ng/kg TEQ, additional soil will be removed to clean subsurface material.

The lateral and vertical limits of contamination in the Work Zone 2 excavation area were delineated using PDI data (Appendix A.1). Following surveys confirming that the Work Zone 2 excavation design prism is achieved, a 10-point composite verification sample will be collected from the bottom of the Work Zone 2 excavation and analyzed for dioxins/furans to document post-removal conditions. Backfilling of the Work Zone 2 excavation will occur prior to receipt of verification sampling documentation.

4.2.2 Work Zone 3

Intertidal excavation will be performed using mechanical means from upland areas, excavating from the uplands working toward the water. Conducting intertidal sediment and shoreline bank soil excavation in the dry during low tide periods will reduce the potential for release of impacted intertidal sediment and shoreline bank soils during construction, also minimizing potential impacts to eelgrass near Work Zone 3 from turbidity.

Intertidal sediment to be removed will be excavated using mechanical means during low tide conditions "in the dry," to the extent practicable. During the construction window, typical daytime low tides reach elevation 0 feet MLLW (although on some days this occurs for only a few minutes). Seasonally, low tides within the Bay typically occur in June. Permissions to work during these times have been requested as part of the permitting process. Seasonally low tides lengthen the low tide period and increase workable time during each day, providing a benefit to the overall project sequencing.

Depending on weather, tides, scheduling, and contractor production, it may be necessary to conduct some relatively limited intertidal excavation below water. As necessary, intertidal excavation during shallow water conditions (e.g., to address weather, access, and/or schedule constraints) would be described in the contractor's Construction Work Plan or Work Plan addendum and would be subject to approval by the Project Engineer and Ecology to ensure protectiveness.

For the area excavated in the dry during each work shift, either placement of a temporary geotextile (Section 4.4.5) or partial or complete placement of the intertidal cap (Section 7.1.2) will be completed

during the same tide window; such that exposed intertidal sediments and shoreline bank soils are covered prior to the area being inundated by the incoming tide.

4.3 General Construction Best Management Practices

A range of BMPs will be used during cleanup construction activities to minimize potential environmental impacts. These BMPs are summarized in the list below and in Sections 4.4 through 4.6. Additional BMPs may be required by the project permits and will also be implemented as appropriate.

The following BMPs will be employed to prevent the potential for spillage from construction equipment:

- The National Response Center (1-800-424-8802) and the Washington Emergency Management Division (1-800-258-5990 OR 1-800-OILS-911) will be notified immediately if a spill occurs.
- The excavation contractor will inspect fuel hoses, oil or fuel transfer valves, and fittings on a regular basis for drips or leaks to reduce the risk of spills into the surface water.
- On-site fueling of equipment will be limited to locations more than 200 feet from the shoreline.
- Equipment will have properly functioning mufflers, engine-intake silencers, and engine closures according to federal standards.
- When wet materials are transported, haul trucks or containers will be lined or otherwise sealed to prevent release of soil or effluent during transport.
- The contractor will prepare a spill prevention, control, and countermeasures plan and will have a spill kit on site, as well as a marine spill response contractor available on an on-call basis. These precautions will minimize the potential for petroleum products or other deleterious materials to enter surface waters.

4.4 Excavation Best Management Practices

Excavation operations have well-established BMPs to minimize potential recontamination and manage potential water quality impacts. Operational and engineering controls will be defined in the Construction Specifications and the project permits, which the contractor will be required to implement.

4.4.1 Qualified Contractor

Bidding contractors will need to meet minimum qualifications that demonstrate experience with projects similar in scope and complexity. Specific requirements will be provided in the construction bid documents. Typically, the contractor will need to demonstrate experience with soil excavation in the Pacific Northwest for similar projects within the last 5 to 7 years. In addition, the project

superintendent will typically need to demonstrate similar experience. Contractors that cannot demonstrate experience may not be considered responsive to the bid.

4.4.2 Real-Time Positioning

The contractor will be required to use real-time positioning controls such as a differential global positioning system electronically displayed in the operator's cabin to provide real-time positioning control for the material placement bucket. Controlling the position of the excavation and material placement equipment will help to accurately achieve the required excavation prism, placement thickness, and material stockpile segregation in Work Zone 2.

4.4.3 Minimizing Excavation and Material Placement During Peak Tidal Exchange Periods

Intertidal excavation and subtidal material placement during peak tidal exchange periods may increase the potential for water quality impacts. The contractor may need to minimize material placement during these high current periods if visual turbidity is observed around the work area.

4.4.4 Intertidal Geotextile Placement

If the contractor cannot complete intertidal excavation and confirm that required excavation elevations have been achieved "in the dry" prior to the next incoming tide, the contractor may be required to place and secure a temporary geotextile to minimize the potential for sediment resuspension during submerged conditions. The geotextile layer will be used as a temporary measure to minimize the potential for sediment resuspension during submerged conditions of the intertidal excavation. The geotextile would be removed at the start of the subsequent "dry" excavation period.

4.5 Material Transloading, Beneficial Reuse, Containment, and Disposal

Excavated material may be removed via haul truck. BMPs for transloading include the following:

- Upland staging facilities installed for stockpiling and loading excavated materials are intended only for temporary use during the project. After the project is completed, these temporary facilities will be removed.
- Excess or waste materials will not be disposed of or abandoned waterward of mean higher high water or allowed to enter waters of the state.
- Erosion control measures for the upland sediment placement area will be defined in the Construction Specifications and adhered to during construction activities. Unfiltered runoff from temporary upland stockpiles back to surface water will not be allowed.

- Construction materials will not be stored where high tides, wave action, or upland runoff can cause materials to enter surface waters, except for the feeder berm area which is specifically intended to be inundated.
- When wet materials are transported, haul trucks or containers will be lined or otherwise sealed to prevent release of soil or effluent during transport.
- Containment berms to prevent release of runoff or intermingling of soils where applicable.

4.6 Cover, Cap, and Armor Material Placement

After excavation is completed, the design includes placing various cap materials depending on the specific Work Zone. Engineered caps will be placed in Work Zones 2, 3 and 5; Work Zone 5 requirements are described in the MAF permit issued by Kitsap Public Health District. The Construction Specifications will identify acceptable placement methods and material specifications. As discussed in Appendix G, the contractor will be required to demonstrate that they can consistently meet sand cover thickness tolerances.

5 Site Preparation and Staging Area Design

As part of construction activities, the Work will require mobilization of land-based equipment such as excavators, backhoes, dozers, loaders, dump trucks or other equipment as well as water-based equipment including barges and other specialized equipment. The selected contractor or contractors will be required to bring the necessary equipment to the project area. The equipment will be staged, moored, and/or repositioned as necessary to complete the work, as shown on the Construction Drawings (Appendix E).

This section discusses the project areas that may be used by the contractor to stage equipment and stockpile or transload excavated soils and hardscape/debris, and capping/armor materials. The configuration and layout of upland staging areas will depend on the selected contractor's construction methods. Potential temporary staging, stockpiling, and transloading areas are shown in Drawing G-03.

5.1 Mill Site Staging Areas

Portions of the Mill Site uplands will be made available to the contractor for use in staging equipment and materials for the integrated cleanup and restoration project, for access to conduct shoreline work, and for temporary stockpiling and transloading of cap materials and/or excavated soil, sediment, and debris for shipment (as necessary). Most of the southern 18 acres of the Mill Site uplands will be available to the contractor during construction as shown in Drawing G-04. The northwestern portion of the Mill Site that currently houses an environmental laboratory will not be available. The available area may be modified as necessary to coordinate construction activities with tenants or site users.

Locations and approximate dimensions of stockpiles within the Mill Site will be described in the contractor's work plans, complying with permitting requirements and subject to Ecology approval, subject to stockpile volume requirements so that stockpile sampling and characterization is performed on the designated volume of material. All temporary stockpile areas will be appropriately contained to prevent uncontrolled runoff from entering surface water (runoff will be allowed to infiltrate within the stockpile areas). Methods for containing the stockpiles will be described in the construction work plan, which will be a required contractor submittal that will detail operations, including set up and breakdown, stormwater management, and maintenance and cleaning of upland work areas. An example containment scenario incorporates stacked ecology blocks, k-rails, or constructed berms, around the perimeter of each stockpile with an impervious geotextile fabric along the stockpile perimeter as shown in G-04. The perimeter containment will be further subdivided into discrete stockpile areas, each with a capacity of approximately 1,500 cy of excavated material for subsequent characterization.

The contractor will be responsible for site security at the upland staging areas. The contractor will also be responsible for daily housekeeping and will need to maintain a spill kit on site to control and contain any equipment leakage that could occur. The contractor will not be permitted to discharge solid or liquid waste from the staging area into the adjacent waterbody.

In summary, the following specific requirements will govern the operation of the upland staging area:

- The temporary staging and stockpiling area will be constructed in accordance with the Construction Drawings and Specifications and will include perimeter containment to prevent the release of soil from the temporary staging and stockpiling area. Active catch basins and stormwater outfall were abandoned during previous in-water cleanup activities and a perimeter berm preventing runoff from most of the Mill Site upland area remains in place. However, within the area contained by the perimeter berm additional measures will be employed to prevent cross-contamination of clean and potentially contaminated materials.
- The upland staging area will be isolated from surface water using standard erosion and sedimentation controls, such as filter fence barriers and/or lined ecology block walls or berms.
- The contractor will be required to maintain a clean upland staging area to prevent vehicles from tracking contaminated soil or sediment off site or into clean on-site material stockpile areas.
- Trucks will be loaded within the established temporary staging and stockpiling areas so that stockpiled materials are contained within the area. Any spilled material will be immediately picked up and deposited in the appropriate stockpile area.
- The contractor will be required to ensure that no materials are tracked off site onto public roads.
- Equipment will be fueled in a designated area that separates fueling operations and protects the environment from accidental spills during fueling.
- The contractor will maintain a spill kit on site in the event a leak develops from their equipment. In the event of a spill, all other work will stop until the contractor has adequately cleaned the spill.

5.1.1 Stockpile Soil Management

The soil stockpiling approach is described in Section 2.4. Discrete stockpile areas of excavated soil and sediment will not be co-mingled until characterization of stockpiles has been completed. Ex situ sampling will consist of the following:

- One 10-point composite sample will be collected and analyzed per each approximately 1,500-cy pile.
- The 10 discrete subsamples will be collected at approximately equidistant locations around the perimeter of each stockpile.

- Composite samples will be analyzed for dioxins/furans, cPAHs, lead, and porewater salinity. Preliminary data results are expected to be available within approximately 8 weeks of sample submittal to the laboratory (subject to laboratory turn-around-times at the time of construction).

Results of the ex situ sampling will be compared against suitability criteria for on-site backfill, MAF containment or permitted off-site landfill disposal, consistent with permitting requirements and other approvals.

Clean rock materials excavated from the existing shoreline and identified as suitable for replacement as armor material will be stockpiled separately and will not be subject to testing.

5.1.2 Stockpile and Excavation Water Management

This section describes the means and methods for water management within soil excavation areas and stockpiles.

5.1.2.1 General Water Management Approach

As discussed in the Bay EDR (Anchor QEA 2015a) and confirmed by additional PDI groundwater verification sampling (Appendix A) and modeling (Section 3.2), the infiltration of water from stockpiles into groundwater is protective of underlying Mill Site groundwater and nearshore sediments. Accordingly, the primary water management tool for the stockpile area will be infiltration. As necessary, the contractor will demolish or perforate impermeable surfaces within the stockpile areas to allow for infiltration of interstitial water from sediments, as well as run-on from rainfall.

5.1.2.2 Generated Water Management

Water produced during any dewatering needed in the Work Zone 2 excavation area will be managed via direct infiltration. Where infiltration rates cannot accommodate water from the excavation area, excess water will be collected in one or more sumps or temporary tanks. Sumps or temporary tanks will provide temporary storage until water can be allowed to infiltrate.

5.1.2.3 Stormwater Management

As summarized in Section 1.1, an NPDES construction stormwater general permit was obtained for the previous Bay cleanup project and remains active. Stormwater will be managed according to permit conditions.

The contractor will prepare a stormwater pollution prevention plan (SWPPP), replacing the SWPPP prepared by the previous contractor, that meets conditions of the permit and describes the BMPs

that will be employed to minimize generated waters and ensure compliance with applicable water quality criteria and discharge requirements. The SWPPP will:

- Identify potential sources of pollution that may be reasonably expected to affect the quality of stormwater discharge from the work area.
- Describe and ensure implementation of practices that will be used to reduce the pollutants in stormwater discharge from the work area.
- Ensure compliance with terms of the State of Washington general permit for construction stormwater discharges as applicable.
- Identify applicable BMPs for stormwater management.

The contractor will not allow stormwater to directly discharge to the Bay. The contractor will install and operate an appropriate system for management of construction water generated during the work, as discussed in Section 5.1.2.2. The contractor will use structural devices such as hay bales, silt fences, and catch basin inserts, to filter or divert stormwater as needed.

5.2 Model Airplane Field Upland Disposal Area

If excavated material is unsuitable for use as backfill in local uplands, this soil will be placed within the existing permitted MAF Work Zone 5[9]. This area is located within upland property owned by the Companies (Drawing C-07) and has a remaining permitted capacity of approximately 73,000 cy (Anchor QEA 2017[10]). The upland placement in the MAF will be consistent with material placement conducted in August and September 2017, following verification by the Kitsap Public Health District that stockpiled material at the Mill Site is suitable for placement at the MAF. Clearing, grubbing, and grading will be performed to provide appropriate subgrade for material placement if necessary.

The subgrade will be firm and unyielding and will be compacted to a level that permits the movement of construction equipment and other related traffic without causing rutting and/or deformation of the surface. The compaction of placed material, installation of geotextile marker layer followed by clean cap material, jute mat installation on side slopes, and hydroseeding will be performed consistent with previous MAF landfill construction specifications.

Construction activities will be performed using standard earth moving equipment. All activities will comply with the BMPs described in Sections 4.3 and 4.5.

5.2.1 Leachate and Stormwater Management Prior to MAF Disposal

Some soils excavated from the Work Zones 1, 2, and 3 may need to be sparged in temporary stockpiles to meet MAF suitability criteria for salinity prior to transport to the MAF. Sparging is

[9] Work Zone 5 requirements are described in the MAF permit issued by Kitsap Public Health District.
[10] The 73,000 cy of remaining permitted capacity at the MAF is still current.

anticipated to accomplished by rinsing the soils with natural rainfall, supplemented with freshwater irrigation applications of additional water if necessary. As discussed in the Bay EDR (Anchor QEA 2015a) and confirmed by additional PDI groundwater verification sampling (Appendix A) and modeling (Section 3.2), the infiltration of water from stockpiles into groundwater is protective of underlying groundwater and adjacent sediments. Stockpiled soils placed in the upland Mill Site containment area will not require sparging to reduce salinity.

During development of the upland containment facility, stormwater will be managed in accordance with the requirements of the NPDES construction stormwater general permit.

5.3 Haul Routes

Traffic impacts associated with cleanup project construction activities will be mitigated to the extent practicable. This will include limiting barge transport through the Bay to the extent practicable, and where appropriate transporting construction materials to and from the Mill Site using designated truck haul routes. Appropriate scheduling of haul traffic will minimize impacts to the town and risk to the public. Flaggers will be used if necessary to ensure public safety.

As many as 1,200 truck round trips may be required between the Mill Site uplands through the Town Center of Port Gamble to transport excavated material to the MAF. However, if clean soils are relocated to the Mill Site containment area in Work Zone 3, trucking of that material through the Town Center would not be necessary, and less truck traffic would occur.

Delivery of clean aggregate materials would potentially require additional round trips (up to 5,000 additional truck and trailer trips). The actual number of trips needed will be dictated by the size of the trucks used, and whether additional capacity can be provided with dump truck trailers (also known as “pups”). Haul routes are shown in Drawing G-03.

5.4 Working Hours

The temporary stockpile and staging area is zoned “rural historic town waterfront.” Most of the uplands in the Town of Port Gamble are rural historic town commercial or residential. The areas around the Bay are “rural wooded” or “rural residential” and the PGST Reservation is zoned as “tribal land.” As such, noise limitations apply between the hours of 10 pm and 7 am. Construction activities are likely to occur between 7 am and 10 pm, 6 days per week (provided construction in the intertidal areas occurs during the daytime low tides in the summer months).

5.5 Temporary Site Controls

Upland temporary facilities will be controlled by the contractor with respect to safety, noise, dust, security, and traffic. The construction site will be closed to the public.

Temporary erosion and sediment control (TESC) BMPs will be employed to prevent pollution of air and water and control, respond to, and dispose of eroded sediment and turbid water during construction. TESC BMPs will be employed in all work areas, equipment and material storage areas, stockpiles, and haul areas.

5.6 Other Environmental Considerations

Other environmental considerations associated with upland staging and stockpiling activities include control of fugitive dust. The contractor will control fugitive dust from the stockpile and staging areas using appropriate BMPs. The tracking of soil or dust off site will be controlled. Final permitting documents may require additional environmental considerations that will be included as part of the final design.

6 Cleanup Design

The following sections describe the detailed design related to the excavation, backfill, and capping of cleanup areas identified in Work Zones 1, 2, and 3, including water management, material stockpile and staging, offloading, and upland containment design. Additional details regarding excavation, backfill, and capping construction activities are provided in the Construction Quality Assurance Plan (Appendix G).

6.1 Pre-Design Investigation Data

As discussed in Section 2.3, sequential PDI was performed to delineate remedial action boundaries in Work Zones 1 and 2 (Appendix A.1).

An approximate 0.07-acre area within Work Zone 1 contains soils exceeding the 12 ng/kg dioxin/furan TEQ cleanup level (Figure 2) and extending down to approximately 1.5 feet bgs. While soil dioxin/furan TEQ concentrations in Work Zone 1 are suitable for capping, the Companies have elected to remove the relatively small volume (approximately 200 cy) of contaminated soils in this area to provide a more permanent remedy and to support potential future redevelopment actions.

Nine cores advanced within Work Zone 2 contained soils with dioxin/furan exceeding remediation levels over the following approximate elevation intervals (see Appendix A and Appendix E: Drawing C-01):

- GP-10: +14.9 to +6.9 feet MLLW
- GP-12: +6.2 to +2.2 feet MLLW
- PG-PDI-SC-038: +11.6 to +9.6 feet MLLW
- PG-PDI-SC-043: +5.7 to +3.7 feet MLLW
- PG-PDI-SC-044: +9.3 to +0.3 feet MLLW
- PG-PDI-SC-045: +3.0 to 0.0 feet MLLW
- PG-PDI-SC-046: +0.4 to -0.6 feet MLLW
- PG-PDI-SC-048: +4.3 to +0.3 feet MLLW
- PG-PDI-SC-049: +9.5 to 7.5 feet MLLW

6.2 Work Zone 2 Excavation Prism Design

The following subsections provide a description of the excavation prism design within Work Zone 2.

6.2.1 Lateral Extent

The delineated Work Zone 2 excavation prism encompasses approximately 0.8 acres. The lateral extents of the excavation footprint within Work Zone 2 were developed to remove all material exceeding the 260 and 530 ng/kg dioxin/furan TEQ remediation levels described in Section 2.2.2. The lateral extent of the excavation prism was conservatively bounded by soil borings in which no soil

interval samples exceeded remediation levels. These borings defined the outer perimeter of the excavation footprint by connecting a straight line between adjacent borings that had no remediation level exceedances. To further inform the excavation prism remedial design, a three-dimensional geostatistical model was developed to interpolate measured dioxin/furan TEQ concentrations exceeding remediation levels between adjacent cores, as discussed below.

6.2.2 Excavation Vertical Extent

The vertical extent of the Work Zone 2 excavation prism encompasses a volume of approximately 18,000 cy. The vertical extent of the excavation prism was developed to remove all material exceeding the 260 and 530 ng/kg dioxin/furan TEQ remediation levels described in Section 2.2.2. The vertical extent of the excavation prism was bounded by soil boring intervals with soil concentrations below remediation levels. All sampling intervals within each boring were compared to adjacent borings to create volumetric surfaces representing the maximum vertical extent of soils exceeding remediation levels. Based on the deepest sample exceedance concentrations of adjacent borings and the interpolations of the three-dimensional geostatistical model, borings were grouped together into three subareas within the excavation prism. For each of these subareas, the bottom excavation depths were determined based on the maximum depth of remediation level exceedance among all borings within that subarea plus at least 1 foot to conservatively bound the vertical excavation boundary.

The vertical excavation depths for each subarea were determined to be -2 feet, +2 feet, and +5.5 feet MLLW as depicted on Drawing C-01. The horizontal boundary between the three excavation subareas was determined by following a similar and consistent methodology for defining the horizontal extents of the excavation boundary: connecting adjacent core locations that had similar depths of remediation level exceedances. To verify that all soil exceeding remediation levels would be removed by excavating to these defined depths, the three-dimensional geostatistical model was used to interpolate between boring sampling intervals. The geostatistical confirmed that the excavation subareas will remove all material exceeding remediation levels.

Because the excavation depths of each subarea extend to the bottom of bounding sample intervals, the concentrations of the bounding intervals also represent the concentrations at the base of excavation. At two boring locations (PG-PDI-045 and GP-PDI-46), initial soil cores did not extend deep enough to include a bounding interval below the remediation level. Subsequently, deeper borings were advanced adjacent to these areas; the depth of remediation level exceedance at PG-PDI-045 and GP-PDI-46 was interpolated based on the results from these adjacent borings. Excavation subareas containing these two borings were conservatively extended a minimum of 1 foot deeper than the deepest remediation level exceedance elevation, consistent with sample results in surrounding borings.

6.2.3 Excavation Lifts

Following the horizontal and vertical delineation of the excavation prism, the prism was split into multiple lifts to inform a stockpile plan to segregate excavated soil into expected concentration ranges. The lifts were established considering excavation prism subarea bottom elevations, depth to groundwater (~8 feet MLLW), soil dioxin/furan concentration trends with depth relative to adjacent soil borings, disposal criteria, stockpile size, and construction phasing and constructability. Five excavation lifts were established (Appendix E – Construction Drawings C-02.1 through C-02.5):

- Ground surface (+14 to +16 feet MLLW) to +12 feet MLLW
- +12 to +8 feet MLLW
- +8 to +5.5 feet MLLW
- +5.5 to +1 feet MLLW
- +1 to -2 feet MLLW

Three stockpile groups were identified for the excavation prism based on interpolated chemical concentrations and associated disposal criteria:

- Stockpile Group A: anticipated >45 ng/kg dioxin/furan TEQ (off-Site commercial landfill where confirmed)
- Stockpile Group B: anticipated 12 to 45 ng/kg dioxin/furan TEQ (MAF where confirmed)
- Stockpile Group C: anticipated <12 ng/kg dioxin/furan TEQ (reuse as backfill where confirmed)

Within each lift, the three-dimensional geospatial model was used to interpolate between adjacent borings to define the subarea horizontal excavation extents of soil concentration that fell within each of the three concentration ranges. The model calculated the depth averaged concentrations for the subareas within each lift to confirm that excavated soil volumes are anticipated to be within the target concentration ranges.

As soil is excavated from each of the stockpile groups (A, B, and C), material will be further segregated into approximately 1,500 cy stockpiles. Each individual stockpile will be subsampled via 10-point composite sample to confirm the dioxin/furan TEQ concentration prior to disposal or reuse as discussed in Section 6.5.

Table 5 summarizes the anticipated volumes of soil within each stockpile group.

Table 5
Approximate Volume of Soil in Work Zone 2 Excavation Prism

Lift	Approximate Volume (cy) <12 ng/kg Backfill	Approximate Volume (cy) 12-45 ng/kg MAF	Approximate Volume (cy) >45 ng/kg Commercial Landfill	Total Volume[1] (cy)
Surface to +12 feet MLLW	1,860	1,560	860	4,280
+12 to +8 feet MLLW	1,560	1,600	1,720	4,880
+8 to + 5.5 feet MLLW	--	1,670	1,370	3,040
+5.5 to +1 feet MLLW	--	1,690	2,540	4,230
+1 to -2 feet MLLW	--	935	725	1,660
Total Volume (cy)	3,420	7,455	7,214	18,090

Notes:
--: Not applicable
1. Volumes estimated assuming vertical sidewalls; side slope volumes not included in Table 5.

6.2.4 Excavation Side Slopes

As each lift is excavated, the contractor will be responsible for determining appropriate methods for sloping or shoring the excavation. Table 5 reflects contaminated material volumes only; side slopes during excavation must remain stable and prevent material from failing or sloughing into the excavation[11]. Prospective stockpile volumes summarized in Table 5 and do not include side slope allowances.

6.3 Work Zone 2 Water Management

Work Zone 2 excavation activities are expected to encounter groundwater at a depth of approximately 8 feet bgs, where it will be managed appropriately by the contractor. Dewatering means and methods will be determined by the contractor and may include installing and pumping from groundwater exaction wells around the perimeter of the excavation or installing a sump and directly pumping to dewater from within the excavation. Dewatering operations will be specified in the contractor's Ecology-approved work plan. As described in Section 5.1.2.2, any water generated from excavation operations will be managed via on-site infiltration and may need to be temporarily stored in on site tanks if infiltration proceeds more slowly than water is generated.

[11] During prior 2002 to 2005 interim actions at the Mill Site, excavation slopes of 1.5H:1V adjacent to the excavation footprint were observed to be stable.

6.4 Soil Stockpiling

This section describes the stockpile plan and stockpile management of excavated soils. The plan for stockpiling described in this section pertains to the excavation activities in Work Zones 1 and 2.

6.4.1 Stockpile Soil Management

Stockpile soil management is described in Section 5.1.1. The Staging and Stockpiling Area will be constructed in accordance with the Construction Drawings and Specifications and will include perimeter containment to prevent the release of sediment and water from the staging and stockpiling area (Drawing C-05). The existing Mill Site perimeter berm may be part of this containment; however, within the Mill Site clean imported materials must be within separate containment areas than potentially contaminated materials.

6.5 Soil Contaminant Isolation Cap Design

This section summarizes the design for soil contaminant isolation caps to be constructed in Work Zones 2 and 3. Cap designs are summarized in the Construction Drawings (Appendix E).

All post-excavation upland surface and subsurface (at any depth) soils remaining within Work Zones 2 and 3 with dioxin/furan TEQ concentrations exceeding 12 ng/kg TEQ will be capped. Caps in these areas will consist of a geotextile marker layer, a minimum of 1.5 feet of clean permeable soil, and 0.5 feet of topsoil topped with hydroseed (or riparian planting, as discussed in Section 7). The edges of the clean permeable soil caps will be graded at 5H:1V side slopes, starting beyond the required cap footprint.

7 Restoration Design

The following sections describe the detailed design related to excavation, resurfacing, backfill, and habitat restoration in Work Zones 3 and 4. Additional details regarding cap placement and habitat restoration construction activities are provided in the Construction Quality Assurance Plan (Appendix G).

7.1 Work Zone 3 Mill Site Restoration

This section describes the restoration work to be performed within Work Zone 3, including intertidal shoreline restoration, beach back shore habitat and riparian zone development, with integrated upland soil and sediment capping.

7.1.1 Shoreline Excavation and Hardscape Removal

Shoreline restoration will include excavating approximately 15,000 cy of fill over 1,450 lineal feet of the southern Mill Site shoreline, as depicted in Drawing CM-01, to lay back upper intertidal slopes to achieve an average slope of approximately 8H:1V.

Prior to shoreline excavation, hardscape (asphalt and concrete) in the restoration footprint including the riparian area will be processed (removed, stockpiled, and resized) and disposed of at approved off-site landfills or recycling facilities, as appropriate. Shoreline excavation and capping will be conducted in discrete sections such that the size of the area allows for work to be completed or protectively covered during a single tide cycle before the excavation area is submerged by the rising tide. The work will include the following:

- Removing and temporarily stockpiling existing cap material for reuse
- Excavating the shoreline to the design grades shown on the Appendix E – Construction Drawings
- Stockpiling excavated soils/sediments for characterization prior to final placement or disposal
- Placing the first cap layer (at a minimum) or temporary geotextile material, to avoid exposing excavated surfaces to incoming tides

All excavated soils and sediments will be stockpiled and tested following the methods described in Section 6.4. Material will not be disposed of or reused prior to review of stockpile sample testing data. Test results will determine the suitability of soils for their final disposition, as described in Section 6.5. Excavated armor rock material will be stockpiled separately and does not need to be tested.

7.1.2 Soil Stockpiling

Stockpiling and stockpile management will follow similar methodology as described in Section 5.1.1; however, the CoC testing requirements for excavated materials within Work Zone 3 differ slightly.

Composite samples will be analyzed for CoCs including dioxins/furans, cPAHs, lead, cadmium[12], and porewater salinity.

Clean rock materials excavated from the shoreline and identified as suitable for replacement on the shoreline as armor material will be stockpiled separately and do not need to be tested.

7.1.3 Engineered Intertidal Cap Design

This section summarizes the design for engineered caps to be constructed within intertidal zones of Work Zone 3, consistent with the Bay EDR (Anchor QEA 2015a).

Following intertidal excavation, an engineered cap will be placed to provide both protective containment and restore beach habitat. The cap will include the following three layers:

- A minimum 1-foot-thick layer of salvaged armor rock and imported angular cobble-sized materials with a d_{50} of approximately 6 inches and a maximum size of 12 inches
- A minimum 1-foot-thick layer of rounded beach substrate (cobble/gravel) with a d_{50} of approximately 3 inches, also filling voids in the underlying armor layer
- A minimum 1-foot-thick layer of rounded habitat substrate (sand/gravel) with a d_{50} of approximately 0.4 (3/8) inch, also filling voids in the underlying rounded beach substrate layer

The bottom two layers provide protective containment consistent with cleanup requirements, including a lower layer of robust angular armor material overlain by the intermediate layer of larger rounded cobble/gravel that also provides suitable habitat for benthic organisms and forage fish. The surface layer of smaller sand/gravel habitat substrate will further improve beach habitat for forage fish, shellfish, and juvenile salmonids. Habitat gradations are summarized below.

Salvage and imported armor rock. Salvaged and imported armor rock at the bottom layer of the shoreline cap must conform to the following grading limits.

Approximate Size	Percent Passing
12-inches	70-100
9-inches	50-70
6-inches	35-50
2-inches	2-10

[12] Cadmium is a CoC for sediment but not for upland soil; cadmium analysis is required for Work Zone 3 stockpiles.

Rounded Habitat Substrate. Rounded habitat substrate in the intermediate shoreline cap layer must conform to the following specifications:

Approximate Size	Percent Passing
8-inch	99-100
6-inch	70-90
3-inch	30-60
¾-inch	10 max.

Notes: 2022 Washington Department of Transportation Standard Specification 9-03.11(2) 8-inch Streambed Cobbles

Sand/Gravel Habitat Substrate. The top layer of sand/gravel habitat substrate within the shoreline cap layer must conform to the following specifications:

Approximate Size	Percent Passing
2.5-inch	99-100
2-inch	65-95
1-inch	50-85
3/8-inch	40-60
No. 4	26-44
No. 40	16 max.
No. 200	5.0-9.0

Notes: 2022 Washington Department of Transportation Standard Specification 9-03.11(1) Streambed Sediment

As summarized in the Construction Drawings (Appendix E) and consistent with the Bay EDR (Anchor QEA 2015a), the upper elevations of constructed intertidal cap surface will extend up to the boundary of the beach backshore at an elevation of approximately +11.5 feet MLLW. The salvaged and imported protective armor rock layer will extend beneath the beach backshore cap material to an elevation of approximately +13.3 feet MLLW to provide slope protection in the backshore. The intertidal caps will extend downslope to tie into existing capped slopes in the Bay. Below +0 MLLW, the existing armored slope will remain in place and the intertidal cap will blend into the existing slope with +0 feet MLLW as an inflection point. In areas where the existing intertidal cap does not extend below +0 feet MLLW, additional cap material will be placed at the toe of the slope to grade into the existing mudline. At the terminating edges on the northern and southern ends of Work Zone 3, caps will be gently graded into existing slopes as shown in the Construction Drawings.

The gradation of the surface habitat layer is not sized to resist movement from wave action. It is anticipated that localized movement and reshaping of this layer will occur, and the thickness of this layer will vary over time as the restored beach establishes dynamic equilibrium. The surface layer will be supplemented by incoming littoral drift sediments, which are expected to further enhance the

beach surface over time. Monitoring, maintenance, and adaptive management of the Work Zone 3 shoreline restoration is described in Appendix I.

7.1.4 Feeder Berm

Beach sampling data collected in 2015 by PGST immediately south of the Mill Site, along with similar Anchor QEA sampling in 2020 of materials that have accreted on the surface of the intertidal caps, determined that local littoral drift materials entering the southern Mill Site shoreline area are a mixture of sand, gravel, and silt with a d_{50} of approximately 0.05 inch (medium sand). Under typical wave conditions, these littoral drift materials will settle onto and mix into the beach substrate layers, improving and sustaining shoreline processes and habitat functions. Since completion of cleanup construction in early 2017, approximately 0.5 to 1 foot of littoral drift materials have steadily deposited on top of angular caps placed in lower intertidal areas of the southern Mill Site shoreline (with slopes of roughly 6H:1V or flatter), restoring beach habitat and functions (Anchor QEA 2021). The Mill Site shoreline receives sediment input from approximately 0.6 mile of the Bay shoreline to the south of Work Zone 3 with relatively steep slopes or weak bank material, along with three streams that empty into the western shoreline of the Bay. These natural inputs nourish the southern shoreline. Based on analytical calculations and comparisons with reference sites, approximately 300 cy per year of sediment is transported through littoral drift into the Work Zone 3 shoreline area from the south (Anchor QEA 2023). Oyster populations have been concurrently expanding into these cap areas, providing further evidence of improving habitat functions that also help to stabilize the enhanced and restored beach and improve overall water quality conditions.

To enhance the deposition of finer grained sediments onto the surface of the restored beach, a minimum 0.25-acre, 1,500-cy habitat feeder berm (approximately 5 years of littoral drift supply, conservatively assuming no new incoming sources) composed of sand/gravel habitat substrate d_{50} of approximately 0.4 inch (Drawing C-10) will be placed at the southern end of the Mill Site shoreline in the beach backshore (up to approximately +11 to +12 feet MLLW) as shown in C-07 and C-09. The feeder berm will further sustain shoreline processes and habitat functions during the initial post-construction period. The feeder berm will be placed in orientation and location as shown in the Appendix E – Construction Drawings. Monitoring, maintenance, and adaptive management of the Work Zone 3 shoreline restoration is described in Appendix I.

7.1.5 Beach Backshore

Above the intertidal beach, a 30-foot-wide back beach area will extend along a 20H:1V average beach slope. Within this area, existing hardscape will be removed and stockpiled for resizing and offsite disposal. Additional volume of material will be removed to accommodate the restored beach backshore cap, which consists of an extension of the lower two layers of the intertidal cap (i.e., imported and salvaged armor rock and rounded habitat substrate) overlaid by 1 foot of clean

imported beach sand. Extension of the bottom two layers of cap material into the beach backshore will raise elevations of protective material to approximately +13.3 feet MLLW to account for changes due to sea level rise discussed in Appendix D. The backshore will then be planted with the following:

- American Dune Grass (*Leymus mollis*)
- Puget Sound Gumweed (*Grindelia integrefolia*)
- Yellow Sand Verbena (*Abronia latifolia*)

Beachgrass will be planted within 10-cubic-inch tubes on average two-foot centers. Protection for the beach backshore will include temporary waterfowl exclusion fencing, consisting of a perimeter of 3-foot height wire mesh fencing attached to studded t-posts, with polypropylene rope tied between. Wire mesh will be buried 0.5-feet below grade, with 2.5-feet extending above grade. The rope will also include mylar reflective tape to discourage birds from landing within the backshore planted area. Exclusion fencing will be removed once plants are well-established.

7.1.6 Riparian Zone

Restoration of nearshore riparian habitat includes removal of surface hardscape within the 150-foot shoreline buffer, followed by placement of a minimum of 2 feet of clean sandy backfill material. Soil amendments will include placing 4 inches of compost and rototilling into the top 1 foot of clean sandy soil, overlain with 3 inches of mulch. The 150-foot-wide riparian area will then be planted with a combination of native plants including deciduous or coniferous trees (Pacific madrone clusters 1-gallon pot on average 12-foot centers and Red Alder 1-gallon pot on average 9-foot centers, all other tree species 1-gallon and 5-gallon pots on average 12-foot centers), shrubs (1-gallon pots on average 6-foot centers). Subject to availability, the plant list is as follows:

- Trees
  - Grand Fir (*Abies grandis*)
  - Douglas Fir (*Psuedotsuga menziesii*)
  - Shore Pine (*Pinus contorta, var. contorta*)
  - Western Red Cedar (*Thuja plicata*)
  - Red Alder (*Alnus rubra*)
  - Big Leaf Maple (*Acer macrophyllum*)
  - Pacific Madrone (*Arbutus menziesii*)
- Shrubs (medium to tall height)
  - Beaked Hazelnut (*Coryuis cornuta*)
  - Nootka Rose (*Rosa nutkana*)
  - Oceanspray (*Holodiscus discolor*)
  - Red Elderberry (*Sambucus racemose*)
  - Snowberry (*Symphoricarpos alba*)
  - Indian Plum (*Oemleria cerasiformis*)

    - Thimbleberry (*Rubus parviflorus*)
    - Salal (*Gaultheria shallon*)
- Beach Backshore
    - American Dune Grass (*Leymus mollis*)
    - Puget Sound Gumweed (*Grindelia integrifolia)*
    - Yellow Sand Verbena (*Abronia latifolia*)

As shown in Appendix E – Construction Drawings, appropriately sized species will be planted in such a way that the view corridor for Port Gamble adjacent to the upland placement area as required by the PGST Conservation Easement (E-404965) is protected. The view corridor area will be planted with a combination of native plants including deciduous or coniferous trees (Shore Pine 5-gallon pot on average 12-foot centers, all other tree species 1-gallon pots on average 9-foot centers) and shrubs (1-gallon pots on average 6-foot centers). Subject to availability, the plant list within the view corridor, as well as their typical height, is as follows:

- Trees
    - Vine Maple (*Acer circinatum*) (<25 feet)
    - Slide Alder (*Alnus virdusi*) (<30 feet)
    - Pacific Crabapple (*Malus Fusca*) (<30 feet)
    - Shore Pine (*Pinus contorta, var. contorta*) (<30 feet)
- Shrubs
    - Nootka Rose (*Rosa nutkana*) (<10 feet)
    - Serviceberry (*Amerlanchier alnifolia*) (<25 feet)
    - Snowberry (*Symphoricarpos alba*) (<6 feet)
    - Thimbleberry (*Rubus parviflorus)* (<8 feet)

To protect the woody riparian plant stems (trees, willows, and shrubs) from small mammals such as mice, voles, and rabbits, plastic or galvanized metal mesh tubes/cylinders will be buried at least 3 inches below grade and extend 2 feet above for shrubs and 3 feet above grade for trees. The planting protection tubes will be attached to wood stakes (lodge pole pine or Douglas fir) for stability.

The riparian zone will be bounded along the west and north by an approximately 1,700-foot-long wood-rail fence. Along the interior of the wood-rail fence, a row of Nootka Roses will be planted. Protected habitat restoration area signage will be placed along the entire perimeter of the riparian area at approximately every 100 to 200 feet as per the Drawings and Specifications.

7.1.7 Upland Placement Area

Excavated soils from within Work Zone 3 that meet cleanup levels (Table 2) will be relocated to the upland placement area directly adjacent to the bluff to a maximum height of 15 feet and the edges

graded at 4H:1V side slopes. Where the upland placement area meets the steep slopes of the upland bluff, material will be placed up to the slope as shown on the drawings. The upland placement area will be overlain with 0.5 feet of topsoil and hydroseeded with native meadow grasses. Stormwater from the upland placement area will infiltrate into underlying soils consistent with existing conditions.

7.2 Work Zone 4 – Western Bay Nearshore Thin Layer Sand Cover

As discussed previously, nearshore cover placement will be performed under a separate contract, though the details of the work are included in this EDR. The complementary dual goals of the western Bay nearshore thin layer sand cover are to provide suitable substrate to restore benthic habitat functions and to provide an opportunity for eelgrass restoration. Placing a sand cover layer in shallow subtidal zones of former log rafting areas will restore benthic habitat functions and provide suitable substrate in areas where there is currently little or no eelgrass.

PDI sediment characterization performed in August 2021 (Anchor QEA and Grette 2021) identified two surface sediment areas in former shallow subtidal log rafting areas in the western Bay with persistent concentrations of wood debris degradation products (e.g., hydrogen sulfide; [H_2S]) that currently degrade habitat functions (Figure 3). A 4.9-acre healthy native eelgrass (*Zostera marina*) meadow is growing in substrate between these two areas, along with a smaller northern patch of 1.7 acres. Placement of an average 6-inch sand cover over at least 11 acres of sediments (approximately 9,000 cy) with elevated porewater H_2S concentrations and non-optimal grain size and organic content within the -2 to -15 feet MLLW depth range will restore benthic habitat functions in this shallow subtidal zone. Constructing the nearshore wood debris cover using materials with low percent fines and organic content will promote consolidation and concurrently provide a better substrate for eelgrass within the optimal transplanting zone (approximately -3 to -6 feet MLLW). The northern and southern sand cover placement areas depicted in Figure 3 incorporate approximate 100-foot offsets of cover placement from the edges of the meadow and northern patch to avoid potential impacts to existing eelgrass beds.[13]

As practicable, the sand cover may be constructed using clean dredge material from the nearby Driftwood Key navigation channel. Otherwise, clean marine (preferred) or local upland quarry sources will be used. If an alternative to Driftwood Key is necessary, material will be tested to verify suitability. Materials will be placed using a clamshell bucket or equivalent by slightly opening the bucket and spreading the material over the area to be covered, releasing it above the water surface, resulting in an even placement with minimal "hummocks". The average 6-inch placed thicknesses will be verified by calculating material quantities placed and comparing pre-placement and post-placement

[13] Taking into account the accuracy of construction in the shallow subtidal zone, during the 2015 to 2017 Port Gamble Bay cleanup action, cap and cover materials were successfully placed closer to the edge of eelgrass meadows without impacts to these beds, optimizing overall habitat development.

hydrographic surveys. Where thin spots are determined by survey, a steel probe will be advanced to accurately measuring the thickness from the surface to the probe-determined contact with the underlying sediment. Additional sand cover will be placed as necessary to fill thin spots identified by steel probing.

The tolerance for the sand cover placement will be +/- 2 inches. Tolerance will be confirmed by comparing pre- and post-placement bathymetric surveys; however, bathymetric survey comparisons could potentially underestimate the placed sand thickness due to subgrade settlement. If the required thin layer sand placement thickness cannot be confirmed using bathymetric survey information alone, the following actions will be taken:

- The Contractor's reported quantity of material and the area over which it was placed (using bucket maps from GPS tracking software) will be reviewed to determine whether the appropriate amount of material was placed to achieve the required thickness and whether placement was sufficiently uniform.
- Bathymetric survey data will be reviewed for indications of mounding, high spots, or other anomalies that would indicate that placement was uneven.

If necessary, a steel probe will be advanced through the sand cover to confirm sand thickness overlying the probe-determined contact with native sediments. The confirmatory probe sampling plan will be developed collaboratively with Ecology and the Natural Resource Trustees, targeting the thinnest sand areas from the bathymetric comparison.

Pre-construction survey and data collection and post-construction smoothing of the sand cover surface (to remove small-scale peaks and valleys) will be performed as described in the *Western Bay Nearshore Eelgrass Transplanting and Thin Layer Sand Cover Scope of Work* (Grette Associates, forthcoming).

8 Implementation Schedule

This section provides an overview of the anticipated implementation schedule for integrated cleanup and restoration work.

Cleanup and restoration construction activities described in this EDR are targeted to be completed within a single season; however, site constraints, weather, tides, and contractor productivity could necessitate the work spanning multiple in-water work windows. The targeted start date for construction is June 2024, subject to final permitting approvals. Construction activities will be conducted in a manner that achieves the following goals:

- Provide for a safe work environment.
- Protect existing facilities from damage.
- Maintain reasonable access and operation for users of the Bay.
- Minimize the potential for recontamination.
- Accomplish the work in a timely manner.
- Accomplish the in-water work during the allowable work windows established in the project permits.
- Accomplish the work in a cost-effective manner.
- Comply with Kitsap County codes.

The project work windows, as defined in the final project permits, will govern in-water work activities in Work Zone 3. However, some work may be appropriately initiated prior to the opening of these in-water work windows. Likewise, some work activities may continue after closure of these in-water work windows. Activities that are not subject to in-water work restrictions may include the following:

- Preparation and/or removal of staging areas
- Preparation, processing (e.g., sparging), testing, and/or removal of upland stockpile areas
- Upland excavations and backfill, including preparatory activities for the development of the upland containment area
- Upland staging or transportation and disposal of dredged materials, soil, debris, and other construction materials
- Excavation, backfilling, seeding, and planting in the backshore and riparian zones

9 References

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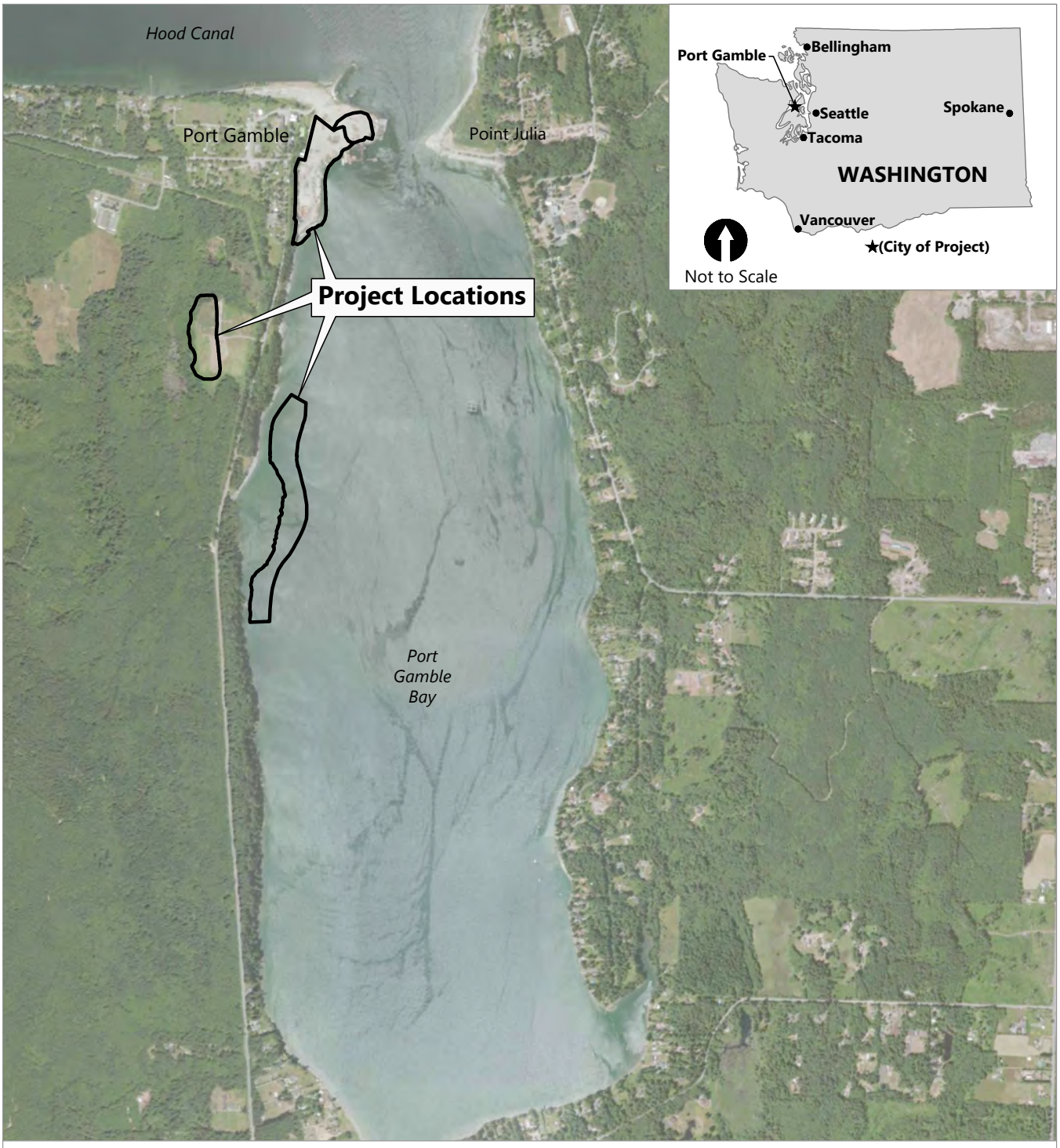
Figures



SOURCE: Aerial courtesy Esri et al.
HORIZONTAL DATUM: Washington State Plane North Zone, NAD83, U.S. Survey Feet

0 2000
Feet

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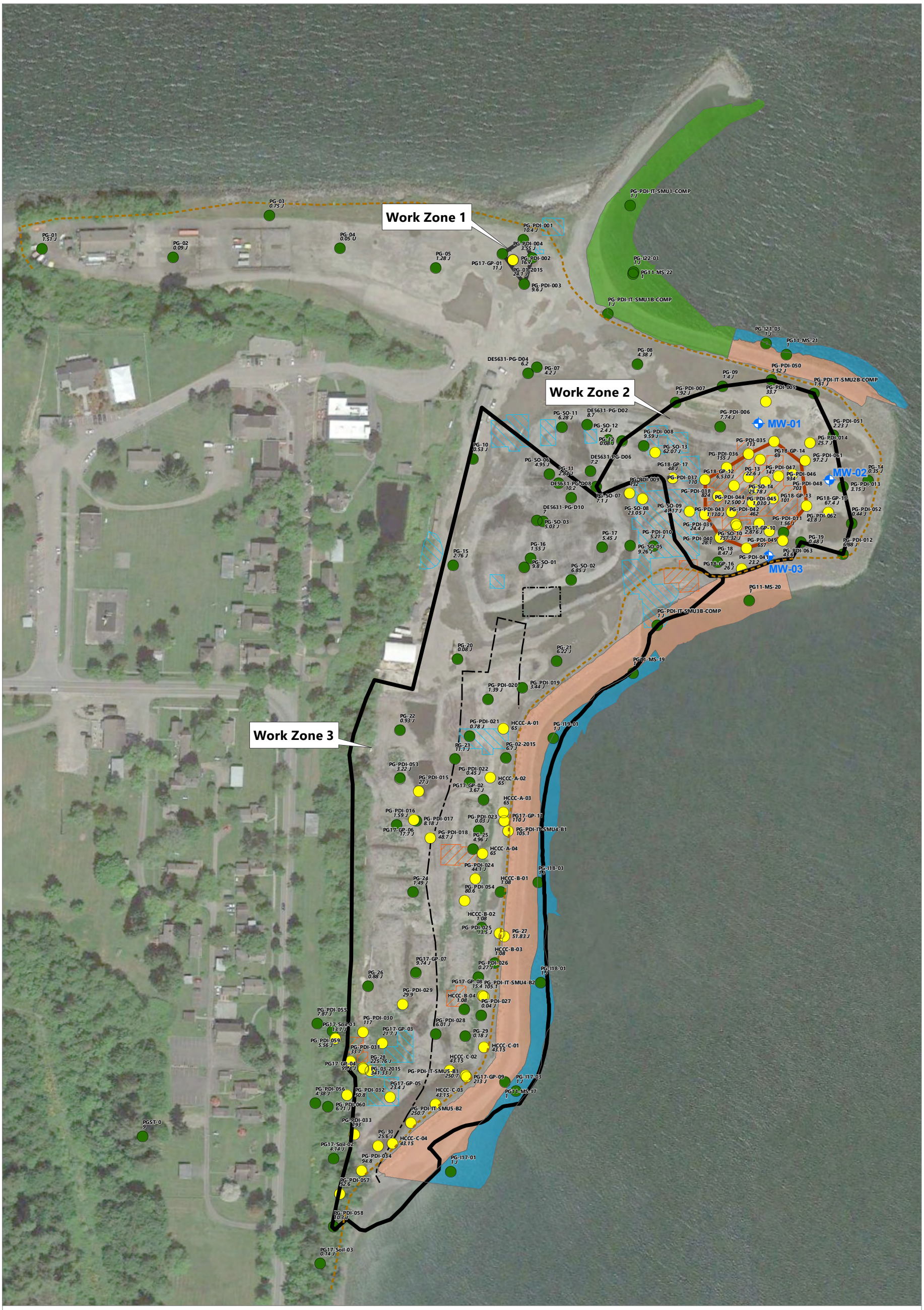
ANCHOR QEA

Figure 1
Vicinity Map

Engineering Design Report
Port Gamble Integrated Cleanup and Habitat Restoration Design



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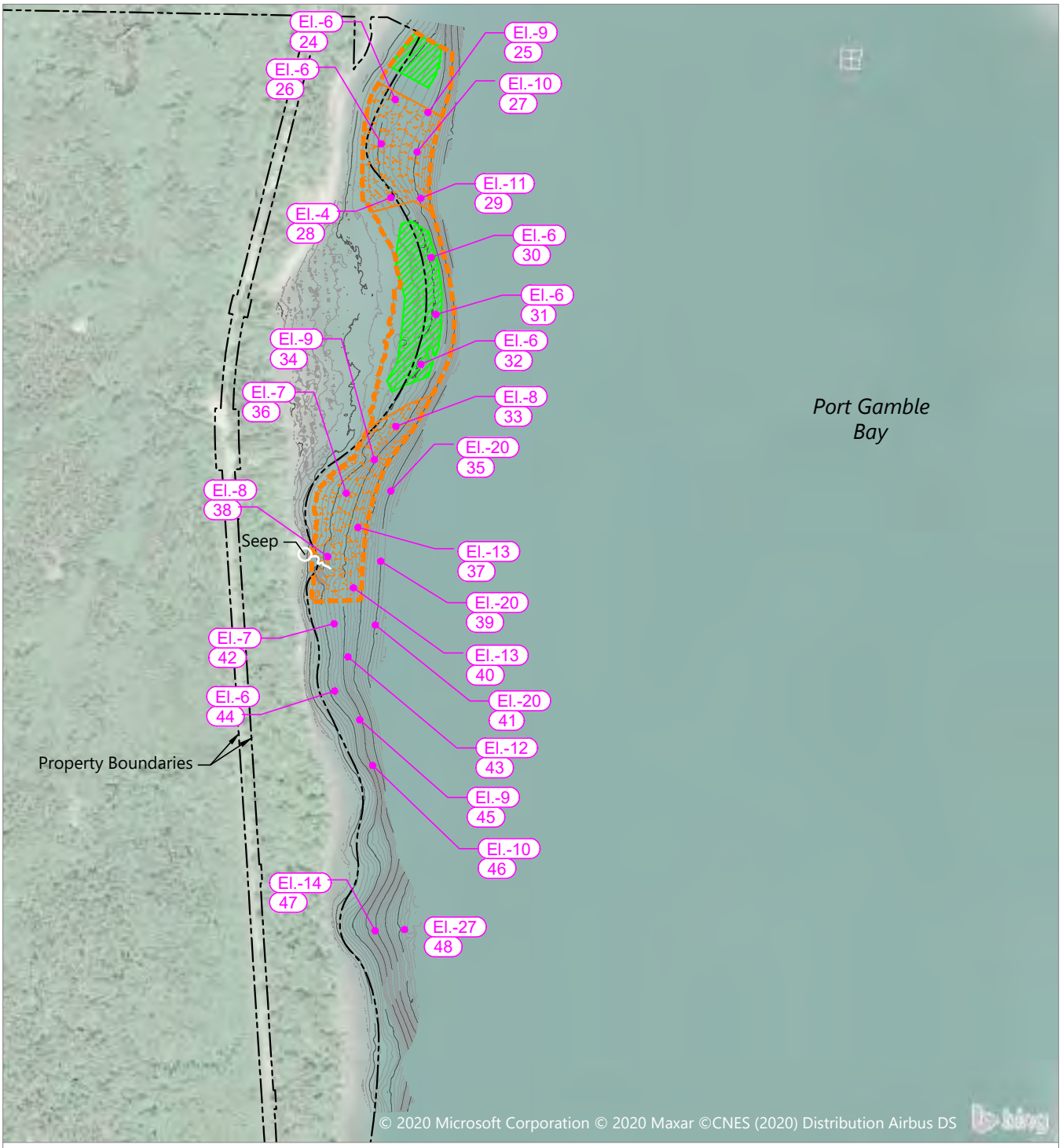
ANCHOR QEA

Figure 2
Mill Site Cleanup and Restoration Areas
Engineering Design Report
Port Gamble Integrated Cleanup and Habitat Restoration Design



SOURCE: Survey by eTrac dated June 30, 2020.
HORIZONTAL DATUM: Washington State Plane North, North American Datum (NAD83), U.S. Survey Feet
VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

- Current Eelgrass Beds (July 2021)
- Sand Cover Placement Area
- 5 — Existing Contours (1' & 5' Intervals)
- 2020 Wood Debris Sampling Stations Re-Sampled in 2021

0 800
Feet

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ANCHOR QEA

Figure 3
Western Bay Wood Debris Sampling Locations

Engineering Design Report
Port Gamble Integrated Cleanup and Habitat Restoration Design

Appendix A
Pre-Design Investigation Data

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ANCHOR QEA

Memorandum

February 11, 2022

To: John Evered, Washington State Department of Ecology
From: Clay Patmont and Jason Cornetta, Anchor QEA
cc: Jamie Northrup, Linda Berry-Maraist, Stephanie Foster, and Adrian Miller, Rayonier

Re: Pre-Design Investigation Data Report: Port Gamble Mill Site Upland Area

Introduction

This memorandum summarizes data collected during the pre-design investigation (PDI) at the Port Gamble Mill Site upland area, to inform forthcoming remedial design of the upland area cleanup remedy. The remedy design process is described in the Remedial Design Work Plan (RDWP; Anchor QEA 2021) approved by the Washington State Department of Ecology (Ecology) in March 2021. As discussed in the RDWP, multiple phases of PDI were anticipated to fill remedial design data gaps and address design objectives. Three phases of data collection were conducted, as summarized below, to address the following design objectives:

- Lateral and vertical delineation of the Area 2B excavation prism, to ensure that all soils exceeding the 530 nanogram per kilogram (ng/kg) dioxin/furan toxicity equivalent quotient (TEQ) remediation level are addressed by the excavation prism remedial design[1]
- Lateral delineation of capping Areas 1 through 4, to refine these areas and ensure the caps specified in the soil isolation cap remedial design are protective of human health
- Collection of additional information on surficial hardscape and geotechnical material properties within capping and excavation areas

First phase PDI field investigations were performed from April 13 to 15, 2021. These investigations resulted in the collection of 48 surface soil samples between 0 and 2 feet below ground surface (bgs), along with 85 subsurface soil samples between 2 and 15 feet bgs. Second phase PDI field investigations were performed from July 28 to 29, 2021. Second phase investigations included the collection of an additional 11 surface soil samples between 0 and 2 feet bgs, along with 29 subsurface soil samples between 2 and 25 feet bgs. The third and final phase PDI field investigations were performed on November 1 and 3, 2021. The final phase investigations included the collection of an additional 6 surface soil samples and 23 subsurface soil samples between 2 and 15 feet bgs.

Sampling and analysis procedures were consistent with the Ecology-approved RDWP (Anchor QEA 2021). All samples were analyzed for total solids and dioxin/furan congeners at the Analytical

[1] PDI sampling in Area 2B was intended to collect sufficient data to eliminate the need for post-excavation confirmatory sampling as described in the RDWP.

Resources, Inc., Tukwila, Washington, laboratory. Representative samples of materials from each lithology type observed were analyzed for grain size. Samples were also collected for hydraulic conductivity testing; however, these samples had higher hydraulic conductivities than the laboratory could quantify. As a result, the grain size data will be used during design to inform stockpile and excavation dewatering requirements.

Results

Table 1 includes final validated PDI surface and subsurface soil data. The Area 2B excavation prism data are further summarized in Table 2, and include continuously sampled, direct-push core results for perimeter and interior locations.

As shown in Table 2, there were no perimeter core exceedances of the 530 ng/kg dioxin/furan TEQ soil remediation level defining excavation requirements. The interior core samples shown in Table 2 will be used to design the excavation prism to ensure removal of soils exceeding the 530 ng/kg dioxin/furan TEQ soil remediation level.

A relatively deep boring (PDI-047) was advanced midway between PDI-045 and PDI-046 and sampled continuously to 25 feet bgs (Figure 1). The results from boring PDI-047 verify that soils with elevated dioxin/furan concentrations do not extend below 18 feet bgs (Table 2).

Figure 1 summarizes surface soil dioxin/furan TEQ concentrations at the Port Gamble Mill Site upland area, including the PDI data and prior remedial investigation/feasibility study data summarized in the RDWP (Anchor QEA 2021).

Prospective capping areas exceeding the 12 ng/kg soil cleanup level delineated by these data, conservatively defined by connecting surface soil sample locations with dioxin/furan concentrations below 12 ng/kg TEQ, are as follows:

- Area 1: 0.1 acre
- Area 2: 3.6 acres
- Area 3: 4.9 acres

Conclusions

The Areas 1, 2, and 3 surface soil sampling data collected during the PDI adequately delineate the areal extent of soils exceeding the 12 ng/kg dioxin/furan TEQ cleanup level. Similarly, the Area 2B excavation prism data collected during the PDI adequately delineate the lateral and vertical extent of soils exceeding the 530 ng/kg dioxin/furan TEQ remediation level. These data are sufficient to inform the forthcoming remedial design of the Port Gamble Mill Site upland area remedy.

References

Anchor QEA, 2021. *Remedial Design Work Plan – Upland Area of the Port Gamble Bay and Mill Site: Former Pope & Talbot, Inc., Sawmill Site Uplands, Port Gamble*. Prepared for Rayonier, Inc., and Washington State Department of Ecology. January 2021.

Tables

Table 1

Soil Data Summary - Port Gamble Mill Site Upland Pre-Design Investigation

Location ID Sample Date / Time Depth Chemical	PG-PDI-001 4/14/2021 8:35 0 - 2 ft	PG-PDI-002 4/14/2021 8:50 0 - 2 ft	PG-PDI-003 4/14/2021 8:55 0 - 2 ft	PG-PDI-004 4/14/2021 8:45 0 - 2 ft	PG-PDI-005 4/13/2021 16:45 0 - 2 ft	PG-PDI-005 4/13/2021 16:47 0 - 2 ft	PG-PDI-006 4/13/2021 16:25 0 - 2 ft	PG-PDI-007 4/13/2021 16:20 0 - 2 ft	PG-PDI-008 4/13/2021 16:10 0 - 2 ft	PG-PDI-009 4/13/2021 16:05 0 - 2 ft	PG-PDI-010 4/13/2021 16:00 0 - 2 ft	PG-PDI-011 4/14/2021 9:40 0 - 2 ft
Conventional Parameters (pct)												
Moisture (water) content	--	--	--	--	--	--	--	--	--	--	--	--
Total Solids	**93.04**	**91.33**	**91.82**	**87.05**	**93.11**	**93.81**	**95.49**	**91.21**	**92.84**	**87.5**	**92.62**	**92.64**
Grain Size (pct)												
Percent passing 1 inch (1 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.75 inch (3/4 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.5 inch (1/2 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.375 inch (3/8 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 4750 micron sieve (#4)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 2000 micron sieve (#10)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 850 micron sieve (#20)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 425 micron sieve (#40)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 250 micron sieve (#60)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 150 micron sieve (#100)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 106 micron sieve (#140)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 75 micron sieve (#200)	--	--	--	--	--	--	--	--	--	--	--	--
Dioxin Furans (ng/kg)												
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**0.794 J**	**1.13**	**0.454 J**	**0.510 J**	**2.03**	**2.55**	**0.312 J**	0.999 U	**0.278 J**	**8.6**	**0.303 J**	**0.121 J**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**2.98**	**5.68**	**1.42**	**1.24 J**	**10.5**	**14.7**	**1.38 J**	0.999 U	**1.07 J**	**58.8**	**1.02 J**	**0.218 J**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**1.91**	**3.79**	**1.57 J**	**0.802 J**	**8.31**	**9.73**	**0.896 J**	0.999 U	**1.26**	**36.4**	**0.800 J**	0.997 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**14.8**	**14.2**	**2.46 J**	**1.98**	**41.2**	**53.3**	**9.19**	**2.88**	**14.5**	**89.9**	**8.29**	**2.31**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**5.2**	**6.93**	**2.16 J**	**0.969 J**	**14.6**	**19.3**	**2.75**	**0.692 J**	**2.73 J**	**54.4**	**2.46**	**0.667 J**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**159**	**78.4**	**32.1**	**16.6**	**247**	**306**	**211**	**73.3**	**297**	**778**	**102**	**31.2**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**1440**	**250**	**67.1**	**73**	**1240**	**1370**	**2010**	**1230**	**3100**	**2360**	**762**	**282**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	**80.8**	**92.9**	**23.2**	**39**	**51.4**	**69.4**	**6.4**	**9.05**	**10.3**	**881**	**13.3**	0.997 U
Total Pentachlorodibenzo-p-dioxin (PeCDD)	**49.1**	**70.6**	**15.7**	**19.3**	**71.9**	**92.1**	**7.77**	**2.24**	**7.61**	**865**	**10.1**	**0.294**
Total Hexachlorodibenzo-p-dioxin (HxCDD)	**129**	**141**	**13.4**	**27**	**284**	**379**	**78.2**	**18.7**	**75.9**	**1320**	**63.3**	**10.9**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	**527**	**120**	**43.1**	**27.2**	**683**	**761**	**536**	**142**	**758**	**1470**	**321**	**55.9**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**4.66**	**9.61**	**2.64**	**3.33**	**1.08**	**1.42**	**1.01 J**	**0.294 J**	**0.881 J**	**35.5**	**0.581 J**	**0.089 J**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**3.43**	**11.3 J**	**11.6**	**1.99**	**1.29**	**1.64**	**0.536 J**	0.999 U	**0.739 J**	**48.4**	**0.590 J**	**0.147 J**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**1.76**	**4**	**1.69**	**0.944 J**	**0.904 J**	**1.24**	**0.423 J**	**0.254 J**	**0.866 J**	**38**	**0.647 J**	**0.116 J**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**4.07**	**20**	**40.1**	**2.91**	**2.73**	**3.53**	**2**	**0.519 J**	**2.44**	**64**	**1.64**	**0.621 J**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**2.23**	**6.09**	**8.4**	**0.978 J**	**3.88**	**5.12**	**2.11 J**	0.999 U	**1.5**	**46**	**1.09**	**0.499 J**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	**0.665 J**	**1.02**	**0.858 J**	0.995 U	**1.99**	**2.29**	**1.72**	**0.472 J**	**0.979 J**	**13.3**	**0.537 J**	**0.351 J**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**2.26**	**4.61**	**1.7**	**0.541 J**	**6.66**	**8.84**	**3.52**	0.999 U	**2.6**	**42.6**	**1.63**	**0.549 J**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**32**	**85.5**	**50.6**	**11.2**	**143**	**207**	**80.1**	**21.2**	**123**	**484**	**68.1**	**25.8**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**1.53**	**2.54**	**3.32**	0.995 U	**4.63**	**5.71**	**3.42**	**3.06**	**6.34**	**46.7**	**1.53 J**	**1.01 J**
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**44.4**	**64.9**	**9.7**	**11.6**	**102**	**131**	**112**	**31.2**	**246**	**754**	**94.9**	**28**
Total Tetrachlorodibenzofuran (TCDF)	**55.6**	**102**	**16.4**	**35.1**	**19.8**	**20.9**	**7.48**	**2.98**	**15.6**	**540**	**4.14**	**0.566**
Total Pentachlorodibenzofuran (PeCDF)	**32.3**	**67.7**	**19.6**	**12.9**	**33.5**	**40.4**	**13**	**1.97**	**7.04**	**474**	**9.57**	**2.54**
Total Hexachlorodibenzofuran (HxCDF)	**49.7**	**101**	**69.5**	**14.7**	**190**	**272**	**126**	**28.9**	**151**	**645**	**57.3**	**30.1**
Total Heptachlorodibenzofuran (HpCDF)	**81.6**	**166**	**58.4**	**21.5**	**357**	**515**	**246**	**74.1**	**497**	**1190**	**180**	**76**
Total Dioxin/Furan (U = 0)	**1720 J**	**570 J**	**238 J**	**129 J**	**1830 J**	**2140**	**2440 J**	**1360 J**	**3800 J**	**4960**	**1050 J**	**374 J**
Total Dioxin/Furan (U = 1/2)	**1720 J**	**570 J**	**238 J**	**130 J**	**1830 J**	**2140**	**2440 J**	**1370 J**	**3800 J**	**4960**	**1050 J**	**374 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	**10.4 J**	**16.7 J**	**9.60 J**	**3.55 J**	**25.2 J**	**33.7**	**7.74 J**	**1.92 J**	**9.59 J**	**132**	**5.21 J**	**1.56 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	**10.4 J**	**16.7 J**	**9.60 J**	**3.60 J**	**25.2 J**	**33.7**	**7.74 J**	**3.08 J**	**9.59 J**	**132**	**5.21 J**	**1.61 J**

Table 1

Soil Data Summary - Port Gamble Mill Site Upland Pre-Design Investigation

Location ID Sample Date / Time Depth Chemical	PG-PDI-012 4/14/2021 9:35 0 - 2 ft	PG-PDI-013 4/14/2021 9:30 0 - 2 ft	PG-PDI-014 4/13/2021 16:50 0 - 2 ft	PG-PDI-015 4/15/2021 8:45 0 - 2 ft	PG-PDI-016 4/15/2021 8:55 0 - 2 ft	PG-PDI-017 4/15/2021 8:50 0 - 2 ft	PG-PDI-018 4/15/2021 9:00 0 - 2 ft	PG-PDI-019 4/15/2021 9:30 0 - 2 ft	PG-PDI-020 4/15/2021 9:25 0 - 2 ft	PG-PDI-021 4/15/2021 9:20 0 - 2 ft	PG-PDI-022 4/15/2021 9:10 0 - 2 ft	PG-PDI-023 4/15/2021 9:40 0 - 2 ft
Conventional Parameters (pct)												
Moisture (water) content	--	--	--	--	--	--	--	--	--	--	--	--
Total Solids	**91.82**	**94.19**	**90.79**	**93.23**	**90.09**	**95.48**	**95.37**	**93.71**	**93.53**	**93.84**	**94.26**	**95.77**
Grain Size (pct)												
Percent passing 1 inch (1 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.75 inch (3/4 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.5 inch (1/2 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.375 inch (3/8 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 4750 micron sieve (#4)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 2000 micron sieve (#10)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 850 micron sieve (#20)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 425 micron sieve (#40)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 250 micron sieve (#60)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 150 micron sieve (#100)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 106 micron sieve (#140)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 75 micron sieve (#200)	--	--	--	--	--	--	--	--	--	--	--	--
Dioxin Furans (ng/kg)												
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**0.375 J**	**0.272 J**	**1.78 J**	**0.419 J**	**0.365 J**	0.999 U	**0.396 J**	0.995 U	0.997 U	0.998 U	0.996 U	0.995 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**1.52**	**0.743 J**	**9.43**	**3.29**	**0.265 J**	**1.05**	**6.76**	**0.730 J**	**0.474 J**	0.998 U	0.996 U	0.995 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**1.2**	**0.475 J**	**9.37**	**3.1**	0.998 U	**0.807 J**	**7.13**	**0.302 J**	**0.221 J**	0.998 U	0.996 U	0.995 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**9.86**	**7.42**	**51.7**	**50.7**	**1.75**	**14.4**	**93.4**	**4.85**	**1.93**	**2.01**	**2.32**	0.995 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**2.85**	**1.65**	**12.1**	**10.3**	**0.558 J**	**3**	**17.4**	**2.52**	0.706 U	0.654 U	0.465 U	0.995 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**170**	**43.3**	**258**	**340**	**17.7**	**107**	**660**	**109**	**36.2**	**25.7**	**8.74**	2.29 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**1590**	**157**	**883**	**281**	**60.2**	**95.3**	**498**	**922**	**287**	**149**	**36.4**	**14**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	**24.1**	**5.81**	**30.7**	**7.77**	**1.4**	**3.99**	**5.51**	**1.85**	**1.56**	**0.891**	0.996 U	0.995 U
Total Pentachlorodibenzo-p-dioxin (PeCDD)	**21.8**	**5.95**	**59.1**	**12.9**	**2.03**	**3.6**	**31.7**	**2.18**	**0.861**	**0.309**	**0.544**	**0.132**
Total Hexachlorodibenzo-p-dioxin (HxCDD)	**98**	**45.6**	**339**	**189**	**7.34**	**52.7**	**408**	**32.2**	**26**	**15**	**13**	**0.165 J**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	**729**	**100**	**532**	**435**	**24.6**	**142**	**891**	**280**	**136**	**89.9**	**15.3**	**1.55 J**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**1.11**	**0.125 J**	**1.55 J**	**0.556 J**	**0.228 J**	0.999 U	0.995 U	**0.316 J**	0.997 U	0.998 U	0.996 U	0.995 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**1.27 J**	0.998 U	**0.940 J**	**1.13**	**0.423 J**	0.999 U	**2.03**	**0.551 J**	0.997 U	0.998 U	0.996 U	0.995 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**0.750 J**	**0.177 J**	**1.37 J**	**1.34 J**	**0.282 J**	**0.485 J**	**2.21 J**	**0.418 J**	0.997 U	0.998 U	0.996 U	0.995 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**2.26**	**0.485 J**	**3.42**	**8.58**	**0.561 J**	**2.85**	**14.6**	**0.808 J**	**0.297 J**	**0.237 J**	**0.155 J**	0.995 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**1.56**	**0.630 J**	**4.56**	**13.2**	**0.549 J**	**4.12**	**23.4**	0.474 U	0.307 U	0.287 U	0.996 U	0.995 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	**0.700 J**	**0.585 J**	**3.18 J**	**9.98**	**0.214 J**	**2.83**	**18.5**	0.995 U	0.997 U	**0.203 J**	0.996 U	0.995 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**1.3**	**1.37**	**9.63**	**26.1**	**0.874 J**	**8.58**	**46.4**	1.20 U	0.437 U	0.361 U	0.996 U	0.995 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**42.3**	**31.4**	**159**	**683**	**18.6**	**213**	**1160**	**14.3**	**6.98**	**9.92**	**5.11**	0.518 U
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**1.97**	**0.748 J**	**4.63**	**14.3**	**0.500 J**	**5.1**	**22.6**	**0.741 J**	**0.154 J**	0.998 U	0.996 U	0.995 U
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**70.4**	**22.4**	**104**	**423**	**14.6**	**143**	**684**	**18.4 J**	**9.14**	**8.19**	4.33 U	0.845 U
Total Tetrachlorodibenzofuran (TCDF)	**7.71**	**0.649**	**15**	**12.4**	**1.16**	**3.11**	**26.6**	**0.977**	0.997 U	**0.388**	0.996 U	0.995 U
Total Pentachlorodibenzofuran (PeCDF)	**8.06**	**4.4**	**56.3**	**114**	**3.65**	**27.9**	**311**	**6.34**	**0.649**	**3.32**	**1.01**	0.995 U
Total Hexachlorodibenzofuran (HxCDF)	**58.3**	**41.4**	**233**	**899**	**22.8**	**270**	**1570**	**31.1**	**10.3**	**12.6**	**3.19**	0.995 U
Total Heptachlorodibenzofuran (HpCDF)	**136**	**77.1**	**392**	**1740**	**46.4**	**547**	**2960**	**44.9**	**18.6**	**24.1**	**12.3**	**1.11 J**
Total Dioxin/Furan (U = 0)	**1900 J**	**269 J**	**1520 J**	**1870 J**	**118 J**	**602 J**	**3260 J**	**1070 J**	**342 J**	**195 J**	**52.7 J**	**14**
Total Dioxin/Furan (U = 1/2)	**1900 J**	**269 J**	**1520 J**	**1870 J**	**118 J**	**603 J**	**3260 J**	**1080 J**	**346 J**	**199 J**	**60.1 J**	**22.3**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	**6.88 J**	**3.15 J**	**25.7 J**	**27.0 J**	**1.59 J**	**8.18 J**	**48.7 J**	**3.27 J**	**1.24 J**	**0.648 J**	**0.397 J**	**0.0042**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	**6.88 J**	**3.17 J**	**25.7 J**	**27.0 J**	**1.64 J**	**8.74 J**	**48.8 J**	**3.91 J**	**2.08 J**	**1.98 J**	**1.84 J**	**1.58**

Table 1

Soil Data Summary - Port Gamble Mill Site Upland Pre-Design Investigation

Location ID / Sample Date / Time / Depth / Chemical	PG-PDI-024 4/15/2021 9:35 0 - 2 ft	PG-PDI-024 4/15/2021 9:37 0 - 2 ft	PG-PDI-025 4/15/2021 10:10 0 - 2 ft	PG-PDI-026 4/15/2021 10:15 0 - 2 ft	PG-PDI-027 4/15/2021 10:20 0 - 2 ft	PG-PDI-028 4/15/2021 10:30 0 - 2 ft	PG-PDI-029 4/15/2021 10:35 0 - 2 ft	PG-PDI-030 4/15/2021 10:45 0 - 2 ft	PG-PDI-031 4/15/2021 10:35 0 - 2 ft	PG-PDI-032 4/15/2021 10:25 0 - 2 ft	PG-PDI-033 4/15/2021 10:20 0 - 2 ft	PG-PDI-034 4/15/2021 10:45 0 - 2 ft
Conventional Parameters (pct)												
Moisture (water) content	--	--	--	--	--	--	--	--	--	--	--	--
Total Solids	**94.03**	**93.77**	**93.78**	**95.3**	**95.78**	**94.31**	**91.62**	**89.12**	**88.3**	**80.44**	**72.22**	**91.77**
Grain Size (pct)												
Percent passing 1 inch (1 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.75 inch (3/4 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.5 inch (1/2 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.375 inch (3/8 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 4750 micron sieve (#4)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 2000 micron sieve (#10)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 850 micron sieve (#20)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 425 micron sieve (#40)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 250 micron sieve (#60)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 150 micron sieve (#100)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 106 micron sieve (#140)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 75 micron sieve (#200)	--	--	--	--	--	--	--	--	--	--	--	--
Dioxin Furans (ng/kg)												
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**0.640 J**	**0.560 J**	0.997 U	0.999 U	0.997 U	**0.273 J**	**8.89**	**4.02**	**1.17**	**2.99**	**10.5**	**1.61**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**3.9**	**4.27**	**1.19 J**	0.999 U	0.997 U	**1.52**	**12.2**	**12.7**	**11.1**	**22.6**	**93.2**	**19.5**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**13.4**	**12.7**	0.997 U	0.999 U	0.997 U	**1.11**	**7.33**	**7.61**	**5.03**	**2.99**	**24.8**	**24.9**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**92.7**	**94.4**	**76.7**	**0.922 J**	0.997 U	**12.2**	**14.7**	**231**	**61.3**	**102**	**312**	**261**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**18.1**	**18.4**	**29.9**	0.268 U	0.997 U	**3.26**	**9.95**	**30.1**	**16.8**	**49.1**	**145**	**41.9**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**1370**	**1340**	**135**	**7.34**	1.82 U	**74.7**	**81**	**1560**	**510**	**424**	**1460**	**1450**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**16500 J**	**16800 J**	**63.8**	**44.2**	**13.6**	**292**	**122**	**1660**	**4420 J**	**2070**	**7070 J**	**3600**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	**2.4**	**6.13**	**1.31**	**0.333**	**4.94**	**15.2**	**248**	**53.8**	**151**	**144**	**389**	**53.4**
Total Pentachlorodibenzo-p-dioxin (PeCDD)	**21.8**	**49.2**	**5.03**	**1.86**	**2.03**	**13.4**	**226**	**77.7**	**124**	**173**	**574**	**116**
Total Hexachlorodibenzo-p-dioxin (HxCDD)	**512**	**499**	**413**	**3.69**	**1.77**	**96.5**	**326**	**856**	**407**	**711**	**2090**	**1360**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	**2460**	**2340**	**245**	**15.9**	**1.62 J**	**111**	**137**	**2130**	**1790**	**855**	**2870**	**2370**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**9.72**	**9.96**	0.997 U	0.999 U	0.997 U	**0.510 J**	**5.81**	**3.77**	**5.12**	**11.7**	**50.3**	**4.9**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**4.65**	**4.76**	0.997 U	0.999 U	**0.195 J**	0.997 U	**6.43 J**	**5.94**	**3.57 J**	**5.11**	**20.2 J**	**4.25**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**7.31**	**7.87**	0.997 U	0.999 U	0.997 U	0.997 U	**6.19**	**7.28**	**3.64**	**4.92**	**26.2**	**5.82**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**3.32**	**3.63**	**0.363 J**	0.999 U	0.997 U	**1.35 J**	**6.61**	**35.5**	**5.51**	**2.78**	**16**	**14.6**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**2.16**	**2.11**	0.268 U	0.166 U	0.997 U	**1.9**	**5.14**	**46.6**	**6.62**	**3.07**	**18.2**	**20.4**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	**20.5**	**12**	0.997 U	0.999 U	0.997 U	**1.42**	**1.13**	**59.2**	**7.82**	**2.06**	**11**	**20.1**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**6.86**	**6.44**	0.769 U	0.999 U	0.997 U	**3.82**	**4.94**	**98.1**	**12.9**	**5.26**	**29.1**	**46.4**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**170**	**178**	**17.8**	**4.89**	0.910 U	**78.8**	**32.8**	**2940**	**157**	**77**	**284**	**1230**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**8.12**	**9.02**	**0.464 J**	0.999 U	0.997 U	**1.99**	**1.87**	**60**	**5.53**	**3.11**	**9.8**	**23.9**
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**391**	**411**	**8.49**	4.56 U	0.983 U	**52**	**17**	**1820**	**170**	**114**	**274**	**892**
Total Tetrachlorodibenzofuran (TCDF)	**50.5**	**48.1**	0.997 U	**0.416**	**0.203**	**8.7**	**77.9**	**65.8**	**68.5**	**189**	**729**	**61.1**
Total Pentachlorodibenzofuran (PeCDF)	**357**	**391**	**3.4**	**2.15**	**0.626**	**20.6**	**72.2**	**591**	**162**	**104**	**448**	**415**
Total Hexachlorodibenzofuran (HxCDF)	**568**	**594**	**31.1**	**6.52**	**1.10 J**	**100**	**60.9**	**3830**	**283**	**122**	**539**	**1740**
Total Heptachlorodibenzofuran (HpCDF)	**695**	**726**	**47.6**	**11.1**	**2.09 J**	**184**	**61.4**	**7790**	**394**	**216**	**696**	**3280**
Total Dioxin/Furan (U = 0)	**18600 J**	**18900 J**	**334 J**	**57.4 J**	**13.8 J**	**527 J**	**344 J**	**8580**	**5400 J**	**2900**	**9850 J**	**7660**
Total Dioxin/Furan (U = 1/2)	**18600 J**	**18900 J**	**337 J**	**64.8 J**	**21.6 J**	**528 J**	**344 J**	**8580**	**5400 J**	**2900**	**9850 J**	**7660**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	**44.1 J**	**43.7 J**	**13.4 J**	**0.228 J**	**0.00993 J**	**6.01 J**	**29.9 J**	**117**	**33.7 J**	**50.8**	**193 J**	**94.8**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	**44.1 J**	**43.7 J**	**14.3 J**	**1.67 J**	**1.57 J**	**6.17 J**	**29.9 J**	**117**	**33.7 J**	**50.8**	**193 J**	**94.8**

Table 1

Soil Data Summary - Port Gamble Mill Site Upland Pre-Design Investigation

Location ID Sample Date / Time Depth Chemical	PG-PDI-035 4/13/2021 10:15 0 - 2 ft	PG-PDI-035 4/13/2021 10:18 2 - 4 ft	PG-PDI-035 4/13/2021 10:20 4 - 5 ft	PG-PDI-035 4/13/2021 10:30 5 - 10 ft	PG-PDI-035 4/13/2021 10:35 10 - 12 ft	PG-PDI-035 4/13/2021 10:36 12 - 14 ft	PG-PDI-035 4/13/2021 10:38 14 - 15 ft	PG-PDI-036 4/13/2021 11:40 0 - 2 ft	PG-PDI-036 4/13/2021 11:42 2 - 4 ft	PG-PDI-036 4/13/2021 11:45 4 - 6 ft	PG-PDI-036 4/13/2021 11:55 6 - 8 ft	PG-PDI-036 4/13/2021 12:00 8 - 10 ft
Conventional Parameters (pct)												
Moisture (water) content	--	--	--	--	--	--	--	--	--	--	--	--
Total Solids	**92.76**	**95.86**	**93.77**	**88.58**	**79.2**	**76.42**	**47.93**	**92.96**	**90.8**	**78.36**	**77.98**	**62.13**
Grain Size (pct)												
Percent passing 1 inch (1 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.75 inch (3/4 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.5 inch (1/2 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.375 inch (3/8 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 4750 micron sieve (#4)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 2000 micron sieve (#10)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 850 micron sieve (#20)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 425 micron sieve (#40)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 250 micron sieve (#60)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 150 micron sieve (#100)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 106 micron sieve (#140)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 75 micron sieve (#200)	--	--	--	--	--	--	--	--	--	--	--	--
Dioxin Furans (ng/kg)												
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**0.411 J**	**0.220 J**	**1.57**	5.59 U	12.6 U	**0.530 J**	0.999 U	10.8 U	0.998 U	**0.175 J**	0.999 U	**2.13**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**2.16**	**0.423 J**	**5.37**	**4.24 J**	**7.48 J**	**2.16**	**1.86**	**15.4**	**1.16 J**	0.999 U	**0.119 J**	**13.8**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**5.45**	**1.68**	**17.9**	**6.86 J**	**7.66 J**	**1.66**	**1.3**	**26**	**1.57**	**0.131 J**	**0.224 J**	**11.4**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**32.6**	**17.1**	**177**	**147**	**169**	**13.5**	**10.8**	**220**	**7.12**	**0.626 J**	**0.649 J**	**33.9**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**4.6**	**1.53**	**14.9**	**11**	**9.68 J**	**1.91**	**1.18**	**53.1**	**2.75**	**0.253 J**	**0.351 J**	**3.88**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**694**	**256**	**2920**	**2160**	**3140**	**266**	**212**	**4370**	**289**	**15.8**	**12.1**	**678**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**7680 J**	**1810**	**14500**	**11800**	**20300**	**1740**	**1170**	**77800 J**	**6000 J**	**239**	**171**	**6370**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	**7.99**	**0.479**	**28.5**	**9.33**	**3**	**6.93**	**15.5**	**32.5**	**10.9**	**1.59**	**0.657**	**89.3**
Total Pentachlorodibenzo-p-dioxin (PeCDD)	**13.1**	**1.44**	**44.7**	**15.8**	**7.48**	**13.1**	**9.24**	**90.7**	**10.4**	**0.567**	**0.286**	**121**
Total Hexachlorodibenzo-p-dioxin (HxCDD)	**179**	**41.4**	**453**	**339**	**468**	**58.8**	**45.3**	**753**	**51.8**	**4.56**	**3.42**	**316**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	**1870**	**361**	**3980**	**2990**	**4440**	**389**	**298**	**7710**	**612**	**30.7**	**23.1**	**1440**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**0.613 J**	**0.677 J**	**2.78 J**	5.59 U	12.6 U	0.998 U	**2**	**1.98 J**	0.998 U	**0.359 J**	0.999 U	**6.97 J**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**0.956 J**	**0.213 J**	**1.51 J**	**2.05 J**	12.6 U	**0.982 J**	**1.79 J**	**3.76 J**	0.998 U	**0.147 J**	0.999 U	**3.35**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**1.05**	**0.211 J**	**2.06**	5.59 U	12.6 U	0.998 U	**0.972 J**	10.8 U	**0.447 J**	**0.131 J**	0.999 U	**3.06**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**5.81**	**2.75**	**34**	**25.2**	**35.8**	**4.16**	**4.77**	**39.3**	**1.99**	**0.169 J**	**0.191 J**	**7.76**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**3.15**	**2.02 J**	**18.4**	**13.6**	**18.4 J**	**1.90 J**	**1.75**	**16.1**	**3.41**	**0.238 J**	**0.176 J**	**4.11**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	**7.35**	**3.83**	**20.3**	**15**	**18.3**	**1.94**	**1.33**	**22.9**	**0.801 J**	0.999 U	0.999 U	0.998 UJ
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**8.18**	**4.61**	**49.6**	**38.7**	**52.2**	**5.18**	**4.09**	**43.3**	**4.73**	0.999 U	0.999 U	**7.3**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**469**	**230**	**3560**	**2390**	**3380**	**269**	**192**	**2700**	**68.3**	**6.99**	**6.09**	**421**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**18.1**	**12.6**	**123**	**87.5**	**126**	**9.92**	**7.34**	**132**	**3.17**	0.999 U	**0.373 J**	**18.1**
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**649**	**336**	**5630**	**4080**	**4730**	**483**	**363**	**4840**	**65**	**10.2**	**10.3**	**916**
Total Tetrachlorodibenzofuran (TCDF)	**7.14**	**1.35**	**22.6**	**12.1**	**74**	**4.74**	**30.1**	10.8 U	**7.17**	**2.34**	0.999 U	**88.4**
Total Pentachlorodibenzofuran (PeCDF)	**20.6**	**14.7**	**111**	**71.9**	**169**	**19.6**	**9.47**	**88.8**	**40.3**	**0.147**	0.999 U	**41.5**
Total Hexachlorodibenzofuran (HxCDF)	**525**	**254**	**3900**	**2660**	**4090**	**333**	**229**	**3140**	**111**	**9.05**	**7**	**510 J**
Total Heptachlorodibenzofuran (HpCDF)	**1700**	**853**	**13700**	**9060**	**12600**	**992**	**717**	**11100**	**160**	**23.9**	**23.1**	**1620**
Total Dioxin/Furan (U = 0)	**9580 J**	**2680 J**	**27100 J**	**20800 J**	**32000 J**	**2800 J**	**1980 J**	**90300 J**	**6450 J**	**274 J**	**202 J**	**8500 J**
Total Dioxin/Furan (U = 1/2)	**9580 J**	**2680 J**	**27100 J**	**20800 J**	**32000 J**	**2800 J**	**1980 J**	**90300 J**	**6450 J**	**276 J**	**205 J**	**8500 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	**24.0 J**	**9.76 J**	**113 J**	**81.2 J**	**113 J**	**11.9 J**	**9.50 J**	**155 J**	**8.96 J**	**0.699 J**	**0.518 J**	**37.8 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	**24.0 J**	**9.76 J**	**113 J**	**85.1 J**	**122 J**	**12.1 J**	**10.0 J**	**162 J**	**9.52 J**	**1.30 J**	**1.33 J**	**37.9 J**

Table 1

Soil Data Summary - Port Gamble Mill Site Upland Pre-Design Investigation

Location ID Sample Date / Time Depth Chemical	PG-PDI-036 4/13/2021 12:05 10 - 12 ft	PG-PDI-036 4/13/2021 12:10 12 - 14 ft	PG-PDI-036 4/13/2021 12:15 14 - 15 ft	PG-PDI-037 4/13/2021 13:40 0 - 2 ft	PG-PDI-037 4/13/2021 13:45 2 - 4 ft	PG-PDI-037 4/13/2021 13:50 4 - 6 ft	PG-PDI-037 4/13/2021 13:55 6 - 8 ft	PG-PDI-037 4/13/2021 14:00 8 - 10 ft	PG-PDI-037 4/13/2021 14:05 10 - 12 ft	PG-PDI-037 4/13/2021 14:10 12 - 14 ft	PG-PDI-037 4/13/2021 14:15 14 - 15 ft	PG-PDI-038 4/14/2021 11:10 0 - 2 ft
Conventional Parameters (pct)												
Moisture (water) content	--	--	--	--	--	--	--	--	--	--	--	--
Total Solids	**73.38**	**77.75**	**34.68**	**93.17**	**79.93**	**85.29**	**88.41**	**68.33**	**80.78**	**81.49**	**89.71**	**94.16**
Grain Size (pct)												
Percent passing 1 inch (1 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.75 inch (3/4 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.5 inch (1/2 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.375 inch (3/8 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 4750 micron sieve (#4)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 2000 micron sieve (#10)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 850 micron sieve (#20)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 425 micron sieve (#40)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 250 micron sieve (#60)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 150 micron sieve (#100)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 106 micron sieve (#140)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 75 micron sieve (#200)	--	--	--	--	--	--	--	--	--	--	--	--
Dioxin Furans (ng/kg)												
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**0.712 J**	**0.363 J**	**0.599 J**	**0.896 J**	**4.38**	0.997 U	**0.395 J**	0.997 U	0.998 U	**0.386 J**	0.994 U	**0.383 J**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**1.78**	**0.720 J**	**1.71**	**14.7**	**24.4**	**0.240 J**	**1.64 J**	**0.752 J**	**1.37**	**2.42**	0.994 U	**2.01**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**1.49**	**0.396 J**	**0.798 J**	**12.6**	**13.5**	0.997 U	**5.94**	**0.392 J**	**2.96**	**1.75 J**	0.994 U	**5.36**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**3.96**	**1.54**	**1.50 J**	**101**	**247**	**0.617 J**	**5.62**	**0.623 J**	**9.52**	**3.64**	0.994 U	**49.6**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**1.4**	**0.650 J**	**1.39**	**37.4**	**63.2**	**0.280 J**	**1.63**	**0.423 J**	**1.85**	**3.03**	0.994 U	**5.9**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**76**	**30.9**	**10.2**	**1390**	**2110**	**9.51**	**81.5**	**4.12**	**179**	**23.4**	**0.647 J**	**1050**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**405**	**133**	**22.7**	**16700 J**	**16000**	**83.4**	**632**	**9.76 J**	**2670**	**26.8**	**6.53 J**	**12600 J**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	**10.7**	**4.86**	**37.3**	**614**	**445**	**1.54**	**31.1**	**3.51**	**26.5**	**49.5**	0.994 U	**10.1**
Total Pentachlorodibenzo-p-dioxin (PeCDD)	**14**	**7.13**	**29.7**	**796**	**358**	0.997 U	**40**	**4.76**	**23.7**	**77.2**	0.994 U	**12.7**
Total Hexachlorodibenzo-p-dioxin (HxCDD)	**29.4**	**13.4**	**51.7**	**2180**	**1420**	**3.92**	**58.7**	**13.6**	**62.2**	**130**	0.994 U	**260**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	**128**	**49.2**	**16.7**	**2400**	**3260**	**16**	**129**	**4.12**	**288**	**33.4**	0.994 U	**2150**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**1.06 J**	**0.691 J**	**2.79**	**3.86**	**13.3 J**	**0.187 J**	**1.28**	**1.2**	**0.912 J**	**1.65**	0.994 U	**1.63**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**0.705 J**	**0.390 J**	**1.48**	**2.69**	**8.84**	**0.147 J**	**1.02**	**1.08**	**0.828 J**	**1.47**	0.994 U	**0.789 J**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**0.439 J**	**0.272 J**	**1.30 J**	**1.97**	**8.33**	**0.105 J**	**0.992 J**	**1.07 J**	**0.607 J**	**1.21**	0.994 U	**0.848 J**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**1.47**	**0.726 J**	**0.686 J**	**9.67**	**17.8**	**0.142 J**	**1.4**	**1.06 J**	**1.62**	**0.986 J**	0.994 U	**9.13**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**0.920 J**	**0.591 J**	**0.553 J**	**5.69**	**23**	**0.151 J**	**1.32**	**0.954 J**	**1.14**	**0.649 J**	0.994 U	**4.24**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	**0.472 J**	**0.240 J**	**0.188 J**	**9.02**	**8.04**	0.997 U	**0.749 J**	0.997 U	**1.12**	**0.180 J**	0.994 U	**6.83**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**1.53**	**1.15**	**0.856 J**	**13.2**	**39.3**	**0.191 J**	**1.68**	**0.785 J**	**2.21**	**0.600 J**	0.994 U	**10**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**60.9**	**30.2**	**3.07**	**619**	**893**	**4.35**	**37.5**	**3.19**	**95.3**	**1.79**	**0.499 J**	**657**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**3.15**	**1.36 J**	**0.333 J**	**27.6**	**35.5**	**0.177 J**	**1.85**	0.997 U	**4**	0.997 U	0.994 U	**23.5**
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**106**	**46.7**	**3.44**	**815**	**930**	**5.22**	**61.7**	**1.90 J**	**157**	0.939 U	**1.17 J**	**1130**
Total Tetrachlorodibenzofuran (TCDF)	**5.09**	**5.38**	**41.6**	**27.9**	**213**	**0.452**	**16.9**	**14.2**	**6.2**	**25.8**	0.994 U	**3.24**
Total Pentachlorodibenzofuran (PeCDF)	**8.8**	**4.24**	**5.4**	**54.6**	**254**	**0.671**	**12.2**	**3.82**	**7.12**	**11.7**	0.994 U	**21.8**
Total Hexachlorodibenzofuran (HxCDF)	**68.4**	**31.4**	**5.64**	**703**	**1220**	**4.72**	**44.1**	**3.39**	**110**	**2.24**	0.994 U	**749**
Total Heptachlorodibenzofuran (HpCDF)	**215**	**96.9**	**6.59**	**2310**	**2610**	**13**	**125**	**4.36**	**352**	**2.44**	0.994 U	**2600**
Total Dioxin/Furan (U = 0)	**667 J**	**250 J**	**53.6 J**	**19800 J**	**20400 J**	**105 J**	**838 J**	**27.3 J**	**3130 J**	**70.0 J**	**8.85 J**	**15600 J**
Total Dioxin/Furan (U = 1/2)	**667 J**	**250 J**	**53.6 J**	**19800 J**	**20400 J**	**106 J**	**838 J**	**28.8 J**	**3130 J**	**70.9 J**	**15.3 J**	**15600 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	**5.43 J**	**2.45 J**	**3.76 J**	**61.1 J**	**110 J**	**0.600 J**	**5.74 J**	**1.73 J**	**7.34 J**	**4.72 J**	**0.0138 J**	**33.4 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	**5.43 J**	**2.45 J**	**3.76 J**	**61.1 J**	**110 J**	**1.20 J**	**5.74 J**	**2.28 J**	**7.84 J**	**4.73 J**	**1.57 J**	**33.4 J**

Table 1

Soil Data Summary - Port Gamble Mill Site Upland Pre-Design Investigation

Location ID Sample Date / Time Depth Chemical	PG-PDI-038 4/14/2021 11:15 2 - 4 ft	PG-PDI-038 4/14/2021 11:20 4 - 6 ft	PG-PDI-038 4/14/2021 11:25 6 - 8 ft	PG-PDI-038 4/14/2021 11:30 8 - 10 ft	PG-PDI-038 4/14/2021 11:35 10 - 15 ft	PG-PDI-039 4/13/2021 14:45 0 - 2 ft	PG-PDI-039 4/13/2021 14:50 2 - 4 ft	PG-PDI-039 4/13/2021 14:55 4 - 6 ft	PG-PDI-039 4/13/2021 15:00 6 - 8 ft	PG-PDI-039 4/13/2021 15:05 8 - 10 ft	PG-PDI-039 4/13/2021 15:10 10 - 12 ft	PG-PDI-039 4/13/2021 15:15 12 - 14 ft
Conventional Parameters (pct)												
Moisture (water) content	--	--	--	--	--	--	--	--	--	--	--	--
Total Solids	**90.13**	**92.67**	**86.26**	**30.95**	**87.46**	**92.82**	**93.63**	**94.04**	**81.36**	**77.34**	**88.65**	**90.03**
Grain Size (pct)												
Percent passing 1 inch (1 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.75 inch (3/4 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.5 inch (1/2 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.375 inch (3/8 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 4750 micron sieve (#4)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 2000 micron sieve (#10)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 850 micron sieve (#20)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 425 micron sieve (#40)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 250 micron sieve (#60)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 150 micron sieve (#100)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 106 micron sieve (#140)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 75 micron sieve (#200)	--	--	--	--	--	--	--	--	--	--	--	--
Dioxin Furans (ng/kg)												
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**3.96**	**2.42**	**1.64**	**5.27 J**	3.81 U	0.998 U	0.996 U	0.995 U	**0.621 J**	**0.796 J**	0.998 U	0.999 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**71.8**	**30.5**	**11.5**	**30.2**	**3.29 J**	0.998 U	0.996 U	0.995 U	**2.09 J**	**10.3 J**	0.998 U	0.999 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**49.7**	**51.2**	**7.89**	**11.6**	**8.92**	**2.25 J**	**0.593 J**	0.995 U	**1.61**	**9.32**	0.998 U	0.999 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**259**	**1600**	**46.8**	**45.6**	**307**	**38.1**	**0.582 J**	0.995 U	**14**	**17.7**	**1.35**	0.999 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**121**	**252**	**13.7**	10.7 U	**34.9**	**3.83 J**	**0.665 J**	0.995 U	**2.36**	**17**	**0.519 J**	0.999 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**1480**	**24000**	**1070**	**771**	**8330**	**786**	**1.93 J**	**9.75 J**	**247**	**152**	**30.6**	**1.72 J**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**6090 J**	**138000**	**11100 J**	**4170**	**76200**	**13700 J**	**12.6**	**110**	**3540**	**300**	**410**	**17.8**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	**3260**	**283**	**264**	**470**	**16.7**	**3.09**	0.996 U	**0.093**	**44.4**	**271**	**0.242**	0.999 U
Total Pentachlorodibenzo-p-dioxin (PeCDD)	**5030**	**535**	**186**	**434**	**21.3**	**3.09**	0.996 U	0.995 U	**35**	**395**	0.998 U	0.999 U
Total Hexachlorodibenzo-p-dioxin (HxCDD)	**11300**	**4560**	**281**	**478**	**778**	**112**	0.996 U	0.995 U	**78.5**	**912**	**7**	**0.288**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	**2380**	**33400**	**1610**	**1170**	**12200**	**1300**	**1.99**	0.995 U	**387**	**214**	**47.1 J**	0.999 U
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**22.1**	**28.4 J**	**4.22**	**44.9 J**	3.81 U	0.998 U	0.996 U	0.995 U	**4.33 J**	**3.25**	0.998 U	0.999 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**10.3**	**11.9**	**2.77**	**36.3 J**	**3.02 J**	**0.557 J**	0.996 U	0.995 U	**3.29 J**	**3.00 J**	0.998 U	0.999 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**11.3**	**11.9 J**	**2.32**	**19.2 J**	**2.23 J**	**0.361 J**	0.996 U	0.995 U	**2.20 J**	**1.83 J**	0.998 U	0.999 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**14.2**	**273**	**6.49**	**49.9**	**57.7**	**6.04**	0.996 U	0.995 U	**7.11**	**2.52**	**0.327 J**	0.999 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**7.9**	**150**	**5.42 J**	**19.7 J**	**30.8**	**2.84**	0.996 U	0.995 U	**2.64**	**1.24**	0.998 U	0.999 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	**8.07**	**223**	**11.6**	10.7 U	**43.2**	**6.24**	0.996 U	0.995 U	**1.07**	0.998 U	0.998 U	0.999 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**13**	**332**	**11.3**	10.7 U	**74.4**	**7.65**	0.996 U	0.995 U	**3.66**	**1.21**	**0.340 J**	0.999 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**431**	**19700**	**428**	**413**	**4610**	**513**	**1.33**	**7.25**	**188**	**4.57**	**19.0 J**	**1.24 J**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**18.9**	**815**	**21.2**	**20**	**199**	**20.5**	**0.855 J**	0.995 U	**6.47**	0.998 U	0.998 U	0.999 U
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**585**	**32100**	**792**	**937**	**7590**	**817**	**2.45 J**	**9.5**	**308**	**2.9**	**26.1**	**2.09 J**
Total Tetrachlorodibenzofuran (TCDF)	**213**	**157**	**53.9**	**372**	3.81 U	**0.24**	0.996 U	0.995 U	**41**	**25.7**	0.998 U	0.999 U
Total Pentachlorodibenzofuran (PeCDF)	**117**	**589**	**48.9**	**85.7**	**84.6**	**8.64**	0.996 U	**0.717**	**14.2**	**15.3**	0.998 U	0.999 U
Total Hexachlorodibenzofuran (HxCDF)	**516**	**27400**	**607**	**322**	**5030**	**557**	0.996 U	**4.25**	**220**	**10.8**	**22.1 J**	**0.478**
Total Heptachlorodibenzofuran (HpCDF)	**1470**	**82000**	**1820**	**1470**	**18200**	**1980**	**2.18**	**22.1**	**581**	**6.31**	**64.8**	**2.47**
Total Dioxin/Furan (U = 0)	**9200 J**	**218000 J**	**13500 J**	**6570 J**	**97500 J**	**15900 J**	**21.0 J**	**137 J**	**4330 J**	**528 J**	**488 J**	**22.9 J**
Total Dioxin/Furan (U = 1/2)	**9200 J**	**218000 J**	**13500 J**	**6590 J**	**97500 J**	**15900 J**	**25.5 J**	**143 J**	**4330 J**	**529 J**	**493 J**	**29.3 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	**150 J**	**824 J**	**43.4 J**	**73.1 J**	**216 J**	**24.4 J**	**0.230 J**	**0.206 J**	**12.7 J**	**18.6 J**	**0.880 J**	**0.0356 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	**150 J**	**824 J**	**43.4 J**	**74.7 J**	**218 J**	**25.4 J**	**1.64 J**	**1.77 J**	**12.7 J**	**18.7 J**	**2.25 J**	**1.60 J**

Table 1

Soil Data Summary - Port Gamble Mill Site Upland Pre-Design Investigation

Location ID Sample Date / Time Depth Chemical	PG-PDI-039 4/13/2021 15:20 12 - 14 ft	PG-PDI-039 4/13/2021 15:25 14 - 15 ft	PG-PDI-040 4/14/2021 12:25 0 - 2 ft	PG-PDI-040 4/14/2021 12:30 2 - 4 ft	PG-PDI-040 4/14/2021 12:35 4 - 6 ft	PG-PDI-040 4/14/2021 12:40 6 - 8 ft	PG-PDI-040 4/14/2021 12:45 8 - 10 ft	PG-PDI-040 4/14/2021 12:50 10 - 12 ft	PG-PDI-040 4/14/2021 12:52 10 - 12 ft	PG-PDI-040 4/14/2021 12:55 12 - 14 ft	PG-PDI-040 4/14/2021 13:00 14 - 15 ft
Conventional Parameters (pct)											
Moisture (water) content	--	--	--	--	--	--	--	--	--	--	--
Total Solids	**88.73**	**91.72**	**97.42**	**94.15**	**93.13**	**91.28**	**67.71**	**77.69**	**76.03**	**87.3**	**88.13**
Grain Size (pct)											
Percent passing 1 inch (1 inch sieve)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.75 inch (3/4 inch sieve)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.5 inch (1/2 inch sieve)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.375 inch (3/8 inch sieve)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 4750 micron sieve (#4)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 2000 micron sieve (#10)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 850 micron sieve (#20)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 425 micron sieve (#40)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 250 micron sieve (#60)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 150 micron sieve (#100)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 106 micron sieve (#140)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 75 micron sieve (#200)	--	--	--	--	--	--	--	--	--	--	--
Dioxin Furans (ng/kg)											
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.997 U	0.998 U	**0.486 J**	**1.04**	0.997 U	**0.687 J**	**1.29 J**	0.996 U	0.997 U	0.999 U	0.999 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	0.997 U	0.998 U	**2.78**	**6.28**	**0.211 J**	**4.24**	**6.08**	0.996 U	**0.731 J**	0.999 U	0.999 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.997 U	0.998 U	**1.77 J**	**3.27**	**0.111 J**	**2.61**	**5.79**	**1.23**	**1.66**	0.999 U	0.999 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.997 U	0.998 U	**12.2**	**28.1**	**1.04 J**	**31.9**	**25**	**6.72**	**6.37**	0.999 U	0.999 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	0.997 U	0.998 U	**4.01**	**8.63**	**0.279 J**	**8**	**7.62**	**0.980 J**	**0.978 J**	0.999 U	0.999 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**0.736 J**	**1.37 J**	**193**	**185**	**11.2**	**228**	**441**	**181**	**174**	**2.95 J**	**0.369 J**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	3.66 U	**9.17 J**	**1640**	**1160**	**103**	**1550**	**2330**	**842**	**859**	**15.5**	2.92 U
Total Tetrachlorodibenzo-p-dioxin (TCDD)	0.997 U	0.998 U	**120**	**160**	**2.77**	**102**	**84.4**	**4.81**	**4.3**	0.999 U	0.999 U
Total Pentachlorodibenzo-p-dioxin (PeCDD)	0.997 U	0.998 U	**84.6**	**93.7**	**1.54**	**78.8**	**88**	**4.67**	**5.08**	**0.104**	0.999 U
Total Hexachlorodibenzo-p-dioxin (HxCDD)	0.997 U	**0.155**	**168**	**200**	**5.96**	**235**	**184**	**29.4**	**36.2**	0.999 U	0.999 U
Total Heptachlorodibenzo-p-dioxin (HpCDD)	**1.18**	**1.1**	**522**	**414**	**32.5**	**816**	**797**	**308**	**308**	**1.63**	**0.371**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	0.997 U	0.998 U	**1.21 J**	**3.52**	**0.340 J**	**2.54 J**	**10.6**	**0.674 J**	0.997 U	0.999 U	0.999 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.997 U	0.998 U	**0.837 J**	**2.35 J**	0.997 U	**1.85 J**	**17.8 J**	**0.412 J**	**0.565 J**	0.999 U	0.999 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	0.997 U	0.998 U	**0.742 J**	**2.30 J**	**0.210 J**	**1.62**	**5.2**	0.996 U	**0.214 J**	0.999 U	0.999 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	0.997 U	0.998 U	**1.67 J**	**2.68**	0.997 U	**3.14**	**42.3**	**2.16**	**2.36**	0.999 U	0.999 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.997 U	0.998 U	**1.5**	**4.11**	**0.219 J**	**3.85**	**12**	**0.869 J**	**0.660 J**	0.999 U	0.999 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	0.997 U	0.998 U	**1.52 J**	**1.26**	0.997 U	**1.29**	**2.66**	**0.909 J**	**0.739 J**	0.999 U	0.999 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.997 U	0.998 U	**3.58**	**5.67**	0.997 U	**6.29**	**4.17 J**	**1.18**	**1.27**	0.999 U	0.999 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**0.221 J**	**0.819 J**	**96.1**	**110**	**5.24**	**139**	**219**	**68.1**	**64.9**	**1.32**	**0.142 J**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	0.997 U	**0.320 J**	**2.59**	**3.79**	0.997 U	**4.37**	**13.1**	**4.62**	**4.49**	0.999 U	0.999 U
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	2.49 U	**1.84 J**	**113**	**89.5**	**5.65**	**131**	**495**	**160**	**176**	**2.71**	**0.405 J**
Total Tetrachlorodibenzofuran (TCDF)	0.997 U	0.998 U	**11.4**	**55.6**	**0.285**	**38.4**	**104**	**1.35**	0.997 U	0.999 U	0.999 U
Total Pentachlorodibenzofuran (PeCDF)	0.997 U	0.998 U	**15.6**	**27.6**	**1.92**	**43.3**	**72.7**	**2.92**	**2.9**	0.999 U	0.999 U
Total Hexachlorodibenzofuran (HxCDF)	0.997 U	0.998 U	**114**	**140**	**5.93**	**164**	**302**	**78.9**	**80.3**	**0.937**	0.999 U
Total Heptachlorodibenzofuran (HpCDF)	0.997 U	**2.1**	**294**	**276**	**14.7**	**358**	**838**	**306**	**294**	**4.07**	**0.437**
Total Dioxin/Furan (U = 0)	**0.957 J**	**13.5 J**	**2080 J**	**1620 J**	**128 J**	**2120 J**	**3640 J**	**1270 J**	**1290 J**	**22.5 J**	**0.916 J**
Total Dioxin/Furan (U = 1/2)	**10.5 J**	**19.5 J**	**2080 J**	**1620 J**	**130 J**	**2120 J**	**3640 J**	**1270 J**	**1290 J**	**29.0 J**	**8.87 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	**0.00957 J**	**0.0284 J**	**9.70 J**	**17.2 J**	**0.670 J**	**15.6 J**	**28.1 J**	**4.32 J**	**4.96 J**	**0.0482 J**	**0.00523 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	**1.58 J**	**1.59 J**	**9.70 J**	**17.2 J**	**1.34 J**	**15.6 J**	**28.1 J**	**5.47 J**	**5.51 J**	**1.62 J**	**1.57 J**

Table 1

Soil Data Summary - Port Gamble Mill Site Upland Pre-Design Investigation

Location ID Sample Date / Time Depth Chemical	PG-PDI-041 4/14/2021 10:25 0 - 2 ft	PG-PDI-041 4/14/2021 10:30 2 - 4 ft	PG-PDI-041 4/14/2021 10:35 4 - 5 ft	PG-PDI-041 4/14/2021 10:40 5 - 8 ft	PG-PDI-041 4/14/2021 10:45 8 - 10 ft	PG-PDI-041 4/14/2021 10:50 10 - 12 ft	PG-PDI-041 4/14/2021 10:55 12 - 14 ft	PG-PDI-041 4/14/2021 10:57 12 - 14 ft	PG-PDI-041 4/14/2021 11:00 14 - 15 ft	PG-PDI-042 4/14/2021 16:10 0 - 2 ft	PG-PDI-042 4/14/2021 16:15 2 - 4 ft	PG-PDI-042 4/14/2021 14:02 2 - 4 ft
Conventional Parameters (pct)												
Moisture (water) content	--	--	--	--	--	--	--	--	--	--	--	--
Total Solids	**93.05**	**92.55**	**90.1**	**91.27**	**74.59**	**82.87**	**88.02**	**86.11**	**86.19**	**91.5**	**95.85**	**95.2**
Grain Size (pct)												
Percent passing 1 inch (1 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.75 inch (3/4 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.5 inch (1/2 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.375 inch (3/8 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 4750 micron sieve (#4)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 2000 micron sieve (#10)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 850 micron sieve (#20)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 425 micron sieve (#40)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 250 micron sieve (#60)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 150 micron sieve (#100)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 106 micron sieve (#140)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 75 micron sieve (#200)	--	--	--	--	--	--	--	--	--	--	--	--
Dioxin Furans (ng/kg)												
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.998 U	**0.536 J**	0.997 U	0.993 U	**1.3**	**0.327 J**	0.995 U	0.998 U	0.996 U	**0.419 J**	0.997 U	1.00 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**0.762 J**	**4.17**	**1.02**	0.993 U	**6.36**	**1.35**	0.995 U	0.998 U	0.996 U	**1.08 J**	0.997 U	1.00 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**0.554 J**	**4.74**	**0.751 J**	**0.509 J**	**5.58**	**3.56**	**0.561 J**	**0.411 J**	0.996 U	**1.2**	**0.478 J**	**0.670 J**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**3.83 J**	**51.2**	**4.11**	**2.61**	**23.2**	**18.2**	**2.66**	**3.41**	0.996 U	**18.6**	**14**	**2.6**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**1.66 J**	**10.1**	**1.44**	0.993 U	**4.41**	**1.91**	0.995 U	0.998 U	0.996 U	**4.15**	**1.59 J**	1.00 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**69.1**	**354**	**107**	**63.5**	**557**	**403**	**62.4**	**87.4**	**1.59 J**	**331**	**271**	**48.9**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**502**	**2370**	**1080**	**415**	**6540 J**	**2810**	**424**	**524**	**10.3**	**3860**	**1350**	**511**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	**1.51**	**68.8**	**14.9**	**0.548**	**231 J**	**16.1**	**0.668**	**0.66**	0.996 U	**1.48**	0.997 U	1.00 U
Total Pentachlorodibenzo-p-dioxin (PeCDD)	**2.56**	**60.2**	**4.98**	**1.51**	**106 J**	**12.9**	**0.329**	0.998 U	0.996 U	**9.22**	0.997 U	1.00 U
Total Hexachlorodibenzo-p-dioxin (HxCDD)	**28.5 J**	**287**	**27.2**	**12.1**	**130**	**68.8**	**8.73**	**12.5**	0.996 U	**122**	**31.8**	**33**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	**198**	**629**	**178**	**98**	**935**	**634**	**103**	**140**	0.996 U	**763**	**380**	**74**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	0.998 U	**2.03**	**0.771 J**	0.993 U	**5.73**	**0.890 J**	0.995 U	0.998 U	0.996 U	**0.754 J**	0.997 U	1.00 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.998 U	**1.42 J**	**0.467 J**	0.993 U	**3.03 J**	**1.3**	0.995 U	0.998 U	0.996 U	**0.575 J**	0.997 U	1.00 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	0.998 U	**1.30 J**	**0.311 J**	0.993 U	**2.54**	**0.873 J**	0.995 U	0.998 U	0.996 U	**0.349 J**	0.997 U	1.00 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**0.366 J**	**3.68**	**0.988 J**	**0.613 J**	**5.04**	**6.04**	**0.832 J**	**0.749 J**	0.996 U	**3.09**	**1.88**	1.00 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**0.326 J**	**5.22**	**1.14**	**0.403 J**	**3.13**	**2.73**	**0.391 J**	0.998 U	0.996 U	**2.87**	**1.81**	1.00 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	**0.205 J**	**2.3**	**0.679 J**	**0.568 J**	**1.24**	**2.04**	0.995 U	**0.628 J**	0.996 U	**1.38**	**1.01**	1.00 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**0.445 J**	**8.85**	**1.74**	**0.894 J**	**5.02**	**4.31**	**0.768 J**	**0.962 J**	0.996 U	**5.58**	**4.31**	1.00 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**14.5**	**229**	**28.9**	**32.3**	**154**	**173**	**32.7**	**35**	**0.670 J**	**192**	**216**	**30.8**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**0.768 J**	**7.96**	**2.36**	**2.49 J**	**10.2**	**14.6**	**2.46**	**3.08**	0.996 U	**7.7**	**8.26**	**1.87**
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**22.5**	**235**	**46.9**	**55.3**	**435**	**437**	**76.3**	**94.2**	**1.41 J**	**274**	**253**	**45.9**
Total Tetrachlorodibenzofuran (TCDF)	0.998 U	**24**	**5.89**	0.993 U	**72.9**	**8**	0.995 U	0.998 U	0.996 U	**2.88**	0.997 U	**1.07**
Total Pentachlorodibenzofuran (PeCDF)	**0.334**	**42.9**	**8.46**	**2.09**	**22.9**	**14.1**	**1.85**	**1.39**	0.996 U	**16.2**	**7.82**	1.00 U
Total Hexachlorodibenzofuran (HxCDF)	**15.8 J**	**256**	**36.2**	**34.2**	**180**	**211**	**37.8**	**40.6**	0.996 U	**232**	**226**	**25.8**
Total Heptachlorodibenzofuran (HpCDF)	**48.7**	**662**	**96.6**	**115**	**661**	**783**	**144**	**158**	**1.64**	**665**	**760**	**118**
Total Dioxin/Furan (U = 0)	**617 J**	**3290 J**	**1280 J**	**574 J**	**7760 J**	**3880 J**	**603 J**	**750 J**	**14.0 J**	**4700 J**	**2120 J**	**642 J**
Total Dioxin/Furan (U = 1/2)	**619 J**	**3290 J**	**1280 J**	**577 J**	**7760 J**	**3880 J**	**607 J**	**753 J**	**20.4 J**	**4700 J**	**2130 J**	**647 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	**2.50 J**	**20.6 J**	**4.01 J**	**1.68 J**	**23.2 J**	**12.8 J**	**1.65 J**	**2.06 J**	**0.0261 J**	**11.9 J**	**7.94 J**	**1.31 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	**3.22 J**	**20.6 J**	**4.51 J**	**2.94 J**	**23.2 J**	**12.8 J**	**2.96 J**	**3.37 J**	**1.59 J**	**11.9 J**	**9.15 J**	**2.77 J**

Table 1

Soil Data Summary - Port Gamble Mill Site Upland Pre-Design Investigation

Location ID Sample Date / Time Depth Chemical	PG-PDI-042 4/14/2021 16:20 4 - 6 ft	PG-PDI-042 4/14/2021 16:25 6 - 8 ft	PG-PDI-042 4/14/2021 16:30 8 - 10 ft	PG-PDI-042 4/14/2021 16:35 10 - 12 ft	PG-PDI-042 4/14/2021 16:40 12 - 14 ft	PG-PDI-042 4/14/2021 16:45 14 - 15 ft	PG-PDI-043 4/14/2021 13:15 0 - 2 ft	PG-PDI-043 4/14/2021 13:20 2 - 4 ft	PG-PDI-043 4/14/2021 13:25 4 - 5 ft	PG-PDI-043 4/14/2021 13:30 5 - 10 ft	PG-PDI-043 4/14/2021 13:35 10 - 12 ft
Conventional Parameters (pct)											
Moisture (water) content	--	--	--	--	--	--	--	--	--	--	--
Total Solids	**95**	**90.63**	**67.2**	**88.63**	**90.14**	**89.15**	**95.99**	**97.19**	**95.74**	**96.69**	**86.74**
Grain Size (pct)											
Percent passing 1 inch (1 inch sieve)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.75 inch (3/4 inch sieve)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.5 inch (1/2 inch sieve)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.375 inch (3/8 inch sieve)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 4750 micron sieve (#4)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 2000 micron sieve (#10)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 850 micron sieve (#20)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 425 micron sieve (#40)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 250 micron sieve (#60)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 150 micron sieve (#100)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 106 micron sieve (#140)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 75 micron sieve (#200)	--	--	--	--	--	--	--	--	--	--	--
Dioxin Furans (ng/kg)											
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.998 U	**0.282 J**	**14.3**	0.998 U	0.999 U	0.999 U	0.998 U	1.00 U	**1.74 J**	**4.09 J**	**18.9**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	0.998 U	**0.545 J**	**84.8**	**0.312 J**	0.999 U	0.999 U	**1.12 J**	1.00 U	**7.7**	**15.9**	**335**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**0.186 J**	**0.404 J**	**215**	0.998 U	0.999 U	0.999 U	**6.48**	1.00 U	**39.8**	**80.6**	**335**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**1.02**	**3.1**	**531**	**1.02 J**	0.999 U	0.999 U	**22.4**	**0.513 J**	**332**	**447**	**1090**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	0.998 U	**0.886 J**	**110**	0.998 U	0.999 U	0.999 U	**2.4**	1.00 U	**25.6**	**46.5**	**132**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**21.6**	**74.8**	**10500**	**20.6 J**	**1.39 J**	**0.843 J**	**442**	**14.7**	**6020**	**10100**	**25500**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**192**	**700**	**108000 J**	**190**	**11.9**	**6.58 J**	**3040**	**128**	**35400**	**75300**	**154000**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	0.998 U	**2.07**	**880**	**0.667**	0.999 U	0.999 U	**1.16**	1.00 U	**16.1**	**7.29**	**729**
Total Pentachlorodibenzo-p-dioxin (PeCDD)	0.998 U	**1.35**	**1090**	**0.327**	0.999 U	0.999 U	**4.19**	1.00 U	**42.1**	**45.8**	**1200**
Total Hexachlorodibenzo-p-dioxin (HxCDD)	**2.73**	**22.7**	**3510**	**4.13**	0.999 U	0.999 U	**83.6**	**23.4**	**808**	**1180**	**5370**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	**34.1**	**203**	**19400**	**22.5**	**1.08**	0.999 U	**830**	**22.1**	**8480**	**14600**	**36400**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	0.998 U	0.998 U	**77.5 J**	0.998 U	0.999 U	0.999 U	0.998 U	1.00 U	**1.91**	**6.02 J**	**36.6 J**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.998 U	0.998 U	**37.7**	0.998 U	0.999 U	0.999 U	0.998 U	1.00 U	**2.39 J**	**3.08 J**	**9.00 J**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	0.998 U	0.998 U	**31.3**	0.998 U	0.999 U	0.999 U	0.998 U	1.00 U	**2.02**	5.17 U	11.5 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**0.260 J**	**0.667 J**	**99.7**	0.998 U	0.999 U	0.999 U	**4.59**	1.00 U	**58.3**	**72.2**	**240**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.998 U	**0.648 J**	**52.1**	**0.251 J**	0.999 U	0.999 U	**2.79 J**	1.00 U	**29.6**	**34.7**	**224**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	0.998 U	**0.278 J**	**72.5 J**	0.998 U	0.999 U	0.999 U	**1.54**	1.00 U	**36.6**	**36.1**	**113**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.998 U	**0.867 J**	**112**	**0.471 J**	0.999 U	0.999 U	0.998 U	1.00 U	**77.6**	**84.8**	**452**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**8.87**	**35.7**	**4970**	**12.5**	**0.670 J**	**0.563 J**	**413**	**8.84**	**4890**	**5460**	**20000**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**0.441 J**	**1.82**	**199**	**0.683 J**	0.999 U	0.999 U	**15.1**	1.00 U	**214**	**285**	**1150**
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**12.9**	**64.3**	**7690**	**19.1**	**1.10 J**	**1.18 J**	**620**	**16.7**	**7860**	**11600**	**28100**
Total Tetrachlorodibenzofuran (TCDF)	0.998 U	**0.305**	**748**	0.998 U	0.999 U	0.999 U	0.998 U	1.00 U	**10.6**	**10**	**1070**
Total Pentachlorodibenzofuran (PeCDF)	0.998 U	**2.64**	**644**	**1.35**	0.999 U	0.999 U	**6.09**	1.00 U	**89.6**	**110**	**4040**
Total Hexachlorodibenzofuran (HxCDF)	**6.39**	**41.4**	**7750 J**	**15.7**	0.999 U	0.999 U	**413**	**7.16**	**5820**	**6550**	**30400**
Total Heptachlorodibenzofuran (HpCDF)	**29.6**	**137**	**19200**	**41.5**	**1.12**	0.999 U	**1530**	**32.6**	**20800**	**24700**	**69400**
Total Dioxin/Furan (U = 0)	**237 J**	**884 J**	**133000 J**	**245 J**	**15.1 J**	**9.17 J**	**4570 J**	**169 J**	**55000 J**	**104000 J**	**232000 J**
Total Dioxin/Furan (U = 1/2)	**242 J**	**886 J**	**133000 J**	**249 J**	**21.6 J**	**15.7 J**	**4570 J**	**175 J**	**55000 J**	**104000 J**	**232000 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	**0.517 J**	**2.86 J**	**428 J**	**0.887 J**	**0.0245 J**	**0.0164 J**	**14.9 J**	**0.330 J**	**194 J**	**285 J**	**1140 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	**1.93 J**	**3.08 J**	**428 J**	**1.80 J**	**1.59 J**	**1.58 J**	**15.7 J**	**1.85 J**	**194 J**	**286 J**	**1140 J**

Table 1

Soil Data Summary - Port Gamble Mill Site Upland Pre-Design Investigation

Location ID Sample Date / Time Depth Chemical	PG-PDI-043 4/14/2021 13:40 12 - 14 ft	PG-PDI-043 4/14/2021 13:45 14 - 15 ft	PG-PDI-044 4/14/2021 13:55 0 - 2 ft	PG-PDI-044 4/14/2021 14:00 2 - 4 ft	PG-PDI-044 4/14/2021 14:05 4 - 6 ft	PG-PDI-044 4/14/2021 14:10 6 - 8 ft	PG-PDI-044 4/14/2021 14:15 8 - 10 ft	PG-PDI-044 4/14/2021 14:20 10 - 12 ft	PG-PDI-044 4/14/2021 14:25 12 - 14 ft	PG-PDI-044 4/14/2021 14:30 14 - 15 ft	PG-PDI-045 4/14/2021 14:40 0 - 2 ft	PG-PDI-045 4/14/2021 14:45 2 - 4 ft
Conventional Parameters (pct)												
Moisture (water) content	**10.9**	**12.7**	--	--	--	--	--	--	--	--	--	--
Total Solids	**90**	**89.87**	**96.85**	**95.28**	**95**	**91.71**	**89.83**	**70.65**	**90.81**	**89.99**	**96.04**	**96.59**
Grain Size (pct)												
Percent passing 1 inch (1 inch sieve)	0.10 U	0.10 U	--	--	--	--	--	--	--	--	--	--
Percent passing 0.75 inch (3/4 inch sieve)	0.10 U	0.10 U	--	--	--	--	--	--	--	--	--	--
Percent passing 0.5 inch (1/2 inch sieve)	0.10 U	0.10 U	--	--	--	--	--	--	--	--	--	--
Percent passing 0.375 inch (3/8 inch sieve)	**95**	**98**	--	--	--	--	--	--	--	--	--	--
Percent passing 4750 micron sieve (#4)	**82**	**86**	--	--	--	--	--	--	--	--	--	--
Percent passing 2000 micron sieve (#10)	**68**	**74**	--	--	--	--	--	--	--	--	--	--
Percent passing 850 micron sieve (#20)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 425 micron sieve (#40)	**34**	**37**	--	--	--	--	--	--	--	--	--	--
Percent passing 250 micron sieve (#60)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 150 micron sieve (#100)	**10**	**7**	--	--	--	--	--	--	--	--	--	--
Percent passing 106 micron sieve (#140)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 75 micron sieve (#200)	**7**	**4**	--	--	--	--	--	--	--	--	--	--
Dioxin Furans (ng/kg)												
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	2.22 U	1.00 U	1.00 U	0.998 U	1.00 U	10.9 U	109 U	140 U	1.10 U	1.00 U	**0.322 J**	0.999 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**14**	1.00 U	1.00 U	0.998 U	1.00 U	**22.3**	**723**	**429**	1.10 U	1.00 U	**1.13**	0.999 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**3.34**	1.00 U	1.00 U	0.998 U	**1.52**	**66.2**	**4080**	140 U	1.10 U	1.00 U	**2.55**	0.999 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**47.8**	**1.78**	**4.12**	**4.46**	**13.2**	**2070 J**	**67700**	**1450**	**3.76**	1.00 U	**11.7**	**2.15**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**5.76 J**	1.00 U	**1.32 J**	**1.25 J**	**1.99**	**574 J**	109 U	140 U	**0.885 J**	1.00 U	**1.62**	**0.615 J**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**1340**	**60.4**	**97.3**	**76.1**	**241**	**57000 J**	**212000**	**27500**	**154**	**11.7**	**242**	**34.2 J**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**7650**	**512**	**849**	**713**	**1740**	**390000 J**	**1610000 J**	**109000**	**1650**	**105**	**5040 J**	**244**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	**58.2**	**0.895**	1.00 U	0.998 U	1.00 U	**132**	**4480**	**63.2**	1.10 U	1.00 U	**2.39**	0.999 U
Total Pentachlorodibenzo-p-dioxin (PeCDD)	**61.1**	**1.68**	1.00 U	0.998 U	**0.893**	**22.3**	**4390**	**429**	1.10 U	1.00 U	**4.2**	0.999 U
Total Hexachlorodibenzo-p-dioxin (HxCDD)	**291**	**8.41**	**23.2**	**10.7**	**39.8**	**8300 J**	**102000**	**3590**	**9.77**	1.00 U	**49.4**	**7.34**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	**1890**	**89.3**	**236**	**111**	**387**	**84700 J**	**389000**	**37400**	**245**	**18.3**	**521**	**51.1 J**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**2.33 J**	1.00 U	1.00 U	0.998 U	1.00 U	**7.02 J**	**1070 J**	140 U	1.10 U	1.00 U	**0.240 J**	0.999 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	2.22 U	1.00 U	1.00 U	0.998 U	1.00 U	**8.31 J**	**79.4 J**	140 U	1.10 U	1.00 U	**0.357 J**	0.999 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	2.22 U	1.00 U	1.00 U	0.998 U	1.00 U	**7.14 J**	109 U	140 U	1.10 U	1.00 U	**0.176 J**	0.999 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**13**	1.00 U	1.00 U	0.998 U	**2.44 J**	**169**	**1950**	**298**	1.10 U	1.00 U	**2.14**	0.999 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**13.2**	1.00 U	1.00 U	0.998 U	**1.66 J**	**157 J**	**779**	**127 J**	1.10 U	1.00 U	**0.933 J**	0.999 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	**5.66**	1.00 U	1.00 U	0.998 U	**1.94**	**82.4**	**733**	140 U	1.10 U	1.00 U	**1.39**	**0.181 J**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**25.9**	1.00 U	1.00 U	**1.3**	**1.3**	**378 J**	**1690**	**311**	1.10 U	1.00 U	**2.32**	0.999 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**1120**	**37.5**	**40.7**	**43.7**	**154**	**15600**	**123000**	**22300**	**46.1**	**7.15**	**136**	**11.2**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**70.7**	**2.46**	**2.38 J**	**2.32**	**9.73**	**732 J**	**5310**	**997**	**2.31 J**	1.00 U	**6.25**	**0.417 J**
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**1670**	**56.6**	**55.9**	**54.9**	**228**	**18800**	**217000**	**45600**	**62.9**	**11.2**	**189**	**22.3**
Total Tetrachlorodibenzofuran (TCDF)	**71.6**	**0.851**	**0.692**	0.998 U	**0.872**	**24.4**	**3120**	**387**	**0.706**	1.00 U	**0.234**	0.999 U
Total Pentachlorodibenzofuran (PeCDF)	**242**	**9.12**	**4.55**	**3.23**	**8.18**	**1290 J**	**13400**	**1030**	**6.24**	1.00 U	**4.27**	0.999 U
Total Hexachlorodibenzofuran (HxCDF)	**1960**	**66.2**	**49.5**	**48.5**	**160**	**18800**	**174000**	**29500**	**58.2**	1.00 U	**149**	**10.6**
Total Heptachlorodibenzofuran (HpCDF)	**3830**	**123**	**132**	**147**	**558**	**56400**	**547000**	**91800**	**151**	**7.15**	**504**	**42.2**
Total Dioxin/Furan (U = 0)	**12000 J**	**671**	**1050 J**	**897 J**	**2400 J**	**486000 J**	**2250000 J**	**208000 J**	**1920 J**	**135**	**5640 J**	**315 J**
Total Dioxin/Furan (U = 1/2)	**12000 J**	**676**	**1060 J**	**902 J**	**2400 J**	**486000 J**	**2250000 J**	**209000 J**	**1930 J**	**142**	**5640 J**	**320 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	**53.8 J**	**1.35**	**2.22 J**	**2.15 J**	**7.04 J**	**1230 J**	**12500 J**	**1200 J**	**3.00 J**	**0.223**	**9.22 J**	**0.833 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	**55.3 J**	**2.87**	**3.68 J**	**3.56 J**	**8.26 J**	**1240 J**	**12600 J**	**1320 J**	**4.61 J**	**1.79**	**9.22 J**	**2.25 J**

Table 1

Soil Data Summary - Port Gamble Mill Site Upland Pre-Design Investigation

Location ID Sample Date / Time Depth Chemical	PG-PDI-045 4/14/2021 14:50 4 - 6 ft	PG-PDI-045 4/14/2021 14:55 6 - 8 ft	PG-PDI-045 4/14/2021 15:00 8 - 10 ft	PG-PDI-045 4/14/2021 15:02 8 - 10 ft	PG-PDI-045 4/16/2021 11:10 10 - 12.5 ft	PG-PDI-045 4/14/2021 15:10 10 - 12 ft	PG-PDI-045 4/14/2021 15:15 12 - 14 ft	PG-PDI-045 4/14/2021 15:40 14 - 15 ft	PG-PDI-046 4/14/2021 15:20 0 - 2 ft	PG-PDI-046 4/14/2021 15:25 2 - 4 ft	PG-PDI-046 4/14/2021 15:30 4 - 6 ft
Conventional Parameters (pct)											
Moisture (water) content	--	--	--	--	--	0.10 U	0.10 U	--	--	--	--
Total Solids	**93.4**	**96.69**	**94.03**	**94.49**	--	**86.07**	**82.48**	**87.76**	**96.87**	**96.78**	**96.2**
Grain Size (pct)											
Percent passing 1 inch (1 inch sieve)	--	--	--	--	--	0.10 U	0.10 U	--	--	--	--
Percent passing 0.75 inch (3/4 inch sieve)	--	--	--	--	**100**	0.10 U	0.10 U	--	--	--	--
Percent passing 0.5 inch (1/2 inch sieve)	--	--	--	--	**98.8**	0.10 U	**88**	--	--	--	--
Percent passing 0.375 inch (3/8 inch sieve)	--	--	--	--	**98.5**	0.10 U	**85**	--	--	--	--
Percent passing 4750 micron sieve (#4)	--	--	--	--	**97.5**	**98**	**80**	--	--	--	--
Percent passing 2000 micron sieve (#10)	--	--	--	--	**94.6**	**95**	**75**	--	--	--	--
Percent passing 850 micron sieve (#20)	--	--	--	--	**89.8**	--	--	--	--	--	--
Percent passing 425 micron sieve (#40)	--	--	--	--	**69.7**	**62**	**49**	--	--	--	--
Percent passing 250 micron sieve (#60)	--	--	--	--	**29.9**	--	--	--	--	--	--
Percent passing 150 micron sieve (#100)	--	--	--	--	**7.7**	**12**	**14**	--	--	--	--
Percent passing 106 micron sieve (#140)	--	--	--	--	**4.3**	--	--	--	--	--	--
Percent passing 75 micron sieve (#200)	--	--	--	--	**3.4**	**7.4**	**8.7**	--	--	--	--
Dioxin Furans (ng/kg)											
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.998 U	**0.279 J**	1.00 U	1.00 U	--	**0.187 J**	**7.72 J**	**9.22**	0.998 U	1.00 U	0.998 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	0.998 U	**1.47**	**0.313 J**	1.00 U	--	**2.52 J**	**133**	**83.9**	**0.710 J**	1.00 U	0.998 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.998 U	**1.95 J**	**0.744 J**	1.00 U	--	**3.88**	**68.0 J**	**32.6**	**1.14 J**	1.00 U	0.998 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**9.29**	**13.1**	**3.95**	**4.47 J**	--	**41.5**	**2060**	**1670**	**4.16**	**2.08**	**1.22 J**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**0.534 J**	**3.17**	**0.502 J**	**1.30 J**	--	**4.76**	**570**	**460**	**1.16**	**0.605 J**	**0.414 J**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**142**	**344**	**84.8**	**81.7**	--	**649**	**27900**	**20600**	**130**	**29.4**	**16.5**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**998**	**3870**	**1080**	**832**	--	**5470 J**	**138000 J**	**91600**	**1500**	**149**	**162**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	**0.281**	**1.76**	**0.917**	1.00 U	--	**12.3**	**653**	**311**	0.998 U	**1.62**	**0.667**
Total Pentachlorodibenzo-p-dioxin (PeCDD)	0.998 U	**1.47**	**0.313**	1.00 U	--	**12.4**	**2820**	**860**	**1.57**	1.00 U	0.998 U
Total Hexachlorodibenzo-p-dioxin (HxCDD)	**21**	**66.2**	**14.9**	**12**	--	**142**	**16700**	**7740**	**52.8**	**8.36**	**3.8**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	**201**	**739**	**132**	**125**	--	**991**	**41300**	**30100**	**539**	**40.4**	**28.8**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	0.998 U	1.00 U	1.00 U	**0.747 J**	--	1.00 U	**12.6 J**	**15.9 J**	**0.174 J**	1.00 U	0.998 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.998 U	**0.481 J**	1.00 U	1.00 U	--	**0.920 J**	**12.1**	**12.3**	**0.415 J**	1.00 U	0.998 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	0.998 U	**0.598 J**	1.00 U	1.00 U	--	**0.520 J**	**7.51 J**	**8.87 J**	0.998 U	1.00 U	0.998 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**1.41**	**2.78**	**0.869 J**	1.00 U	--	**7.73**	**168**	**240**	**1.39**	**0.265 J**	0.998 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.998 U	**1.71**	**0.603 J**	1.00 U	--	**5.06**	**111**	**157**	**0.702 J**	**0.297 J**	0.998 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	**0.938 J**	**1.80 J**	**1.03**	1.00 U	--	**3.62**	**67.6**	**108**	**0.811 J**	1.00 U	0.998 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**1.32**	**3.53**	**1.07**	**1.14 J**	--	**15.5**	**260**	**350**	**1.63**	**0.842 J**	0.998 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**103**	**155**	**60.1**	**53**	--	**734**	**18300**	**28800**	**47.8**	**37.1**	**11.1**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**5.79**	**8.52**	**3.11**	**2.62 J**	--	**23.6**	**616**	**647**	**1.56 J**	**1.53 J**	**0.652 J**
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**189**	**257**	**78.7**	**64.8**	--	**859**	**24200**	**27600**	**71.9**	**37.5**	**11.7**
Total Tetrachlorodibenzofuran (TCDF)	0.998 U	**0.36**	1.00 U	**1.36**	--	**1.74**	**575**	**597**	**0.174**	1.00 U	**0.128**
Total Pentachlorodibenzofuran (PeCDF)	**1.92**	**6.72**	1.00 U	**3.69**	--	**45.5**	**2280**	**1780**	**3.97**	**0.345**	**0.979**
Total Hexachlorodibenzofuran (HxCDF)	**99.9**	**173**	**65.9**	**51.5**	--	**876**	**23700**	**34200**	**53.5**	**32.2**	**11.8**
Total Heptachlorodibenzofuran (HpCDF)	**408**	**589**	**222**	**179**	--	**2570**	**68700**	**92800**	**163**	**109**	**35.7**
Total Dioxin/Furan (U = 0)	**1450 J**	**4670 J**	**1320 J**	**1040 J**	--	**7820 J**	**212000 J**	**172000 J**	**1760 J**	**259 J**	**204 J**
Total Dioxin/Furan (U = 1/2)	**1450 J**	**4670 J**	**1320 J**	**1050 J**	--	**7820 J**	**212000 J**	**172000 J**	**1760 J**	**262 J**	**209 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	**4.21 J**	**11.1 J**	**3.02 J**	**2.41 J**	--	**27.1 J**	**992 J**	**936 J**	**4.10 J**	**1.15 J**	**0.498 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	**5.53 J**	**11.1 J**	**3.73 J**	**3.77 J**	--	**27.1 J**	**992 J**	**936 J**	**4.75 J**	**2.46 J**	**1.96 J**

Table 1

Soil Data Summary - Port Gamble Mill Site Upland Pre-Design Investigation

Location ID Sample Date / Time Depth Chemical	PG-PDI-046 4/14/2021 15:35 6 - 8 ft	PG-PDI-046 4/14/2021 15:40 8 - 10 ft	PG-PDI-046 4/14/2021 15:45 10 - 12 ft	PG-PDI-046 4/14/2021 15:50 12 - 14 ft	PG-PDI-046 4/14/2021 15:55 14 - 15 ft	PG-PDI-047 7/29/2021 9:30 0 - 2 ft	PG-PDI-047 7/29/2021 9:35 2 - 4 ft	PG-PDI-047 7/29/2021 9:40 4 - 6 ft	PG-PDI-047 7/29/2021 9:45 6 - 8 ft	PG-PDI-047 7/29/2021 9:50 8 - 10 ft	PG-PDI-047 7/29/2021 10:00 10 - 12 ft	PG-PDI-047 7/29/2021 10:05 12 - 14 ft
Conventional Parameters (pct)												
Moisture (water) content	--	--	--	--	--	--	--	--	--	--	--	--
Total Solids	**97.01**	**95.32**	**89.35**	**75.26**	**52.88**	--	--	--	--	--	--	--
Grain Size (pct)												
Percent passing 1 inch (1 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.75 inch (3/4 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.5 inch (1/2 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.375 inch (3/8 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 4750 micron sieve (#4)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 2000 micron sieve (#10)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 850 micron sieve (#20)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 425 micron sieve (#40)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 250 micron sieve (#60)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 150 micron sieve (#100)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 106 micron sieve (#140)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 75 micron sieve (#200)	--	--	--	--	--	--	--	--	--	--	--	--
Dioxin Furans (ng/kg)												
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.999 U	0.999 U	1.00 U	**3.17**	**100**	0.493 U	0.499 U	0.498 U	0.496 U	**3.34**	**1.38**	**2.11**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**1.02**	0.999 U	**0.705 J**	**15.5**	**103**	2.46 U	2.49 U	2.49 U	2.48 U	**16.2**	**6.03**	**5.75**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**0.971 J**	**0.238 J**	**1.46**	**43.1**	**67**	2.46 U	2.49 U	2.49 U	**0.741 JEMPC**	**50.2**	**21.5**	**25.5**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**3.97**	**1.51**	**7.26**	**85**	**1040**	**1.6 JEMPC**	2.49 U	**1.02 JEMPC**	**3.14**	**164**	**72.4**	**108**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**1.49**	**0.539 J**	**1.93**	**30.6**	**516**	2.46 U	2.49 U	2.49 U	**0.555 JEMPC**	**48.6**	**21.7**	**20.2**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**130**	**43.3**	**108**	**1120**	**20500**	**50.7**	**5.47**	**17.8**	**48.9**	**2980**	**1290**	**1660**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**1320**	**543**	**1040**	**7380 J**	**97200**	**580**	**66.3**	**272**	**350**	**43400**	**19800**	**15800**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	**0.291**	0.999 U	**3.48**	**65.5**	**1020**	0.493 U	0.499 U	**0.69**	**0.656**	**377 EMPC**	**103 EMPC**	**95.2 EMPC**
Total Pentachlorodibenzo-p-dioxin (PeCDD)	**1.55**	**0.243**	**4.04**	**115**	**824**	2.46 U	2.49 U	2.49 U	2.48 U	**473**	**147**	**161 EMPC**
Total Hexachlorodibenzo-p-dioxin (HxCDD)	**60.2**	**15.8**	**49.4**	**489**	**5750**	**7.17 EMPC**	2.49 U	**4.21 EMPC**	**11.5 EMPC**	**1290**	**534**	**593**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	**561**	**175**	**296**	**1810**	**32300**	**99.5**	**10.8**	**34.5**	**79**	**5860**	**2620**	**2890**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**0.238 J**	0.999 U	1.00 U	**4.47 J**	**67.2 J**	0.493 U	0.499 U	0.498 U	0.496 U	**34.1**	**7.72**	**6.28**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.999 U	0.999 U	**0.453 J**	**5.48**	**66.8**	2.46 U	2.49 U	2.49 U	2.48 U	**63.3**	**15**	**10.5**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**0.683 J**	0.999 U	1.00 U	**2.33**	**33.7**	2.46 U	2.49 U	2.49 U	2.48 U	**33.2**	**11.1**	**15.5**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**2.09**	**0.342 J**	**1.46**	**19.4**	**258**	**0.539 J**	2.49 U	2.49 U	**0.83 JEMPC**	**169**	**46.7**	**37.1**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**0.741 J**	0.999 U	1.00 U	**11.8**	**304**	2.46 U	2.49 U	2.49 U	2.48 U	**49.6**	**19.8**	**21.3**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	**0.688 J**	0.999 U	**0.418 J**	**5.53**	**83**	2.46 U	2.49 U	2.49 U	2.48 U	2.49 U	2.48 U	2.47 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**1.23**	0.999 U	**1.48 J**	**20.1**	**613**	**0.697 JEMPC**	2.49 U	2.49 U	**1.07 J**	**55**	**26.5**	**42**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**40.6**	**14.9**	**49.4**	**759**	**17200**	**20.9**	**3.25**	**9.94**	**33.2**	**1410**	**557**	**1280**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**1.94**	**0.633 J**	**3.32**	**37.2**	**858**	**2.31 J**	2.49 U	2.49 U	**2.79**	**99.6**	**47.4**	**82.5**
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**55.1**	**23.7**	**73.5**	**1030**	**30400**	**48.9**	**2.87 JEMPC**	**17.5**	**68.2**	**2700**	**1020**	**2190**
Total Tetrachlorodibenzofuran (TCDF)	**0.848**	0.999 U	**0.467**	**46.1**	**1850**	0.493 U	0.499 U	0.498 U	0.496 U	**308 EMPC**	**77.2 EMPC**	**107 EMPC**
Total Pentachlorodibenzofuran (PeCDF)	**4.6**	0.999 U	**5.24**	**131**	**5240**	**0.822 EMPC**	2.49 U	**0.767**	**1.61**	**395**	**143**	**192 EMPC**
Total Hexachlorodibenzofuran (HxCDF)	**45.1**	**15.4**	**50.5**	**889**	**23400**	**24.1 EMPC**	**3.91 EMPC**	**12.4 EMPC**	**41.2 EMPC**	**2000 EMPC**	**786**	**1820 EMPC**
Total Heptachlorodibenzofuran (HpCDF)	**128**	**52**	**177**	**2760**	**71200**	**83.4**	**9.94**	**32.1**	**120**	**5040**	**1810**	**4740**
Total Dioxin/Furan (U = 0)	**1560 J**	**628 J**	**1290 J**	**10600 J**	**169000 J**	**706 J**	**77.9 J**	**318 J**	**509 J**	**51300**	**23000**	**21300**
Total Dioxin/Furan (U = 1/2)	**1560 J**	**632 J**	**1290 J**	**10600 J**	**169000 J**	**715 J**	**92.1 J**	**331 J**	**516 J**	**51300**	**23000**	**21300**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	**4.50 J**	**1.02 J**	**4.06 J**	**63.2 J**	**934 J**	**1.21 J**	**0.108 J**	**0.466 J**	**1.61 J**	**147**	**58**	**74.5**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	**5.02 J**	**2.38 J**	**4.81 J**	**63.2 J**	**934 J**	**3.61 J**	**2.92 J**	**3.16 J**	**3.78 J**	**147**	**58.1**	**74.6**

Table 1

Soil Data Summary - Port Gamble Mill Site Upland Pre-Design Investigation

Location ID Sample Date / Time Depth Chemical	PG-PDI-047 7/29/2021 10:10 14 - 16 ft	PG-PDI-047 7/29/2021 10:15 16 - 18 ft	PG-PDI-047 7/29/2021 10:20 18 - 20 ft	PG-PDI-047 7/29/2021 10:25 20 - 22 ft	PG-PDI-047 7/29/2021 10:30 22 - 24 ft	PG-PDI-047 7/29/2021 10:35 24 - 25 ft	PG-PDI-048 7/29/2021 11:00 0 - 2 ft	PG-PDI-048 7/29/2021 11:05 2 - 4 ft	PG-PDI-048 7/29/2021 11:05 2 - 4 ft	PG-PDI-048 7/29/2021 11:10 4 - 6 ft	PG-PDI-048 7/29/2021 11:15 6 - 8 ft
Conventional Parameters (pct)											
Moisture (water) content	--	--	--	--	--	--	--	--	--	--	--
Total Solids	--	--	--	--	--	--	--	--	--	--	--
Grain Size (pct)											
Percent passing 1 inch (1 inch sieve)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.75 inch (3/4 inch sieve)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.5 inch (1/2 inch sieve)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.375 inch (3/8 inch sieve)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 4750 micron sieve (#4)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 2000 micron sieve (#10)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 850 micron sieve (#20)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 425 micron sieve (#40)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 250 micron sieve (#60)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 150 micron sieve (#100)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 106 micron sieve (#140)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 75 micron sieve (#200)	--	--	--	--	--	--	--	--	--	--	--
Dioxin Furans (ng/kg)											
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**2.05**	**3.94**	0.499 U	0.499 U	0.49 U	0.50 U	**6.45**	0.493 U	0.497 U	0.496 U	**2.97**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**9.67**	**6.34**	2.5 U	2.5 U	2.45 U	2.5 U	**25.9**	2.47 U	2.49 U	**1.04 J**	**2.04 J**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**27.4**	**23.7**	2.5 U	2.5 U	2.45 U	2.5 U	**36.4**	2.47 U	2.49 U	**2.37 J**	**2.67**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**97**	**110**	**0.365 JEMPC**	2.5 U	2.45 U	2.5 U	**318**	2.47 U	2.49 U	**8.26**	**18**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**29.1**	**23.2**	2.5 U	2.5 U	2.45 U	2.5 U	**74.4**	2.47 U	2.49 U	**3.33**	**8.03**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**1650**	**1750**	**5.21 EMPC**	**0.695 J**	**0.339 JEMPC**	2.5 U	**2630**	**2.96**	**2.9**	**137**	**337**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**21800**	**18300**	**68.8**	**5.15**	4.9 U	**2.48 J**	**23500**	**23.1**	**21.1**	**1150**	**2570**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	**230 EMPC**	**103 EMPC**	**0.696 EMPC**	0.499 U	0.49 U	0.50 U	**118 EMPC**	0.493 U	0.497 U	**20.2 EMPC**	**32.6 EMPC**
Total Pentachlorodibenzo-p-dioxin (PeCDD)	**315 EMPC**	**134 EMPC**	2.5 U	2.5 U	2.45 U	2.5 U	**251**	2.47 U	2.49 U	**17.5**	**32.6 EMPC**
Total Hexachlorodibenzo-p-dioxin (HxCDD)	**747**	**614**	**3.9 EMPC**	2.5 U	2.45 U	2.5 U	**2120**	**1.32 EMPC**	**1.11**	**44.3**	**132 EMPC**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	**3080**	**3080**	**10.6 EMPC**	**1.22**	**0.701 EMPC**	**0.593**	**5800**	**5.79**	**5.48 EMPC**	**236**	**623**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**17.8**	**5.9**	0.499 U	0.499 U	0.49 U	0.50 U	**4.41**	0.493 U	0.497 U	**2.26**	**1.44**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**30.6**	**11.3**	2.5 U	2.5 U	2.45 U	2.5 U	**9.76**	2.47 U	2.49 U	**3.35**	**1.6 JEMPC**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**18.8**	**20**	2.5 U	2.5 U	2.45 U	2.5 U	**9.94**	2.47 U	2.49 U	**2.1 J**	**2.48**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**75.4**	**47.1**	2.5 U	2.5 U	2.45 U	2.5 U	**38.3**	2.47 U	2.49 U	**10.8**	**4.86**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**26.1**	**24.8**	2.5 U	2.5 U	2.45 U	2.5 U	**28.3**	2.47 U	2.49 U	**4.46**	**3.72**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	2.47 U	2.47 U	2.5 U	2.5 U	2.45 U	2.5 U	2.49 U	2.47 U	2.49 U	2.48 U	2.46 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**35.8**	**44.5**	2.5 U	2.5 U	2.45 U	2.5 U	**53.7**	2.47 U	2.49 U	**4.04**	**8.79**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**946**	**1200**	**2.78**	**0.436 J**	2.45 U	2.5 U	**1270**	**1.08 JEMPC**	**1.16 J**	**64.4**	**139**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**67.5**	**76.6**	2.5 U	2.5 U	2.45 U	2.5 U	**52.6**	2.47 U	2.49 U	**6.23**	**10.6**
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**1930**	**2150**	**5.4**	4.99 U	4.9 U	5.0 U	**1310**	4.93 U	4.97 U	**107**	**314**
Total Tetrachlorodibenzofuran (TCDF)	**172**	**118 EMPC**	0.499 U	0.499 U	0.49 U	0.50 U	**69.7**	0.493 U	0.497 U	**25.1 EMPC**	**43.4 EMPC**
Total Pentachlorodibenzofuran (PeCDF)	**244 EMPC**	**199 EMPC**	2.5 U	2.5 U	2.45 U	2.5 U	**225 EMPC**	2.47 U	2.49 U	**24.8 EMPC**	**50.3 EMPC**
Total Hexachlorodibenzofuran (HxCDF)	**1370**	**1680**	**3.19 EMPC**	**0.207 EMPC**	2.45 U	2.5 U	**1650 EMPC**	**1.27 EMPC**	**1.24 EMPC**	**78.7 EMPC**	**244 EMPC**
Total Heptachlorodibenzofuran (HpCDF)	**3360**	**4300**	**8.24**	**1.16**	2.45 U	2.5 U	**3780**	**2.67 EMPC**	**2.82**	**173**	**550**
Total Dioxin/Furan (U = 0)	**26800**	**23800**	**82.6 J**	**6.28 J**	**0.339 J**	**2.48 J**	**29400**	**27.1 J**	**25.2 J**	**1510 J**	**3430 J**
Total Dioxin/Furan (U = 1/2)	**26800**	**23800**	**95.6 J**	**23.0 J**	**20.4 J**	**21.7 J**	**29400**	**43.7 J**	**41.8 J**	**1510 J**	**3430 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	**82.9**	**80.9**	**0.139 J**	**0.0129 J**	**0.00339 J**	**0.000744 J**	**138**	**0.0473 J**	**0.0469 J**	**7.78 J**	**16.3 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	**83**	**81.1**	**2.84 J**	**2.84 J**	**2.79 J**	**2.85 J**	**138**	**2.84 J**	**2.86 J**	**8.15 J**	**16.4 J**

Table 1

Soil Data Summary - Port Gamble Mill Site Upland Pre-Design Investigation

Location ID Sample Date / Time Depth Chemical	PG-PDI-048 7/29/2021 11:20 8 - 10 ft	PG-PDI-048 7/29/2021 11:25 10 - 12 ft	PG-PDI-048 7/29/2021 11:30 12 - 14 ft	PG-PDI-048 7/29/2021 11:35 14 - 15 ft	PG-PDI-049 7/29/2021 12:15 0 - 2 ft	PG-PDI-049 7/29/2021 12:15 0 - 2 ft	PG-PDI-049 7/29/2021 12:20 2 - 4 ft	PG-PDI-049 7/29/2021 12:25 4 - 6 ft	PG-PDI-049 7/29/2021 12:30 6 - 8 ft	PG-PDI-049 7/29/2021 12:35 8 - 10 ft	PG-PDI-049 7/29/2021 12:40 10 - 12 ft
Conventional Parameters (pct)											
Moisture (water) content	--	--	--	--	--	--	--	--	--	--	--
Total Solids	--	--	--	--	--	--	--	--	--	--	--
Grain Size (pct)											
Percent passing 1 inch (1 inch sieve)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.75 inch (3/4 inch sieve)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.5 inch (1/2 inch sieve)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.375 inch (3/8 inch sieve)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 4750 micron sieve (#4)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 2000 micron sieve (#10)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 850 micron sieve (#20)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 425 micron sieve (#40)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 250 micron sieve (#60)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 150 micron sieve (#100)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 106 micron sieve (#140)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 75 micron sieve (#200)	--	--	--	--	--	--	--	--	--	--	--
Dioxin Furans (ng/kg)											
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**3.02 J**	**44.3**	**61.3**	**1.62 J**	0.496 U	0.497 U	0.491 U	**3.86 J**	**90.1**	**12.8**	**11.6**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	2.5 U	**45.6**	**82.8 J**	**1.8 J**	2.48 U	2.49 U	2.46 U	**33**	**250**	**21**	**23.9**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	2.5 U	**85.4**	**53.2**	**1.68 J**	2.48 U	2.49 U	2.46 U	**62.8**	**231**	**19.8**	**26.4**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**7.03**	**727**	**821**	**30.9**	**2.25 J**	**2.55**	**9.18**	**1090**	**440**	**101**	**47.7**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**6.95**	**218**	**326**	**11.1**	**1.01 J**	**0.953 J**	**1.69 J**	**158**	**166**	**25**	**18.5**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**163**	**14100 J**	**14100 J**	**583**	**51.2**	**47.7**	**124**	**6580 J**	**5890 J**	**1760**	**714**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**892**	**108000 J**	**65900 J**	**3670**	**544**	**477**	**1650**	**26100 J**	**69100 J**	**11900 J**	**5970**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	**29.2 J**	**229 J**	**372 J**	**9.56 J**	0.496 U	0.497 U	**2.23**	**209 J**	**5200**	**398**	**417 J**
Total Pentachlorodibenzo-p-dioxin (PeCDD)	**17.7**	**388 J**	**565 J**	**30.7 J**	2.48 U	2.49 U	**1.84**	**354 J**	**4170**	**400**	**426**
Total Hexachlorodibenzo-p-dioxin (HxCDD)	**98.9**	**3070 J**	**3550 J**	**306 J**	**17.4 J**	**15.3 J**	**44 J**	**4710 J**	**3800**	**773**	**625**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	**296**	**22600**	**22000**	**1080**	**108**	**107**	**218**	**9540**	**10300**	**2990**	**1270**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	0.499 U	**13.5**	**17.6 J**	**0.875**	0.496 U	0.497 U	0.491 U	**43.5**	**273**	**23.6**	**22**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	2.5 U	**39.3**	**56.3**	**1.72 J**	2.48 U	2.49 U	2.46 U	**122**	**196**	**17.1**	**15.7**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**2.33 J**	**72.2**	**132**	**4.77**	2.48 U	2.49 U	2.46 U	**60.5**	**228**	**49.2**	**52.1**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**2.69**	**170**	**195**	**7.68**	2.48 U	2.49 U	2.46 U	**552**	**141**	**35.3**	**18.6**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**3.4**	**161**	**259**	**6.97**	2.48 U	2.49 U	**1.12 J**	**174**	**113**	**24.1**	**14**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	2.5 U	2.65 U	2.48 U	2.5 U	2.48 U	2.49 U	2.46 U	2.49 U	2.46 U	2.48 U	2.48 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**5.9**	**324**	**538 J**	**12.9**	2.48 U	**0.707 J**	**2.87**	**223**	**114**	**47.9**	**27.4**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**73.7**	**10300 J**	**12400 J**	**391**	**13.8**	**10.5**	**74.1**	**10300 J**	**1300**	**928**	**341**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**4.13**	**467**	**604 J**	**17.7**	2.48 U	2.49 U	**3.57**	**339**	**95.5**	**71.4**	**35**
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**72.2**	**16200 J**	**20500 J**	**501**	**23.2**	**16.2**	**108**	**10300 J**	**2870**	**2080**	**892**
Total Tetrachlorodibenzofuran (TCDF)	**67.9 J**	**615 J**	**1070 J**	**53.4 J**	0.496 U	0.497 U	0.491 U	**274 J**	**3420**	**406 J**	**344 J**
Total Pentachlorodibenzofuran (PeCDF)	**77.5 J**	**1720 J**	**2940 J**	**96.7**	2.48 U	2.49 U	**8.04**	**874 J**	**2070**	**399 J**	**315 J**
Total Hexachlorodibenzofuran (HxCDF)	**138 J**	**14000 J**	**17300 J**	**503**	**12.9**	**12.5 J**	**91.9 J**	**11700**	**2200**	**1830 J**	**898**
Total Heptachlorodibenzofuran (HpCDF)	**224 J**	**37900**	**46100 J**	**1080**	**42.8**	**34.9**	**248**	**29900**	**5250**	**4110**	**1550**
Total Dioxin/Furan (U = 0)	**1240 J**	**151000 J**	**116000 J**	**5240 J**	**635 J**	**556 J**	**1970 J**	**56100 J**	**81500 J**	**17100 J**	**8230**
Total Dioxin/Furan (U = 1/2)	**1240 J**	**151000 J**	**116000 J**	**5250 J**	**647 J**	**566 J**	**1980 J**	**56100 J**	**81500 J**	**17100 J**	**8230**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	**9.01 J**	**569 J**	**703 J**	**23.3 J**	**1.15 J**	**1.15 J**	**4.03 J**	**472 J**	**657 J**	**109 J**	**82**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	**10.6 J**	**569 J**	**703 J**	**23.4 J**	**3.70 J**	**3.59 J**	**6.31 J**	**472 J**	**657 J**	**109 J**	**82.1**

Table 1

Soil Data Summary - Port Gamble Mill Site Upland Pre-Design Investigation

Location ID Sample Date / Time Depth Chemical	PG-PDI-049 7/29/2021 12:45 12 - 14 ft	PG-PDI-049 7/29/2021 12:50 14 - 15 ft	PG-PDI-050 7/29/2021 14:05 0 - 2 ft	PG-PDI-051 7/29/2021 14:00 0 - 2 ft	PG-PDI-052 7/29/2021 13:50 0 - 2 ft	PG-PDI-053 7/29/2021 14:45 0 - 2 ft	PG-PDI-054 7/29/2021 14:55 0 - 2 ft	PG-PDI-055 7/28/2021 13:30 0 - 0.5 ft	PG-PDI-055 7/28/2021 13:20 0.5 - 1.5 ft	PG-PDI-056 7/28/2021 13:50 0 - 0.6 ft	PG-PDI-056 7/28/2021 13:40 0.6 - 1.5 ft
Conventional Parameters (pct)											
Moisture (water) content	--	--	--	--	--	--	--	--	--	--	--
Total Solids	--	--	--	--	--	--	--	--	--	--	--
Grain Size (pct)											
Percent passing 1 inch (1 inch sieve)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.75 inch (3/4 inch sieve)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.5 inch (1/2 inch sieve)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.375 inch (3/8 inch sieve)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 4750 micron sieve (#4)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 2000 micron sieve (#10)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 850 micron sieve (#20)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 425 micron sieve (#40)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 250 micron sieve (#60)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 150 micron sieve (#100)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 106 micron sieve (#140)	--	--	--	--	--	--	--	--	--	--	--
Percent passing 75 micron sieve (#200)	--	--	--	--	--	--	--	--	--	--	--
Dioxin Furans (ng/kg)											
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**3.75**	**4.97**	0.496 U	0.495 U	0.493 U	0.494 U	**1.25**	**1.34**	**0.657 J**	**0.536 J**	0.496 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**9.36**	**12.6**	2.48 U	**0.529 J**	2.46 U	**0.541 JEMPC**	**10.1**	**2.56**	**1.53 J**	**1.28 J**	2.48 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**5.11**	**6.66**	2.48 U	**0.549 J**	2.46 U	**0.771 JEMPC**	**29.2**	**1.76 J**	**1.28 J**	**1.2 J**	2.48 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**7.49**	**11**	**5.46**	**2.81**	**1.71 J**	**5.63**	**196**	**6.17**	**3.98**	**3.54**	**0.455 J**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**5.83**	**7.51**	**1.3 J**	**1.23 J**	**0.346 J**	**2.03 J**	**40.5**	**3.44**	**2.52**	**2.31 J**	**0.411 J**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**30**	**36.2**	**38**	**24.9**	**12.5**	**36.9**	**1450**	**51.8**	**33.2**	**37.9**	**5.28**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**92.9**	**66.2**	**241**	**118**	**57.4**	**124**	**5200**	**364**	**253**	**235**	**35.1**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	**194 J**	**249 J**	**2.35 J**	**17.4**	0.493 U	**8.42**	**29.8 EMPC**	**103 J**	**69 J**	**45.9 J**	**5.83 J**
Total Pentachlorodibenzo-p-dioxin (PeCDD)	**163 J**	**207 J**	2.48 U	**12.9 J**	2.46 U	**11.3 EMPC**	**70.3**	**84.6 J**	**57.4 J**	**44.7 J**	**4.98 J**
Total Hexachlorodibenzo-p-dioxin (HxCDD)	**114 J**	**160 J**	**28.1**	**28.3 J**	**12.4 J**	**41.4 EMPC**	**939**	**80.1 J**	**54.9 J**	**46.6 J**	**5.95 J**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	**56.2**	**65.6**	**98.6**	**46.8**	**26.3**	**63.4**	**2290**	**93**	**59.8**	**67.5**	**9.37**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**11.9**	**16.2**	0.496 U	**0.664**	0.493 U	**0.795 EMPC**	**1.64**	**4.88**	**3.68**	**2.52**	0.496 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**7.52**	**11**	2.48 U	**0.592 J**	2.46 U	**0.887 JEMPC**	**2.51**	**2.33 J**	**1.58 J**	**1.48 J**	2.48 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**8.99**	**12.5**	2.48 U	**0.967 J**	2.46 U	**1.25 J**	**9.05**	**3.27**	**2.06 J**	**1.95 J**	2.48 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**5.31**	**7.59**	2.48 U	**1.2 J**	2.46 U	**1.82 J**	**18.3**	**1.48 J**	**0.904 J**	**0.849 J**	2.48 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**4.39**	**5.93**	**0.666 J**	**1.22 J**	2.46 U	**1.46 JEMPC**	**25.9**	**1.48 J**	**0.811 J**	**1.11 J**	**0.178 J**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	2.5 U	2.44 U	2.48 U	2.48 U	2.46 U	2.47 U	2.47 U	2.49 U	2.47 U	2.48 U	2.48 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**3.46**	**5.17**	**1.08 J**	**1.62 J**	**0.412 J**	**2.68**	**55.5**	**2.14 J**	**1.13 J**	**1.51 J**	**0.285 J**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**11.6**	**12.3**	**20.6**	**16.2**	**4.93**	**33.4**	**1300**	**13.7**	**8.59**	**15.9**	**2.63**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**1.18 J**	**1.26 J**	**0.735 J**	**0.852 J**	2.46 U	**1.43 J**	**35.5**	**1.04 J**	**0.68 J**	**0.912 J**	2.48 U
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**12.1**	**6.75**	**17.8**	**17.6 J**	**4.33 J**	**23.9**	**1000**	**26.7**	**15**	**36.5**	**6.7**
Total Tetrachlorodibenzofuran (TCDF)	**161 J**	**227 J**	0.496 U	**5.07 J**	0.493 U	**15.6 EMPC**	**45.1 EMPC**	**89.7 J**	**57.2 J**	**45.4 J**	0.496 U
Total Pentachlorodibenzofuran (PeCDF)	**84.5 J**	**117 J**	**8.67**	**10 J**	**2.52**	**14.8 EMPC**	**202**	**37.7 J**	**22.9 J**	**20.7 J**	2.48 U
Total Hexachlorodibenzofuran (HxCDF)	**36.1 J**	**48.6 J**	**30.8 J**	**23.6 J**	**8.04**	**47.6 EMPC**	**1640**	**26.5 J**	**14.6 J**	**22.4 J**	**3.45 J**
Total Heptachlorodibenzofuran (HpCDF)	**24.3 J**	**20.1 J**	**55**	**42.1 J**	**12.6**	**79.5 EMPC**	**3550**	**40 J**	**23.8 J**	**42.9 J**	**6.8**
Total Dioxin/Furan (U = 0)	**221 J**	**224 J**	**327 J**	**189 J**	**81.6 J**	**237 J**	**9380**	**488 J**	**331 J**	**344 J**	**51.0 J**
Total Dioxin/Furan (U = 1/2)	**222 J**	**225 J**	**335 J**	**190 J**	**92.0 J**	**239 J**	**9380**	**489 J**	**332 J**	**346 J**	**60.2 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	**20.8 J**	**28.2 J**	**1.52 J**	**2.23 J**	**0.440 J**	**3.22 J**	**80.6**	**7.87 J**	**4.79 J**	**4.38 J**	**0.225 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	**21.0 J**	**28.3 J**	**3.82 J**	**2.60 J**	**2.85 J**	**3.59 J**	**80.7**	**7.99 J**	**4.91 J**	**4.50 J**	**2.53 J**

Table 1

Soil Data Summary - Port Gamble Mill Site Upland Pre-Design Investigation

Location ID / Sample Date / Time / Depth / Chemical	PG-PDI-057 7/28/2021 15:15 0 - 0.5 ft	PG-PDI-057 7/28/2021 15:05 0.5 - 1.7 ft	PG-PDI-058 11/3/2021 9:35 0 - 1 ft	PG-PDI-059 11/3/2021 10:30 0 - 1 ft	PG-PDI-060 11/3/2021 10:00 0 - 1 ft	PG-PDI-061 11/1/2021 8:45 0 - 2 ft	PG-PDI-061 11/1/2021 8:50 2 - 4 ft	PG-PDI-061 11/1/2021 8:55 4 - 6 ft	PG-PDI-061 11/1/2021 9:25 4 - 6 ft	PG-PDI-061 11/1/2021 9:00 6 - 8 ft	PG-PDI-061 11/1/2021 9:05 8 - 10 ft	PG-PDI-061 11/1/2021 9:10 10 - 12 ft
Conventional Parameters (pct)												
Moisture (water) content	--	--	--	--	--	--	--	--	--	--	--	--
Total Solids	--	--	**82.95**	**83.04**	**89.41**	**96.44**	**92.45**	**90.81**	**90.79**	**91.05**	**61.65**	**73.58**
Grain Size (pct)												
Percent passing 1 inch (1 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.75 inch (3/4 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.5 inch (1/2 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.375 inch (3/8 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 4750 micron sieve (#4)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 2000 micron sieve (#10)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 850 micron sieve (#20)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 425 micron sieve (#40)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 250 micron sieve (#60)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 150 micron sieve (#100)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 106 micron sieve (#140)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 75 micron sieve (#200)	--	--	--	--	--	--	--	--	--	--	--	--
Dioxin Furans (ng/kg)												
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**5.43**	**5.33**	**0.810 J**	**0.856 J**	**1**	**0.797 J**	**8.14**	0.998 U	0.999 U	**1.7**	**4.73**	**0.594 J**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**7.05**	**6.55**	**3.43**	**2.48**	**2.82**	**3.83 J**	**42.6**	0.998 U	0.999 U	**12.3**	**37.1**	**4.36**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**16.9**	**15.5**	**1.94**	**1.13**	**1.21**	**2.51**	**33.1**	0.998 U	0.999 U	**21**	**112**	**8.13**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**124**	**100**	**13.1**	**2.16**	**3.83**	**54.2**	**219**	0.998 U	**0.387 J**	**33.2**	**18.2**	**5.18**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**19.2**	**18.7**	**4.01**	**1.48**	**2.29**	**14.7**	**50.3**	0.998 U	0.999 U	**11.5**	**21.2**	**3.17**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**852**	**803**	**106**	**15.5**	**24.9**	**338**	**692**	3.97 U	**7**	**225**	**327**	**71**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**7520**	**7000**	**430**	**70.7**	**118**	**723**	**866**	22.6 U	37.4 U	**1090**	**1160**	**382**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	**95.2 J**	**104 J**	**70.3**	**63.4**	**76.9**	**1.88**	**83.1**	0.998 U	0.999 U	**24.1**	**78**	**10.4**
Total Pentachlorodibenzo-p-dioxin (PeCDD)	**114**	**111**	**50.9**	**41**	**45.5**	**11.4**	**238**	0.998 U	0.999 U	**65.2**	**189**	**24.5**
Total Hexachlorodibenzo-p-dioxin (HxCDD)	**579**	**499**	**97.5**	**41.8**	**52.6**	**348**	**1240**	**2.41**	**0.387**	**212**	**342**	**50.1**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	**2990**	**2720**	**167**	**27.9**	**44.8**	**615**	**1240**	**6.97 J**	**10.9**	**612**	**459**	**122**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**5.05**	**4.46**	**3.27**	**4.77**	**5.92**	0.995 U	**0.965 J**	0.998 U	0.999 U	**1.16 J**	**14**	**1.51**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**3.79**	**3.53**	**1.83**	**2.27**	**2.52**	0.995 U	**1.73 J**	0.998 U	0.999 U	**1.44**	**77.1**	**2.21 J**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**9.98**	**8.82**	**1.74**	**2.08**	**2.57**	**0.598 J**	**1.4**	0.998 U	0.999 U	**0.631 J**	**17.2**	0.997 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**11.3**	**10.1**	**2.55 J**	**1.02 J**	**0.982 J**	**2.89**	**6.08**	0.998 U	0.999 U	**5.33**	**131**	**2.87**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**12.6**	**12.6**	**2.25**	**1.11**	**1.28**	**4.66**	**9.15**	**0.210 J**	0.999 U	**2.43**	**36.5**	**0.993 J**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	2.49 U	2.49 U	**1.43**	**0.286 J**	0.999 U	**1.62 J**	**5.79 J**	0.998 U	0.999 U	**2.08 J**	**4.47**	**0.574 J**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**27.8**	**24.7**	**3.72**	**0.972 J**	**1.25**	**7.93**	**16.7**	0.998 U	0.999 U	**3.54**	**8.34**	**1.03**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**430**	**446**	**98.7 J**	**5.56 J**	**7.53 J**	**198**	**450**	**1.37**	**2.42**	**106**	**126**	**44.8**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**14.5**	**14.5**	**2.83 J**	**0.341 J**	**0.325 J**	**6.55 J**	**10.6**	0.998 U	0.999 U	**3.45**	**7.76**	**1.76**
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**424**	**445**	**81.5**	**4.07 J**	**6.46**	**138**	**279**	1.98 U	3.35 U	**99.4**	**172**	**63.4**
Total Tetrachlorodibenzofuran (TCDF)	**90.8 J**	**82.4 J**	**32.6**	**54.6**	**104**	**7.28**	**21.4**	**0.366**	**0.47**	**5.99**	**98.3**	**2.54**
Total Pentachlorodibenzofuran (PeCDF)	**243 J**	**218 J**	**43.6**	**14.6**	**35.9**	**58**	**115**	**0.293**	0.999 U	**21.5**	**305**	**4.54**
Total Hexachlorodibenzofuran (HxCDF)	**715 J**	**676**	**115 J**	**11.9 J**	**15.9 J**	**274**	**549**	**1.57**	**1.68**	**117**	**324**	**39.9**
Total Heptachlorodibenzofuran (HpCDF)	**1180**	**1220**	**260 J**	**10.2 J**	**15.7 J**	**482**	**1070**	**3.1**	**5.45**	**280**	**370**	**143**
Total Dioxin/Furan (U = 0)	**9480**	**8920**	**759 J**	**117 J**	**183 J**	**1500 J**	**2690 J**	**1.58 J**	**9.81 J**	**1620 J**	**2270**	**594 J**
Total Dioxin/Furan (U = 1/2)	**9480**	**8920**	**759 J**	**117 J**	**183 J**	**1500 J**	**2690 J**	**21.8 J**	**36.2 J**	**1620 J**	**2270**	**594 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	**52.6**	**48.1**	**10.3 J**	**5.56 J**	**6.71 J**	**19.3 J**	**97.2 J**	**0.0347 J**	**0.133 J**	**26.0 J**	**88.9**	**8.68 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	**52.7**	**48.2**	**10.3 J**	**5.56 J**	**6.76 J**	**19.4 J**	**97.2 J**	**1.58 J**	**1.66 J**	**26.0 J**	**88.9**	**8.82 J**

Table 1

Soil Data Summary - Port Gamble Mill Site Upland Pre-Design Investigation

Location ID / Sample Date / Time / Depth / Chemical	PG-PDI-061 11/1/2021 9:15 12 - 14 ft	PG-PDI-061 11/1/2021 9:20 14 - 15 ft	PG-PDI-062 11/1/2021 9:40 0 - 2 ft	PG-PDI-062 11/1/2021 9:45 2 - 4 ft	PG-PDI-062 11/1/2021 9:50 4 - 6 ft	PG-PDI-062 11/1/2021 9:55 6 - 8 ft	PG-PDI-062 11/1/2021 10:00 8 - 10 ft	PG-PDI-062 11/1/2021 10:05 10 - 12 ft	PG-PDI-062 11/1/2021 10:10 12 - 14 ft	PG-PDI-062 11/1/2021 10:15 14 - 15 ft	PG-PDI-063 11/1/2021 10:30 0 - 2 ft	PG-PDI-063 11/1/2021 10:35 2 - 4 ft
Conventional Parameters (pct)												
Moisture (water) content	--	--	--	--	--	--	--	--	--	--	--	--
Total Solids	**73.14**	**29.84**	**93.26**	**94.97**	**92.82**	**85.39**	**75.76**	**83.68**	**76.26**	**40.12**	**92.52**	**91.69**
Grain Size (pct)												
Percent passing 1 inch (1 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.75 inch (3/4 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.5 inch (1/2 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 0.375 inch (3/8 inch sieve)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 4750 micron sieve (#4)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 2000 micron sieve (#10)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 850 micron sieve (#20)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 425 micron sieve (#40)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 250 micron sieve (#60)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 150 micron sieve (#100)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 106 micron sieve (#140)	--	--	--	--	--	--	--	--	--	--	--	--
Percent passing 75 micron sieve (#200)	--	--	--	--	--	--	--	--	--	--	--	--
Dioxin Furans (ng/kg)												
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**0.599 J**	**2**	0.996 U	0.998 U	0.999 U	**0.484 J**	**0.349 J**	0.997 U	0.999 U	0.998 U	1.00 U	**0.944 J**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**4.06**	**3.78**	**0.704 J**	**2.45**	**0.264 J**	**3.25**	**1.35**	**1.13**	**0.693 J**	**0.454 J**	1.00 U	**6.42**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**10.1**	**6.66**	**0.588 J**	**1.36 J**	0.999 U	**12**	**5.31**	**3.89**	**1.8**	**0.535 J**	**0.507 J**	**10.7**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**4.5**	**15.9**	**7.89**	**17.3**	**2.04**	**63.7**	**37.5**	**32.6**	**22.4**	**2.76**	**3.02**	**118**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**2.98**	**8.94**	**1.89 J**	**5.66**	**0.540 J**	**5.6**	**3.2**	**2.62**	**1.42**	**0.697 J**	**1.11 J**	**19.2**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**78.2**	**379**	**105**	**168**	**28**	**1070**	**714**	**627**	**465**	**56.1**	**142**	**826**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**396**	**1650**	**1510**	**813**	**225**	**6880 J**	**4550 J**	**3340**	**2180**	**254**	**1650**	**6070 J**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	**5.49**	**22.6**	**1.11**	**12.4**	**1.47**	**10.8**	**0.602**	**0.888**	**0.436**	**1.94**	**4.81**	**218**
Total Pentachlorodibenzo-p-dioxin (PeCDD)	**17.1**	**26.8**	**1.04**	**17.6**	**0.814**	**25.4**	**8.2**	**6.71**	**4.16**	**3.16**	**4.37**	**100**
Total Hexachlorodibenzo-p-dioxin (HxCDD)	**30.6**	**120**	**45.3**	**121**	**7.57**	**170**	**87.6**	**80.1**	**51.4**	**14.2**	**61.5**	**565**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	**115**	**578**	**203**	**277**	**42.3**	**1490**	**979**	**848**	**623**	**75.4**	**870**	**1280**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**2.21**	**2.31 J**	0.996 U	**1.43 J**	**0.286 J**	**1.65 J**	**0.900 J**	**0.400 J**	**0.276 J**	**0.470 J**	**0.288 J**	**3.57 J**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**2.97**	**3.33**	0.996 U	0.998 U	0.999 U	**2.00 J**	**0.583 J**	**0.599 J**	0.999 U	**0.421 J**	1.00 U	**3.00 J**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**0.916 J**	**0.934 J**	0.996 U	0.998 U	**0.246 J**	**1.76**	**0.559 J**	0.997 U	**0.309 J**	**0.798 J**	1.00 U	**3.06**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**3.33**	**6.14**	**1.29**	**2.39 J**	**0.658 J**	**15.4**	**7.31**	**6.85**	**5.2**	**1.2**	**0.461 J**	**7.84**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**0.992 J**	**4.19**	**1.35**	**3.74**	**0.633 J**	**9.7**	**3.88**	**3.49**	**3.82**	**0.993 J**	**0.270 J**	**10.9**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	**0.618 J**	**1.29**	0.996 U	**1.66 J**	**3.18**	**10.5**	**5.41**	**4.45**	**5.14**	**1.17**	1.00 U	**7.45**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**1.28**	**5.92**	**1.78**	**6.69**	**0.886 J**	**20.3**	**8.75**	**8.15**	**7.73**	**1.49**	**0.885 J**	**18.1**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**48.6**	**268**	**57.8**	**117**	**24.9**	**1190**	**699**	**655**	**539**	**55.5**	**20.9**	**456**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**1.79 J**	**9.69**	**2.16**	**4.08**	**1.40 J**	**44.8**	**23.8**	**22.7**	**20.1**	**1.82**	**1.28**	**19.6**
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**74**	**454**	**57.6**	**84.8**	**29.4**	**1680**	**1110**	**1120**	**743**	**98.9**	**46.2**	**517**
Total Tetrachlorodibenzofuran (TCDF)	**5.99**	**38.9**	**1.82**	**14.3**	**0.781**	**16.9**	**4.88**	**3.19**	**1.21**	**3.99**	**0.661**	**55.8**
Total Pentachlorodibenzofuran (PeCDF)	**8.09**	**65.2**	**12.7**	**56.3**	**2.42**	**63.5**	**22.7**	**20.4**	**28.9**	**5.2**	**3.45**	**110**
Total Hexachlorodibenzofuran (HxCDF)	**44.3**	**246**	**72.6**	**171**	**27**	**1160**	**604**	**578**	**462**	**44**	**23.6**	**479**
Total Heptachlorodibenzofuran (HpCDF)	**153**	**831**	**165**	**286**	**73.3**	**4070**	**2460**	**2310**	**1800**	**197**	**74.2**	**1310**
Total Dioxin/Furan (U = 0)	**633 J**	**2820 J**	**1750 J**	**1230 J**	**317 J**	**11000 J**	**7170 J**	**5830 J**	**4000 J**	**477 J**	**1870 J**	**8100 J**
Total Dioxin/Furan (U = 1/2)	**633 J**	**2820 J**	**1750 J**	**1230 J**	**319 J**	**11000 J**	**7170 J**	**5830 J**	**4000 J**	**478 J**	**1870 J**	**8100 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	**9.05 J**	**18.5 J**	**4.30 J**	**9.63 J**	**1.78 J**	**43.8 J**	**25.2 J**	**21.8 J**	**16.7 J**	**2.88 J**	**2.80 J**	**42.9 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	**9.05 J**	**18.5 J**	**5.06 J**	**10.3 J**	**2.34 J**	**43.8 J**	**25.2 J**	**22.4 J**	**17.2 J**	**3.38 J**	**4.02 J**	**42.9 J**

Table 1

Soil Data Summary - Port Gamble Mill Site Upland Pre-Design Investigation

Location ID Sample Date / Time Depth Chemical	PG-PDI-063 11/1/2021 10:40 4 - 6 ft	PG-PDI-063 11/1/2021 10:45 6 - 8 ft	PG-PDI-063 11/1/2021 11:10 6 - 8 ft	PG-PDI-063 11/1/2021 10:50 8 - 10 ft	PG-PDI-063 11/1/2021 10:55 10 - 12 ft	PG-PDI-063 11/1/2021 11:00 12 - 14 ft	PG-PDI-063 11/1/2021 11:05 14 - 15 ft
Conventional Parameters (pct)							
Moisture (water) content	--	--	--	--	--	--	--
Total Solids	**92.84**	**80.16**	**80.64**	**85.99**	**84.72**	**85.66**	**85.62**
Grain Size (pct)							
Percent passing 1 inch (1 inch sieve)	--	--	--	--	--	--	--
Percent passing 0.75 inch (3/4 inch sieve)	--	--	--	--	--	--	--
Percent passing 0.5 inch (1/2 inch sieve)	--	--	--	--	--	--	--
Percent passing 0.375 inch (3/8 inch sieve)	--	--	--	--	--	--	--
Percent passing 4750 micron sieve (#4)	--	--	--	--	--	--	--
Percent passing 2000 micron sieve (#10)	--	--	--	--	--	--	--
Percent passing 850 micron sieve (#20)	--	--	--	--	--	--	--
Percent passing 425 micron sieve (#40)	--	--	--	--	--	--	--
Percent passing 250 micron sieve (#60)	--	--	--	--	--	--	--
Percent passing 150 micron sieve (#100)	--	--	--	--	--	--	--
Percent passing 106 micron sieve (#140)	--	--	--	--	--	--	--
Percent passing 75 micron sieve (#200)	--	--	--	--	--	--	--
Dioxin Furans (ng/kg)							
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.999 U	**3.71**	**3.49**	**1.25 J**	**0.331 J**	**0.479 J**	0.999 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**2.32**	**15.6**	**15.1**	**6.44**	**2.79**	**2.34**	**0.501 J**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**2.66**	**12.1**	**12.9**	**59.7**	**12.2**	**10.2**	**1.23**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**32.3**	**55.3**	**55.5**	**605**	**104**	**11.7**	**1.31**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**5.12**	**12**	**13.2**	**37.2**	**6.36**	**2.74**	0.999 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**201**	**491**	**494**	**12600**	**2480**	**291**	**48.2**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**1300**	**3630**	**3780**	**61300 J**	**18600**	**3070**	**682**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	**33.2**	**370**	**311**	**11.6**	**4.28**	**1.46**	0.999 U
Total Pentachlorodibenzo-p-dioxin (PeCDD)	**26.3**	**211**	**210**	**47.5**	**15.5**	**8.36**	0.999 U
Total Hexachlorodibenzo-p-dioxin (HxCDD)	**155**	**335**	**343**	**1290**	**284**	**55.7**	**9.16**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	**302**	**834**	**842**	**16800**	**3500**	**432**	**84.3**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**2.55**	**12.6 J**	**12.5**	**8.47 J**	**8.17 J**	**0.628 J**	0.999 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**1.67**	**9.14**	**8.81**	**7.6**	**1.33**	0.999 U	0.999 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**1.5**	**7.49**	**7.56**	**5.14**	0.999 U	0.999 U	0.999 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**3.43**	**10.8**	**10.7**	**141**	**27.1**	**2.67**	0.999 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**3.47**	**7.76**	**8.38**	**59**	**10.2**	**0.962 J**	0.999 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	**1.82**	**3.51 J**	**10.5**	**67.2**	**15.3**	**2.27 J**	0.999 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**5.38**	**5.47**	**10.8**	**128**	**22.6**	**1.95**	0.999 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**148**	**259**	**267**	**9570**	**1350**	**99**	**8.87**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**5.36**	**11.1**	**11.5**	**455**	**77.2**	**8.34**	0.999 U
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**178**	**426**	**435**	**19200**	**3010**	**320**	**29.9**
Total Tetrachlorodibenzofuran (TCDF)	**26.2**	**184**	**186**	**24.9**	**20.2**	**1.07**	0.999 U
Total Pentachlorodibenzofuran (PeCDF)	**34.4**	**122**	**122**	**257**	**78.2**	**4.19**	0.999 U
Total Hexachlorodibenzofuran (HxCDF)	**159**	**324**	**337**	**9780**	**1630**	**130**	**8.02**
Total Heptachlorodibenzofuran (HpCDF)	**431**	**843**	**866**	**40400**	**6090**	**527**	**43.1**
Total Dioxin/Furan (U = 0)	**1890**	**4970 J**	**5160**	**104000 J**	**25700 J**	**3820 J**	**772 J**
Total Dioxin/Furan (U = 1/2)	**1900**	**4970 J**	**5160**	**104000 J**	**25700 J**	**3830 J**	**777 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	**12.5**	**42.6 J**	**43.6**	**370 J**	**69.3 J**	**11.1 J**	**1.54 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	**13**	**42.6 J**	**43.6**	**370 J**	**69.5 J**	**11.3 J**	**2.51 J**

Table 1
Soil Data Summary - Port Gamble Mill Site Upland Pre-Design Investigation

Notes:
Bold: Detected result
ft: feet
J: estimated value
ng/kg: nanogram per kilogram
PDI: Pre-Design Investigation
TEQ: toxicity equivalent quotient
U: compound analyzed for, but not detected above detection limit
UJ: Compound analyzed for, but not detected above estimated detection limit

Table 2
Summary of Port Gamble Area 2B Upland Soil Sample Data

	Area 2B Perimeter Samples Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0); ng/kg									
Depth (ft)	**GP-14**	**PDI-035**	**PDI-036**	**PDI-037**	**PDI-039**	**PDI-040**	**PDI-041**	**PDI-061**	**PDI-062**	**PDI-063**
0 - 1	7	--	--	--	--	--	--	--	--	--
0 - 2	--	24	155	61	24	10	3	19	0.4	2.8
1 - 3	69	--	--	--	--	--	--	--	--	--
2 - 4	--	10	9	110	0.2	17	21	97	10	43
3 - 5	7	--	--	--	--	--	--	--	--	--
4 - 6	--	113 [2]	0.7	0.6	0.2	0.7	4 [2]	0.1	2	13
5 -7	0.3	81 [3]	--	--	--	--	--	--	--	--
6 - 8	--		0.5	6	13	16	2 [1]	26	44	43
7 - 9	--		--	--	--	--	--	--	--	--
8 - 10	--		38	2	19	28	23	89	25	370
9 - 11	18	--	--	--	--	--	--	--	--	--
10 - 12	--	113	5	7	0.9	5	13	9	22	70
11 - 13	--	--	--	--	--	--	--	--	--	--
12 - 14	--	12	2	5	0.04	0.05	2	9	17	11
13 - 15	1	--	--	--	--	--	--	--	--	--
14 - 15/16	--	10	4	0	0.03	0.01	0.03	19	3	1.5
16 - 18	--	--	--	--	--	--	--	--	--	--
18 - 20	--	--	--	--	--	--	--	--	--	--
20 - 22	--	--	--	--	--	--	--	--	--	--
22 - 24	--	--	--	--	--	--	--	--	--	--
24 - 25	--	--	--	--	--	--	--	--	--	--

	Area 2B Interior Samples Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0); ng/kg											
GP-10	**GP-12**	**GP-13**	**PDI-038**	**PDI-042**	**PDI-043**	**PDI-044**	**PDI-045**	**PDI-046**	**PDI-047**	**PDI-048**	**PDI-049**
530	23	5	--	--	--	--	--	--	--	--	--
--	--	--	33	12	15	2	9	4	1	138	1
1,850	3	0.8	--	--	--	--	--	--	--	--	--
--	--	--	150	8	0.3	2	0.8	1	0.1	0.05	4
1,800	10	0.3	--	--	--	--	--	--	--	--	--
--	--	--	**824**	0.5	194 [2]	7	4	0.5	0.5	8	472
2,900	14	0.7	--	--	--	--	--	--	--	--	--
--	--	--	43	3	288 [3]	**1,240**	11	5	2	16	**657**
810	0.8	--	--	--		--	--	--	--	--	--
--	--	--	73	462		**12,500**	3	1	147	9	109
22	**6,530**	7	--	--		--	--	--	--	--	--
--	--	--	216 [4]	0.9	**1,130**	**1,200**	27	4	58	**569**	82
--	**750**	86		--	--	--	--	--	--	--	--
--	--	--		0.02	54	3	**1,030**	63	75	**703**	21
0.4	1	101		--	--	--	--	--	--	--	--
--	--	--	--	0.02	1	0.2	**936**	**934**	83	23	28
--	--	--	--	--	--	--	--	--	81	--	--
--	--	--	--	--	--	--	--	--	0.1	--	--
--	--	--	--	--	--	--	--	--	0.01	--	--
--	--	--	--	--	--	--	--	--	0.003	--	--
--	--	--	--	--	--	--	--	--	0.001	--	--

Notes:

1. Interval was 5 to 8 ft.

2. Interval was 4 to 5 ft.

3. Interval was 5 to 10 ft.

4. Interval was 10 to 15 ft.

ft: feet

ng/kg: nanogram per kilogram

TEQ: toxicity equivalent quotient

Red: Sample exceeds the 530 ng/kg TEQ dioxin/furan soil remediation level that defines excavation requirements.

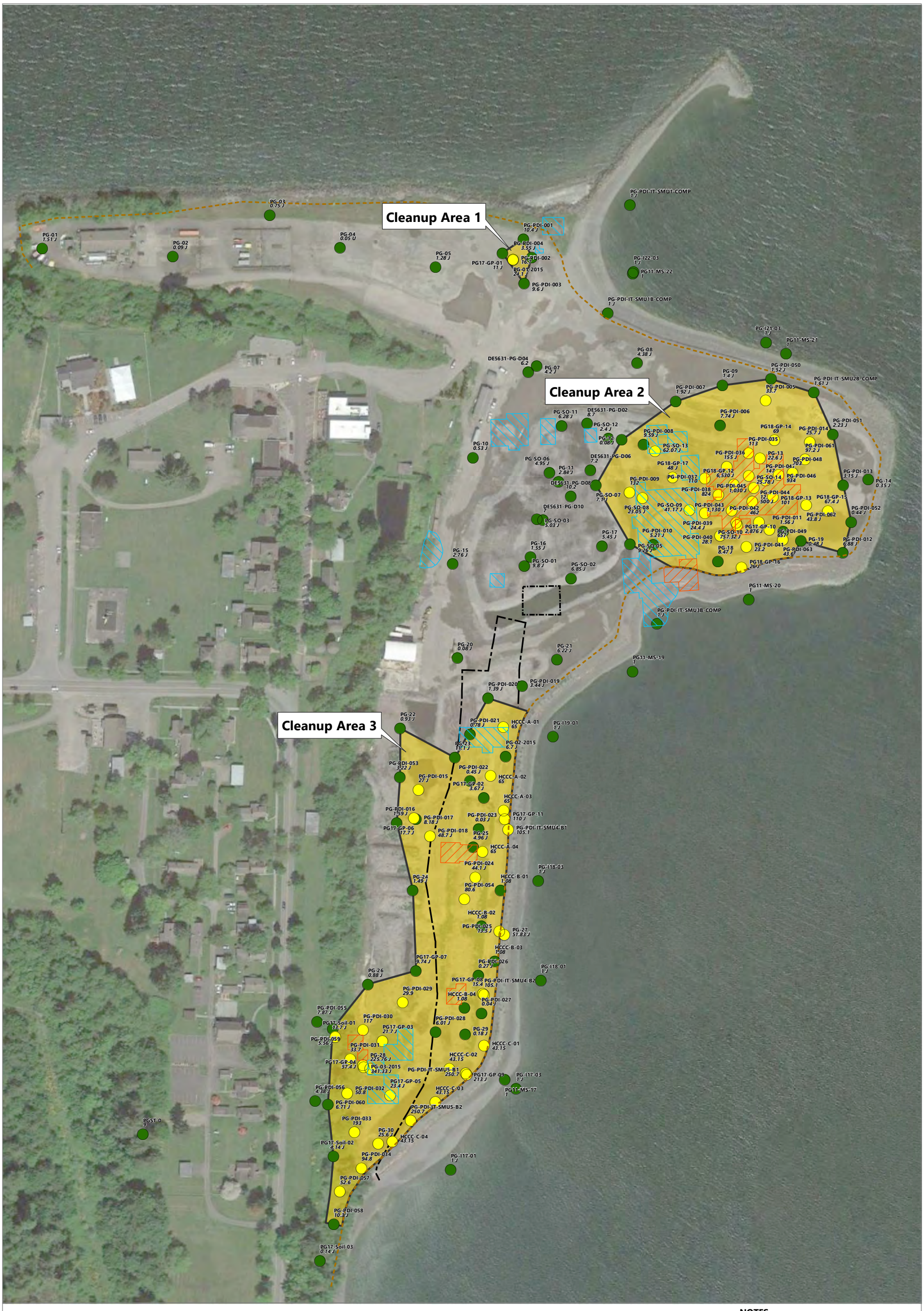
Table 3
2022 Port Gamble Mill Site Groudwater Data (Validated)

Chemical	Port Gamble Mill Site Groundwater Cleanup Level	Method	Task Location ID Sample ID Sample Date Sample Type Matrix X Y	2022MillGroundwater MW-01 PG-MW-01-2022-06-30 6/30/2022 N WG 1211604.125 317044.6866	2022MillGroundwater MW-01 PG-MW-101-2022-06-30 6/30/2022 FD WG 1211604.125 317044.6866	2022MillGroundwater MW-01 PG-MW-01-20220921 9/21/2022 N WG 1211604.125 317044.6866	2022MillGroundwater MW-01 PG-MW-101-20220921 9/21/2022 FD WG 1211604.125 317044.6866	2022MillGroundwater MW-02 PG-MW-02-2022-06-30 6/30/2022 N WG 1211750.448 316928.068	2022MillGroundwater MW-02 PG-MW-02-20220921 9/21/2022 N WG 1211750.448 316928.068	2022MillGroundwater MW-03 PG-MW-03-2022-06-30 6/30/2022 N WG 1211625.028 316770.7432	2022MillGroundwater MW-03 PG-MW-03-20220921 9/21/2022 N WG 1211625.028 316770.7432
Conventional Parameters (mg/L)											
Total Suspended Solids		SM2540D		**1**	**1**	1 U	1 U	**3**	**3**	**2**	**2**
Dioxin Furans (pg/L)											
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)		E1613B		10 U	10 U	9.6 U	9.6 U	10 U	9.6 U	10 U	**1.4 J**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)		E1613B		10 U	10 U	9.6 U	9.6 U	10 U	**1.0 J**	10 U	9.6 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)		E1613B		10 U	10 U	9.6 U	9.6 U	10 U	9.6 U	10 U	9.6 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)		E1613B		10 U	10 U	9.6 U	9.6 U	10 U	9.6 U	10 U	9.6 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)		E1613B		10 U	10 U	9.6 U	9.6 U	10 U	9.6 U	10 U	9.6 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)		E1613B		10 U	10 U	**1.9 J**	9.6 U	10 U	**2.7 J**	10 U	**2.5 J**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)		E1613B		50 U	50 U	41 U	21 U	50 U	38 U	13 U	15 U
2,3,7,8-Tetrachlorodibenzofuran (TCDF)		E1613B		10 U	10 U	9.6 U	9.6 U	10 U	9.6 U	10 U	9.6 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)		E1613B		10 U	10 U	9.6 U	1.5 U	10 U	9.6 U	10 U	9.6 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)		E1613B		10 U	10 U	9.6 U	9.6 U	10 U	9.6 U	10 U	9.6 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)		E1613B		10 U	10 U	0.9 U	9.6 U	10 U	9.6 U	10 U	9.6 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)		E1613B		10 U	10 U	9.6 U	9.6 U	10 U	9.6 U	10 U	9.6 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)		E1613B		10 U	10 U	**1.5 J**	9.6 U	10 U	9.6 U	10 U	9.6 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)		E1613B		10 U	10 U	1.3 U	9.6 U	10 U	0.8 U	10 U	9.6 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)		E1613B		20 U	20 U	1.5 UJ	1.9 U	20 U	2.8 UJ	20 U	1.1 UJ
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)		E1613B		10 U	10 U	**1.4 J**	9.6 U	10 U	9.6 U	10 U	9.6 U
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)		E1613B		20 U	20 U	19 U	19 U	20 U	1.9 U	20 U	19 U
Total Tetrachlorodibenzo-p-dioxin (TCDD)		E1613B		10 U	10 U	9.6 U	9.6 U	10 U	9.6 U	10 U	9.6 U
Total Pentachlorodibenzo-p-dioxin (PeCDD)		E1613B		10 U	10 U	9.6 U	9.6 U	10 U	9.6 U	10 U	9.6 U
Total Hexachlorodibenzo-p-dioxin (HxCDD)		E1613B		10 U	10 U	9.6 U	9.6 U	10 U	9.6 U	10 U	9.6 U
Total Heptachlorodibenzo-p-dioxin (HpCDD)		E1613B		10 U	10 U	**2.2 J**	9.6 U	10 U	**3.0 J**	10 U	9.6 U
Total Tetrachlorodibenzofuran (TCDF)		E1613B		10 U	10 U	9.6 U	9.6 U	10 U	9.6 U	10 U	9.6 U
Total Pentachlorodibenzofuran (PeCDF)		E1613B		10 U	10 U	9.6 U	9.6 U	10 U	9.6 U	10 U	9.6 U
Total Hexachlorodibenzofuran (HxCDF)		E1613B		10 U	10 U	9.6 U	9.6 U	10 U	9.6 U	10 U	9.6 U
Total Heptachlorodibenzofuran (HpCDF)		E1613B		10 U	10 U	**1.4 J**	9.6 U	10 U	**2.8 J**	10 U	9.6 U
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	4.4	E1613B		10 U	10 U	**0.2 J**	9.6 U	10 U	**1.0 J**	10 U	**1.4 J**

Notes:
Bold: Detected result
J: Estimated value
U: Compound analyzed for, but not detected above detection limit
UJ: Compound analyzed for, but not detected above estimated detection limit

FD: field duplicate sample
mg/L: milligrams per liter
N: normal environmental sample
pg/L: picograms per liter
TEQ: Toxic Equivalents Quotient
Totals are calculated as the sum of all detected results (U=0). If all results are not detected, the highest limit value is reported as the sum.
EPA Stage 2B and 4 data validation was completed by Laboratory Data Consultants (LDC).
WG: Groundwater matrix

Figure



Publish Date: 2022/02/10, 4:28 PM | User: cgardner
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ANCHOR QEA

Figure 1
Final Cleanup Areas
Pre-Design Investigation Data Report
Upland Area of the Port Gamble Bay and Mill Site

Appendix B
Cultural Resource Investigation Reports

DRAFT

1201 3rd Avenue, Suite 2600
Seattle, Washington 98101
206.287.9130

ANCHOR QEA

Memorandum

April 24, 2019

To: Linda Berry-Maraist, Pope Resources, LP/OPG Properties LLC

From: Barbara Bundy, Anchor QEA

cc: Clay Patmont, Anchor QEA

Re: Cultural Resources Survey Report Addendum
Port Gamble Upland Mill Site Cleanup Action

The Port Gamble Upland Mill Site Cleanup Action (the Project) is proposed within a portion of the Port Gamble Bay and Mill Site, located in Port Gamble, Washington (Figure 1). The Project requires review under the State Environmental Policy Act (SEPA), led by the Washington State Department of Ecology (Ecology). SEPA requires consideration of historic and cultural preservation.

Four cultural resources documents were developed for the Mill Site and Port Gamble Bay prior to cleanup operations that occurred in 2015 to 2017: A *Cultural Resources Overview* (Sharley et al. 2010); a *Cultural Resources Assessment Plan* (Ecology 2013); a *Cultural Resources Study Plan* (SWCA and Anchor QEA 2014); and a *Cultural Resources Survey Report* (Bundy 2014). Together these documents provided a detailed assessment of cultural resources potential, described an approach to identifying potential impacts through historical research and fieldwork, and reported results. The 2015 to 2017 cleanup project had no impacts to cultural resources. In addition to work related to the cleanup project, other documents have been developed that include analysis of the Mill Site, including *Technical Report of Archaeological Field Investigations to Support the Port Gamble Redevelopment Plan SEPA EIS, Kitsap County, Washington* (Rinck et al. 2018) and *Analysis of Sonicore Samples from the Point Totten Shell Midden (45KP252), Port Gamble, Kitsap County, Washington* (Rinck 2016).

The current Project was not yet designed when the 2015 to 2017 cleanup occurred, so the Project work was not included in the above-listed documentation, though it is within the area studied. This addendum adds the current Project work to the *Cultural Resources Survey Report*. The cleanup actions included in the selected remedy will occur in locations and at elevations (i.e., recent fill) that are not expected to coincide with the presence of cultural resources.

Project Description

The Project includes a cleanup action for a portion of the Port Gamble Bay and Mill Site, located in Port Gamble, Washington (Sections 5 and 8 of Township 27 North, Range 2 East, Willamette Meridian). The Project will take place at the former upland sawmill area (the "Mill Site"), owned by Pope Resources/OPG Properties (PR/OPG). Cleanup activities (Figure 2) will include the following:

- Excavation and disposal at approved off-site landfills approximately 7,500 to 10,500 tons of soils in the northeast portion of the Mill Site that have dioxin/furan concentrations exceeding remediation levels for wildlife, groundwater, surface water, and sediment protection. Excavation will occur up to 15 feet below ground surface.
- Capping of approximately 6 acres in four areas of the Mill Site with dioxin/furan soil concentrations below remediation levels, but exceeding MTCA unrestricted use soil cleanup levels, including lower-concentration excavated and treated soils from the northeast portion of the Mill Site (e.g., amended with activated carbon or other treatment agents to further sequester dioxins/furans as practicable). Excavation will occur up to 3 feet below ground surface.
- Recording of restrictive covenants to preclude use of the shallow aquifer throughout the Mill Site for future drinking water supply and to ensure that soil caps in the Mill Site maintain their protectiveness.

No structures will be modified or demolished as part of the Project. Although the Project is within the external boundaries of Port Gamble National Historic Landmark, the Mill Site is not a contributing feature to the landmark. The Project will occur within view of contributing historic structures but will not result in any changes to the landscape as compared to its current condition; therefore, potential effects to historic and cultural preservation are limited to areas where ground disturbance could affect archaeological materials.

Environmental and Cultural Context

The environmental and cultural context of Port Gamble Bay has been extensively documented in the last 10 years, primarily for projects within and adjacent to the Project area. Relevant reports include the following:

- *Cultural Resources Overview for the Port Gamble Bay Cleanup and Restoration Project, Kitsap County, Washington* (Sharley et al. 2010)
- *Port Gamble Bay Cultural Resources Assessment Plan* (Ecology 2013)
- *Cultural Resources Survey Plan, Port Gamble Bay Cleanup* (SWCA and Anchor QEA 2014)
- *Cultural Resources Survey Report, Port Gamble Bay Cleanup* (Bundy 2014)
- *Technical Report of Archaeological Field Investigations to Support the Port Gamble Redevelopment Plan SEPA EIS, Kitsap County, Washington* (Rinck et al. 2018)
- *Port Gamble Redevelopment Project: Archaeological Resources Discipline Report, Kitsap County SEPA EIS* (Piper et al. 2014)

Information from these reports that is relevant to the Project is briefly summarized here. A review of environmental conditions and cultural history provides a basis for determining expected locations and types of archaeological sites.

The Project is located in an upland shoreline area adjacent to Port Gamble Bay. The Bay is a shallow embayment in the central Puget Sound area, at the northern end of the Kitsap peninsula, near Hood Canal. During the last glacial advance, glaciers covered the Project area. Glaciers began to recede about 15,000 years ago, causing sea level to rise. Sea level during the late Pleistocene and early Holocene varied from 30 to 40 meters above modern sea level around 12,000 years ago, to 60 meters below it at the end of the era of rapid isostatic rebound (Piper et al. 2014). Sea level reached its modern level during the mid to late Holocene; therefore, Holocene shorelines available for settlement would generally be at or below modern levels. Prior to historical and modern changes to the landscape, small and large mammals would have been present in the area, as well as various bird species and culturally important plants, such as wapato, nettles, reeds, and cranberries (Weinmann et al. 1984). Port Gamble Bay hosted salmon, rockfish, sole, herring, sand lance, and other fish, as well as invertebrates (oysters, clams, and geoduck) and crustaceans (crab and shrimp; Sharley et al. 2010).

Archaeological sites in the Central Puget Sound region range from late Pleistocene to historic in age. Table 1 briefly summarizes the archaeological context. Generally, there is a long-term trend through the Holocene towards increasing population density, greater variety and complexity of artifacts, increasing exploitation of coastal resources, and greater sedentism.

Table 1
Central Puget Sound Archaeological Phases

Phase	Date Range	Notable Cultural Features and Sites
Paleoindian, Clovis	Late Pleistocene, circa 13,000 to 10,000 years ago	Scarce (and usually undated) sites include the Manis Mastodon site near Sequim. Focus on upland big game hunting.
Olcott	9,000 to 5,000 years ago	Scarce (and usually undated) sites, usually found in upland context, generally on stream terraces. Characterized by leaf-shaped projectile points and cobble tools. Focus remains on upland big game hunting.
Mid-Holocene Phases	5,000 to 3,000 years ago	Numerous sites in the region—and major expansion of artifact types and classes—corresponds to increasing population and diversifying subsistence base. Evidence of significant exploitation of maritime and littoral resources.
Late Holocene Phases	3,000 to about 200 years ago	Archaeological correlates of ethnographically reported cultures. Large, semi-sedentary villages located at river mouths and confluences and on protected shorelines. Increasingly complex and specialized artifact toolkits. Long-term food storage.
Proto-Historic and Historic	A.D. 1792 to A.D. 1969[a]	Villages and towns, homesteads, lumber mills, canneries, refuse scatters and dumps, irrigation infrastructure, shipwrecks and abandoned vessels, utilities infrastructure, etc.

Note:

a. Resources must be 50 years old to be considered under SEPA.

At the time of Euroamerican contact, Port Gamble Bay and the surrounding area was home to Southern Coast Salish peoples, who spoke dialects of the Twana and Lushootseed languages (Twana and Klallam communities, respectively). Southern Coast Salish place names have been recorded in the Project vicinity, including for the village of Little Boston at Point Julia.

As Euroamerican presence in the area grew in the mid-1800s, tribes were pressured to sign treaties. The Point No Point Treaty, which assigned the S'Klallam, the Chemakum, and the Skokomish peoples (among others) to their respective reservations, was signed in January 1855 (Ruby and Brown 1986). The village of Little Boston at Point Julia was owned by the Mill and settled largely by Mill workers of S'Klallam and Chemakum descent (Sharley et al. 2010). Little Boston residents were relocated by government agencies to a new village on the bluff overlooking Point Julia after the establishment of the Port Gamble Indian Reservation in 1934 (Sharley et al. 2010). Today, Southern Coast Salish people with ties to the Port Gamble area are members of the Port Gamble S'Klallam, Skokomish, Lower Elwha Klallam, Jamestown S'Klallam, and Suquamish tribes.

The earliest documented Euroamerican contact with Port Gamble Bay communities was Captain George Vancouver's 1792 mapping expedition. More regular contact began in the 1820s, when the establishment of Fort Nisqually brought fur traders to the region (Sharley et al. 2010). The Pope & Talbot Lumber Mill (Mill) was constructed at Teekalet (Port Gamble) between July and September of 1853, and operated "almost without pause" until 1995 (Eakins 1997). During this 142-year period, a wide variety of structures were built, torn down, rebuilt, replaced, and otherwise altered. The Mill also expanded its footprint into the intertidal and subtidal waters of Port Gamble Bay, through deposition of fill and riprap. The current eastern extent of the Port Gamble shoreline is approximately 250 feet east (waterward) of its pre-Mill location (Sharley et al. 2010).

Most Mill buildings were removed after the Mill closed in 1995. From 1999 through 2001, PR/OPG completed multiple soil and groundwater investigations at the Mill Site. These investigations informed a 2002 interim remedial action that included excavation of 20,460 tons of soil impacted by mercury from ten upland areas, and a subsequent 2004 to 2005 removal of an additional 5,850 tons of soil from two upland areas (Figures 3 and 4). Some soils that had mercury concentrations lower than cleanup levels were reused as deep backfill. A shoreline and in-water cleanup in 2015 to 2017 included removal of derelict docks, piles, and other structures, as well as dredging and capping in the bay and limited excavation in the intertidal zone.

Several archaeological sites are recorded in the Project vicinity, primarily documented during surveys for the reports listed above. Archaeological site 45KP252 is adjacent to the Project. [redacted] The site boundaries were initially established using results from sonicoring and mechanical excavation of test pits. In 2016, additional sonicores further delineated the northern boundary of the site (Rinck 2016) [redacted]

[redacted]t. The site would be a cultural resource as defined by SEPA.

Archaeological sites 45KP274 and 45KP256 are also [redacted]Site 45KP256, the Port Gamble Workers Housing Debris scatter is a deposit of historic debris present [redacted] It has been recommended NRHP-eligible. The site will not be affected by the Project. Site 45KP274 was a collection of in-water features, primarily pilings and concrete, along the Mill Site shoreline. It was determined not-eligible for the NRHP in 2015 and would not be considered a historic or cultural resource under SEPA. The site was removed in the 2015 to 2017 in-water cleanup.

Evaluation Methods

SEPA review requires consideration of historic and cultural preservation (Washington Administrative Code 197-11-060). The SEPA process considers likely impacts, including short- and long-term direct and indirect impacts. This review determines whether impacts are likely by evaluating the potential for NRHP- or WHR-eligible archaeological resources to be present in the Project area.

Archaeological potential is evaluated by determining the likely location of sediments that may contain precontact or historic archaeological materials, and comparing to project plans to assess whether ground disturbance will occur within those sediments.

Precontact archaeological materials could be present on the Mill site in the following contexts:

- [redacted]
-
-

It is also possible that [redacted]

[redacted]

Results and Recommendations

The Project includes ground disturbance in the capping area of up to 2 feet below the current ground surface and in the excavation area of up to 15 feet below the current ground surface. Two maps are key to understanding the location of potential archaeological materials as related to project elements.

The first shows planned Project work in relation to the location of site 45KP252 (Figure 5) and the second shows 2002 and 2004 to 2005 cleanup activities and planned work for the Project (Figure 6).

The excavation is intended to remove material from the earlier cleanup operations that was inadvertently deposited as deep fill. [redacted] Based on this landform history, the excavation is expected to encounter primarily recent fill, possibly with underlying marine deposits.

Two geoprobes logged in 2017 within the excavation area are consistent with this expectation (Appendix A). The two logs show thick deposits of fairly homogenous sand, over more mixed deposits with brick and wood fragments, atop sand and gravel with trace shell. To the north, GP-12 had a thick deposit of homogeneous sand, ending at about 11 feet below the surface. Beneath it was a layer dominated by wood chips and fragments to about 13 feet below the surface, underlain by a fine to medium sand with shell fragments to 15 feet below surface. To the south, GP-10 revealed homogeneous sand to about 7.4 feet below the surface, underlain by a layer including brick fragments and organics to about 9 feet below the surface. Beneath that layer was wet sand and gravel to 15 feet below surface. Although some historic-age anthropogenic materials (brick and wood chips) were observed, descriptions of the previous cleanup operations indicate that these are likely redeposited from those activities. Even if any diagnostic historic artifacts were to be encountered, they would be out of context and unlikely to be NRHP- or WHR-eligible.

[redacted] are in areas built on fill as the Mill expanded. Monitoring for the intertidal excavation in areas 3 and 4 revealed chronologically and functionally mixed debris lacking integrity (Bundy 2017). It is unlikely that the limited excavation for the capping activity will encounter any sediments other than fill containing this sort of debris.

Therefore, ground disturbance for the Project is unlikely to disturb historic or cultural resources as defined by SEPA. No further investigation or monitoring is recommended. An Inadvertent Discovery Plan will be in place during construction in the event that archaeological materials are encountered.

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Figures

DRAFT

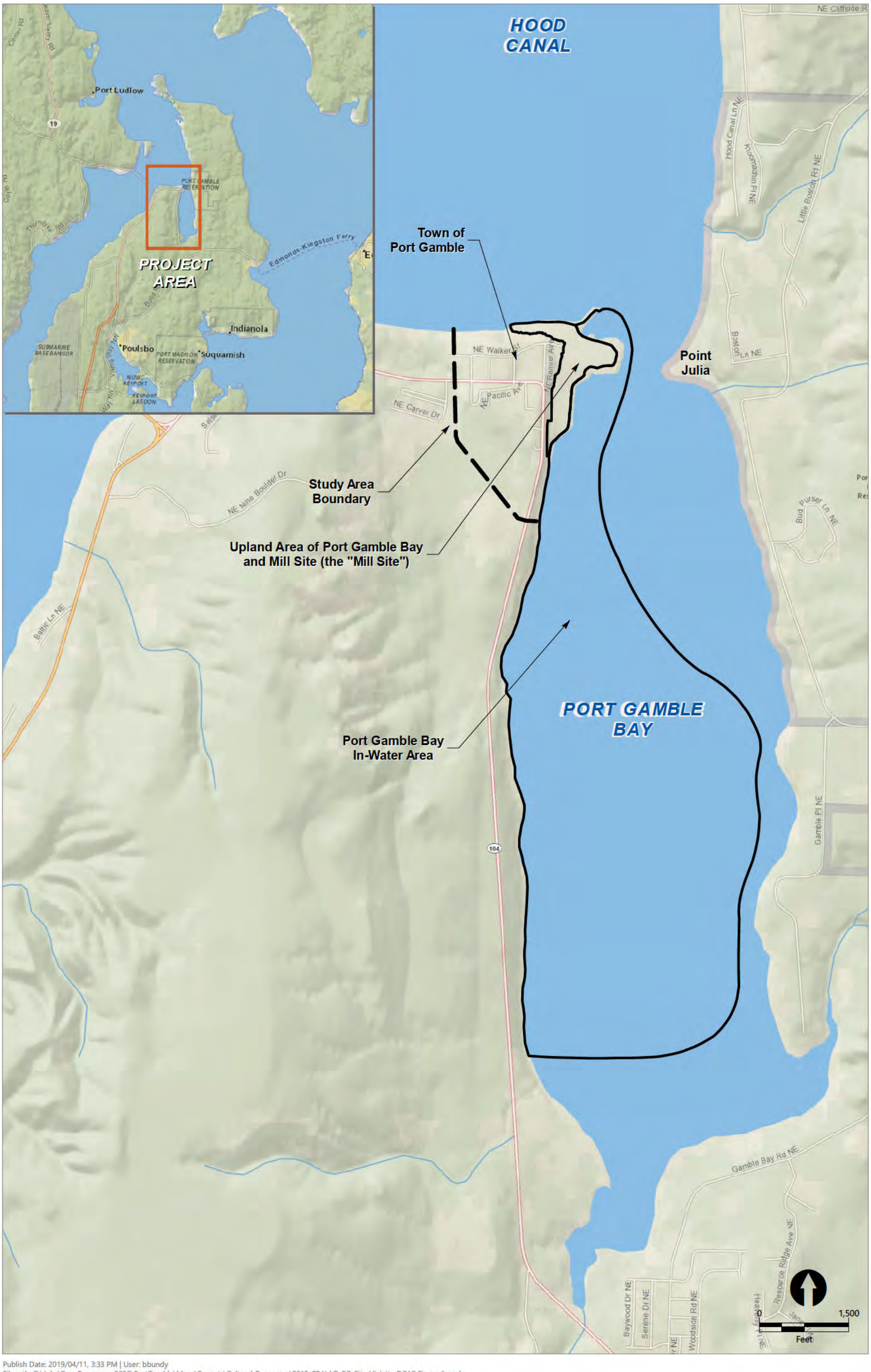

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Figure 1
Site Vicinity Map
Cultural Resources Survey Report Addendum
Upland Area of the Port Gamble Bay and Mill Site

DRAFT

LEGEND:

- Capping
- Excavation
- 2A Area IDs
- Approximate Recent Top of Bank
- Upland Area of Port Gamble Bay and Mill Site (the Site)
- Study Area Boundary

0 300
Feet

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Figure 2
Mill Site Selected Cleanup Remedy
Cultural Resources Survey Report Addendum
Upland Area of the Port Gamble Bay and Mill Site

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Figure 3
2002 Interim Remedial Action Removal Areas
Cultural Resources Survey Report Addendum
Upland Area of the Port Gamble Bay and Mill Site

DRAFT

LEGEND:

2004/2005 Interim Remedial Action Removal Area

- Arsenic and TPH
- Mercury

0 200
Feet

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Figure 4
2004/2005 Interim Remedial Action Removal Areas
Cultural Resources Survey Report Addendum
Upland Area of the Port Gamble Bay and Mill Site

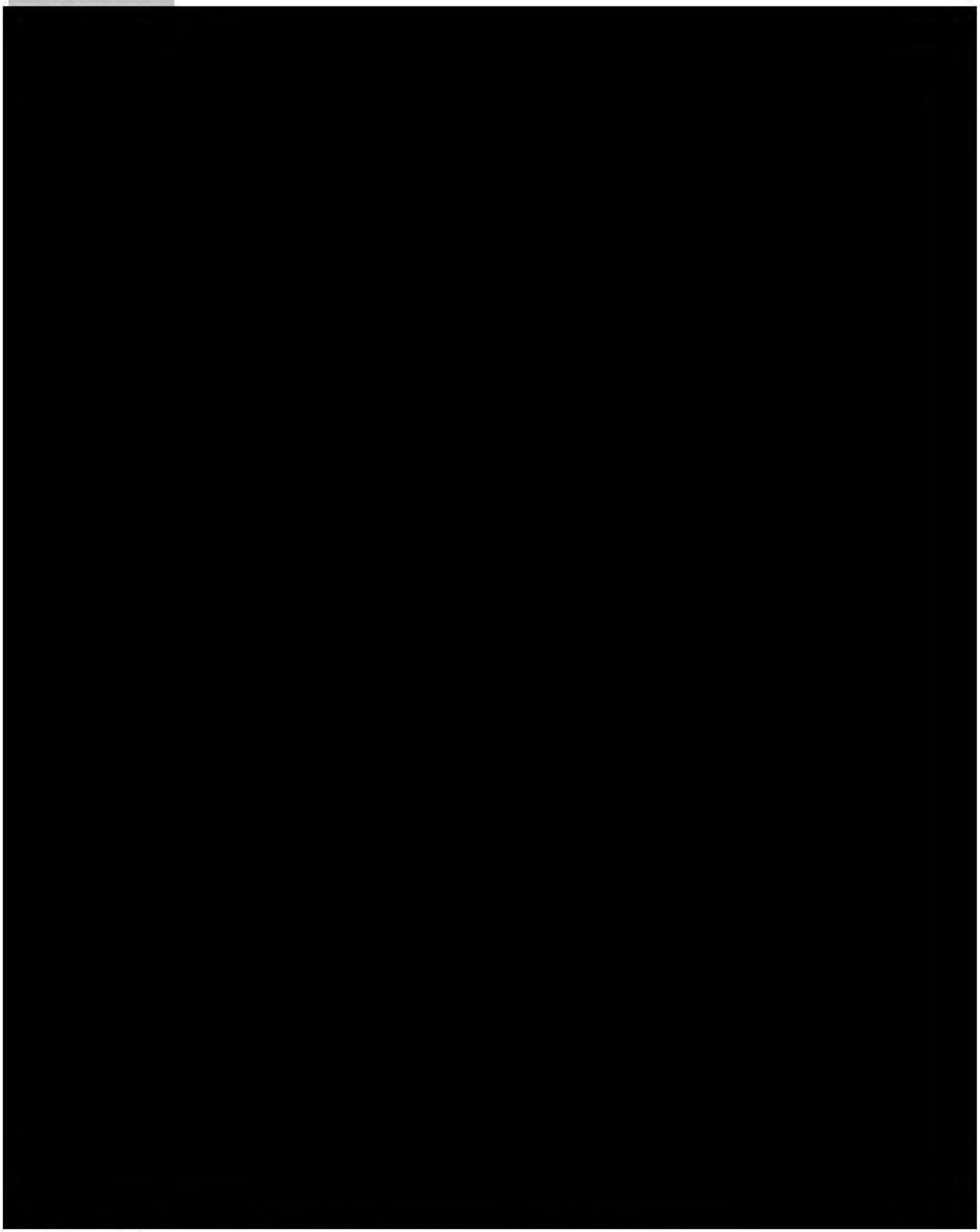

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Figure 5
Site 45KP252 and Selected Cleanup Remedy
Cultural Resources Survey Report Addendum
Upland Area of the Port Gamble Bay and Mill Site

DRAFT

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Figure 6
Proposed and Historical Disturbances
Cultural Resources Survey Report Addendum
Upland Area of the Port Gamble Bay and Mill Site

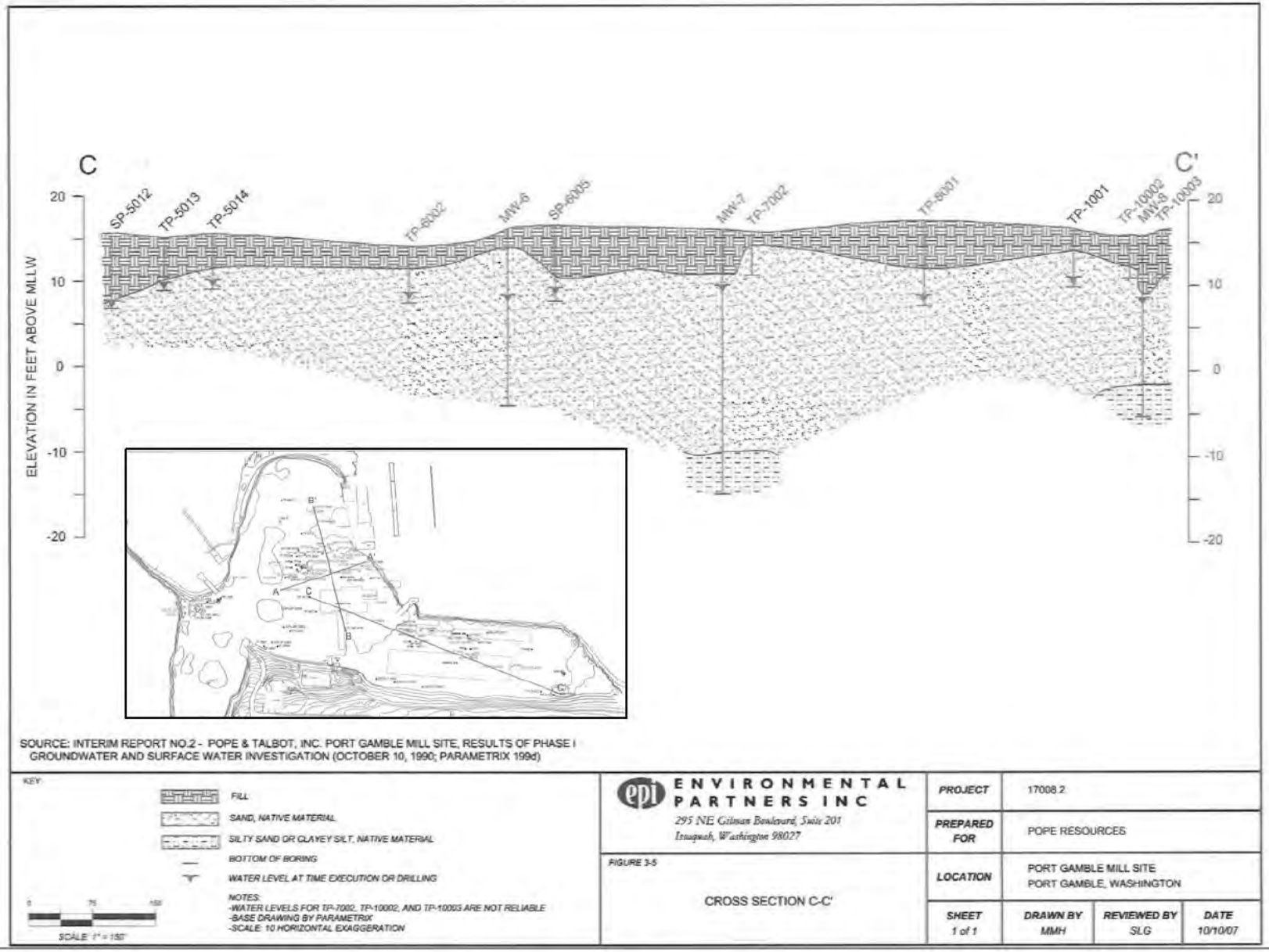

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Figure 7
2007 Mill Site Profile
Cultural Resources Survey Report Addendum
Upland Area of the Port Gamble Bay and Mill Site

Appendix A:
Selected Subsurface Testing Data

DRAFT

PG17-GP-01	
0 - 1 ft	6.9 J
1 - 3 ft	11 J
3 - 5 ft	0.12 U

PG17-GP-02	
0 - 1 ft	0.025 J
1 - 3 ft	0.12 J
3 - 5 ft	3.7 J
5 - 7 ft	0.06 J
9 - 11 ft	0.04 J
13 - 15 ft	0.38 J

PG17-Soil-07
0 - 1 ft
3.2 J

PG17-GP-06	
0 - 1 ft	18 J
1 - 3 ft	1.6 J
3 - 5 ft	0.53 J

PG17-GP-07	
0 - 1 ft	9.7 J
1 - 3 ft	0.03 J
1 - 3 ft	0.77 J (dup)
3 - 5 ft	0.59 J

PG17-GP-03	
0 - 1 ft	4.7 J
1 - 3 ft	22 J
3 - 5 ft	4.2 J

PG17-Soil-06
0 - 1 ft
3.0 J

PG17-Soil-05
0 - 1 ft
12 J

PG17-Soil-01
0 - 1 ft
14 J

PG17-Soil-04
0 - 1 ft
8.0 J
5.6 J (dup)

PG17-GP-04	
0 - 1 ft	57 J
1 - 3 ft	10 J
3 - 5 ft	0.57 J
5 - 7 ft	0.58 J
9 - 11 ft	0.07 J
13 - 15 ft	0.01 J

PG17-Soil-03
0 - 1 ft
0.14 J

PG17-Soil-02
0 - 1 ft
4.1 J

PG18-GP-13	
0 - 1 ft	5.4 J
1 - 3 ft	0.81 J
3 - 5 ft	0.3 J
5 - 7 ft	0.67 J
9 – 11 ft	7.3 J
11 – 13 ft	85.7
13 - 15 ft	101

PG18-GP-14	
0 - 1 ft	6.8 J
1 - 3 ft	69
3 - 5 ft	6.7 J
5 - 7 ft	0.26 J
9 - 11 ft	18 J
13 - 15 ft	1.2 J

PG18-GP-15	
0 - 1 ft	1.5
1 - 3 ft	11 J
3 - 5 ft	67 J
3 - 5 ft	67 J (dup)
5 - 7 ft	1.6 J
9 - 11 ft	51 J
13 - 15 ft	1.2 J

PG18-GP-12	
0 - 1 ft	23 J
1 - 3 ft	2.7 J
3 - 5 ft	9.6 J
5 - 7 ft	9.3 J
5 - 7 ft	14 J (dup)
7 – 9 ft	0.82 J
9 - 11 ft	6,530 J
11 - 13 ft	750 J
13 - 15 ft	1.28 J

PG18-GP-17	
0 - 1 ft	48 J
1 - 3 ft	12
3 - 5 ft	18 J
5 - 7 ft	7.0 J
9 - 11 ft	9.3 J
13 - 15 ft	0.09 J

PG18-GP-16	
0 - 1 ft	7.4 J
1 - 3 ft	20 J
3 - 5 ft	14 J
5 - 7 ft	9.8 J
9 - 11 ft	26 J
13 - 15 ft	0.18 J

PG17-GP-10	
0 - 1 ft	530 J
1 - 3 ft	1,850 J
3 - 5 ft	1,800 J
5 - 7 ft	2,900 J
7 -9 ft	810 J
9 - 11 ft	22 J
13 - 15 ft	0.4 J

PG17-GP-11	
0 - 1 ft	33 J
1 - 3 ft	110 J
3 - 5 ft	6.1 J
3 - 5 ft	9.1 J (dup)
5 - 7 ft	1.3 J
9 - 11 ft	0.94 J
13 - 15 ft	0.039 J

PG17-GP-08	
0 - 1 ft	15
1 - 3 ft	1.3 J
3 - 5 ft	0.72 J
5 - 7 ft	1.3 J
9 - 11 ft	0.07 J
13 - 15 ft	0.04 J

PG17-GP-09	
0 - 1 ft	2.0 J
1 - 3 ft	210 J
3 - 5 ft	23 J
5 - 7 ft	26 J
9 - 11 ft	22 J
13 - 15 ft	0.04 J

PG17-GP-05	
0 - 1 ft	19 J
1 - 3 ft	4.7 J
3 - 5 ft	21 J
3 - 5 ft	23 J (dup)
5 - 7 ft	16 J
9 - 11 ft	0.62 J
13 - 15 ft	0.16 J

LEGEND:

- 2017 Surface Soil Sampling Station
- 2017 Post-Stockpile Sampling Location
- Existing Surface Soil Sample Location
- 18J Detected concentration is greater than MTCA Method B unrestricted land use soil screening criterion

Total Dioxin/Furan TEQ 2005 (ng/kg)

- < 12
- 12 - 45
- 45 - 260
- > 260

- Approximate Recent Top of Bank
- Study Area Boundary

Remedial Excavation Area

- Mercury
- Other

NOTES:

1. Total Dioxin/Furan TEQ reported in ng/kg. Surface-Weighted Average Concentration (SWAC) in the upland area shown is 31.3 ng/kg.
2. Data was log-normalized and interpolated using the inverse distance weighting technique taking the maximum value at all locations.
3. Results flagged with "J" indicate the compound was positively identified and the associated value is an estimated concentration.

0 350
Feet

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Figure 2
Dioxin/Furan TEQ Concentrations in Soil
Draft Cleanup Action Plan
Upland Area of the Port Gamble Bay and Mill Site

Soil Boring Log
GP-10

Sheet 1 of 1

Project: **Port Gamble Supplemental RI**	Location: **Port Gamble, WA**	Method: **Geoprobe**
Project #: **170388-01.01**	N/LAT: **316831.647** E/LONG: **1211560.137**	Total Depth (ft): **15.0**
Client: **Pope Resources LP / OPG Properties LLC**	Horiz. Datum: **NAD 83 State Plane WA North US feet**	Observed Groundwater (ft BGW): **10.0**
Collection Date: **12/5/2017**	Logged By: **Evan Malczyk**	Contractor: **Holocene**
Drilling Equipment: **Geoprobe 7822 DT**	Borehole Diameter: **2.25 inch OD**	Liner Diameter: **1.5 inch**

In-situ Depth (feet)	Recovery (feet / %)	Sediment Description	Lithologic Symbol	Sample ID and Analysis
		Samples and descriptions are corrected for length based on recovery. Cores are assumed to have uniform compaction through each 5-ft segment.		
0		0 - 1.0 feet: WELL GRADED GRAVEL WITH SAND (GW), dry, loose, gray, 80% fine to coarse gravel, 20% medium sand. Gravel is subangular.		PG17-GP-10-00-01-20171205 PCDD/PCDF, TS
	3.0 / 60%	1.0 - 7.6 feet: POORLY GRADED SAND WITH GRAVEL (SP), dry, medium dense, gray/brown, 80% medium sand, 20% fine to coarse gravel, trace fines. Gravel is either subangular or subrounded.		PG17-GP-10-01-03-20171205 PCDD/PCDF, TS
				PG17-GP-10-03-05-20171205 PCDD/PCDF, TS
5				PG17-GP-10-05-07-20171205 PCDD/PCDF, TS
	3.4 / 68%	@6.5 feet: 1 inch layer of dark reddish brown wood fragments (bark-like). @7.4 feet: 1 inch layer of anthropogenics (reddish brick-like fragments).		
		7.6 - 8.1 feet: ELASTIC SILT (MH), moist, medium stiff to stiff, gray, 100% fines. Fines have low to medium plasticity.		PG17-GP-10-07-09-20171205 Archive
		8.1 - 9.0 feet: SILT (ML), moist, medium stiff, dark brown, 80% fines, 20% medium sand. Occasional organics (small fibers and fragments).		
10		@9.0 feet: 1 inch layer of wood fragments diameter of core tube. 9.1 - 15.0 feet: POORLY GRADED SAND (SP), moist, loose, gray, 90% medium to coarse sand, 10% fine to coarse gravel, trace fines. Gravel is subrounded. @10.0 feet: moisture content grades to wet. @10.8 feet: grades to 90% medium to coarse sand, 10% fine to coarse gravel.		PG17-GP-10-09-11-20171205 PCDD/PCDF, TS
	5.0 / 100%			PG17-GP-10-11-13-20171205 Archive
				PG17-GP-10-13-15-20171205 PCDD/PCDF, TS
15		End of Boring @15 feet.		

ANCHOR QEA
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Seattle, WA 98101
206-287-9130

Notes: PCDD/PCDF = polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans
TS = total solids

Soil Boring Log
GP-12

Sheet 1 of 1

Project: **Port Gamble Supplemental RI**	Location: **Port Gamble, WA**	Method: **Geoprobe**
Project #: **170388-01.01**	N/LAT: **316915.68** E/LONG: **1211553.42**	Total Depth (ft): **15.0**
Client: **Pope Resources LP / OPG Properties LLC**	Horiz. Datum: **NAD 83 State Plane WA North US feet**	Observed Groundwater (ft BGW): **10.0**
Collection Date: **3/5/2018**	Logged By: **Evan Malczyk**	Contractor: **Holocene**
Drilling Equipment: **Geoprobe 7822 DT**	Borehole Diameter: **2.25 inch OD**	Liner Diameter: **1.5 inch**

In-situ Depth (feet)	Recovery (feet / %)	Sediment Description Samples and descriptions are corrected for length based on recovery. Cores are assumed to have uniform compaction through each 5-ft segment.	Lithologic Symbol	Sample ID and Analysis
0		0 - 1.0 feet: POORLY GRADED SAND WITH GRAVEL AND SILT (SP-SM), moist, loose, dark brown, 50% medium sand, 40% fine to coarse gravel, 10% fines.		PG18-GP-12-00-01-20180305 PCDD/PCDF, TS
	3.3 / 66%	1.0 - 10.0 feet: POORLY GRADED SAND (SP), moist, loose, light brown, 100% medium sand.		PG18-GP-12-01-03-20180305 PCDD/PCDF, TS
				PG18-GP-12-03-05-20180305 PCDD/PCDF, TS
5				
	3.8 / 76%	@6.0 feet: Same as before but 90% medium sand, 10% fine to coarse gravel.		PG18-GP-12-05-07-20180305 PG18-GP-62-05-07-20180305 (FD) PCDD/PCDF, TS
				PG18-GP-12-07-09-20180305 Archive
10				PG18-GP-12-09-11-20180305 PCDD/PCDF, TS
		10.0 - 11.0 feet: POORLY GRADED SAND WITH SILT (SP-SM), wet, loose, dark grayish brown, 80% medium sand, 10% fines, 10% fine gravel.		
	3.3 / 66%	11.0 - 13.0 feet: WOOD FRAGMENTS [wood chips], moist, dense, reddish brown. Slight H2S-like odor.		PG18-GP-12-11-13-20180305 Archive
		13.0 - 15.0 feet: POORLY GRADED SAND (SP), moist, medium dense, dark gray, 100% fine to medium sand, trace fines, moderate shell hash.		PG18-GP-12-13-15-20180305 PCDD/PCDF, TS
15		End of Boring @15 feet.		

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Notes: FD = field duplicate
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TS = total solids

Soil Boring Log
GP-13

Sheet 1 of 1

Project: **Port Gamble Supplemental RI**	Location: **Port Gamble, WA**	Method: **Geoprobe**
Project #: **170388-01.01**	N/LAT: **316890.60** E/LONG: **1211634.37**	Total Depth (ft): **15.0**
Client: **Pope Resources LP / OPG Properties LLC**	Horiz. Datum: **NAD 83 State Plane WA North US feet**	Observed Groundwater (ft BGW): **6.5**
Collection Date: **3/5/2018**	Logged By: **Evan Malczyk**	Contractor: **Holocene**
Drilling Equipment: **Geoprobe 7822 DT**	Borehole Diameter: **2.25 inch OD**	Liner Diameter: **1.5 inch**

In-situ Depth (feet)	Recovery (feet / %)	Sediment Description	Lithologic Symbol	Sample ID and Analysis
0		Samples and descriptions are corrected for length based on recovery. Cores are assumed to have uniform compaction through each 5-ft segment.		
		0 - 1.3 feet: POORLY GRADED GRAVEL WITH SAND (GP), dry, loose, gray with reddish fines, 70% fine to coarse gravel, 30% medium sand, trace fines.		PG18-GP-13-00-01-20180305 PCDD/PCDF, TS
	3.0 / 60%	1.3 - 14.6 feet: POORLY GRADED SAND (SP), dry to moist, loose, grayish brown, 100% medium sand.		PG18-GP-13-01-03-20180305 PCDD/PCDF, TS
				PG18-GP-13-03-05-20180305 PCDD/PCDF, TS
5				PG18-GP-13-05-07-20180305 PCDD/PCDF, TS
	3.2 / 64%	@6.5 feet: Same as before but moisture content is moist to wet, 100% medium to coarse sand.		PG18-GP-13-07-09-20180305 Archive
				PG18-GP-13-09-11-20180305 PCDD/PCDF, TS
10		@11.0 feet: contains trace wood fragments.		
	4.6 / 92%	@12.0 feet: same as before but moisture content is wet.		PG18-GP-13-11-13-20180305 Archive
		@13.5 feet: pocket of fine gravel @14.3 feet: pocket of decomposed wood fragments, slight H2S-like odor.		PG18-GP-13-13-15-20180305 PCDD/PCDF, TS
15		14.6 - 15.0 feet: POORLY GRADED SAND WITH GRAVEL (SP), wet, medium dense, dark gray, 75% fine sand, 25% fine gravel, trace fines. End of Boring @15 feet.		

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Notes: PCDD/PCDF = polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans
TS = total solids

Soil Boring Log

GP-14

Sheet 1 of 1

Project: **Port Gamble Supplemental RI**	Location: **Port Gamble, WA**	Method: **Geoprobe**
Project #: **170388-01.01**	N/LAT: **317007.45** E/LONG: **1211637.17**	Total Depth (ft): **15.0**
Client: **Pope Resources LP / OPG Properties LLC**	Horiz. Datum: **NAD 83 State Plane WA North US feet**	Observed Groundwater (ft BGW): **7.0**
Collection Date: **3/5/2018**	Logged By: **Evan Malczyk**	Contractor: **Holocene**
Drilling Equipment: **Geoprobe 7822 DT**	Borehole Diameter: **2.25 inch OD**	Liner Diameter: **1.5 inch**

In-situ Depth (feet)	Recovery (feet / %)	Sediment Description	Lithologic Symbol	Sample ID and Analysis
0	3.5 / 70%	3 inches of hardscape layer (asphalt) at surface. 0 - 5 feet: GRAVEL/SAND WITH SILT (GP/SP-SM), dry, loose, dark grayish black, 45% fine gravel, 45% medium sand, 10% fines. @1 feet: color is grayish brown with orange oxidative fragments.		PG18-GP-14-00-01-20180305 PCDD/PCDF, TS PG18-GP-14-01-03-20180305 PCDD/PCDF, TS PG18-GP-14-03-05-20180305 PCDD/PCDF, TS
5	2.3 / 46%	5 - 8.7 feet: POORLY GRADED SAND WITH GRAVEL (SP), moist, loose, gray, 80% medium sand, 20% fine gravel. @7.0 feet: same as before but wet.		PG18-GP-14-05-07-20180305 PCDD/PCDF, TS PG18-GP-14-07-09-20180305 Archive
10	3.0 / 60%	8.7 - 10.5 feet: SAND/WOOD FRAGMENTS [coarse sawdust], wet, loose, dark gray, 50% medium sand, 50% wood fragments. @10.5 feet: 2 inch layer of red fragments (brick-like). 10.5 - 15.0 feet: WOOD FRAGMENTS, contains alternating layers of wood fragments, sand, shell hash, and wood/sand mixtures.		PG18-GP-14-09-11-20180305 PCDD/PCDF, TS PG18-GP-14-11-13-20180305 Archive PG18-GP-14-13-15-20180305 PCDD/PCDF, TS
15		End of Boring @15 feet.		

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Notes: PCDD/PCDF = polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans
TS = total solids

Soil Boring Log

GP-15

Sheet 1 of 1

Project: **Port Gamble Supplemental RI**	Location: **Port Gamble, WA**	Method: **Geoprobe**
Project #: **170388-01.01**	N/LAT: **316861.23** E/LONG: **1211748.36**	Total Depth (ft): **15.0**
Client: **Pope Resources LP / OPG Properties LLC**	Horiz. Datum: **NAD 83 State Plane WA North US feet**	Observed Groundwater (ft BGW): **9.4**
Collection Date: **3/5/2018**	Logged By: **Evan Malczyk**	Contractor: **Holocene**
Drilling Equipment: **Geoprobe 7822 DT**	Borehole Diameter: **2.25 inch OD**	Liner Diameter: **1.5 inch**

In-situ Depth (feet)	Recovery (feet / %)	Sediment Description Samples and descriptions are corrected for length based on recovery. Cores are assumed to have uniform compaction through each 5-ft segment.	Lithologic Symbol	Sample ID and Analysis
0	3.7 / 74%	3 inches of hardscape layer (asphalt) at surface. 0 - 4.5 feet: POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), dry, loose, dark gray, 50% medium sand, 40% fine gravel, 10% fines. @1.4 feet: color is grayish brown. @4.4 feet: layer of dark gray silt.		PG18-GP-15-00-01-20180305 PCDD/PCDF, TS PG18-GP-15-01-03-20180305 PCDD/PCDF, TS PG18-GP-15-03-05-20180305 PG18-GP-65-03-05-20180305 (FD) PCDD/PCDF, TS
5	2.7 / 54%	4.5 - 7.4 feet: POORLY GRADED SAND (SP), moist, loose, gray, 100% medium to coarse sand. 7.4 - 9.4 feet: POORLY GRADED GRAVEL WITH SAND (GP), dry, loose, brown, 60% fine to coarse gravel, 40% coarse sand, trace fines. Gravel is angular, can break with finger pressure.		PG18-GP-15-05-07-20180305 PCDD/PCDF, TS PG18-GP-15-07-09-20180305 Archive
10	2.2 / 44%	9.4 - 10.0 feet: SILTY GRAVEL (GM), moist to wet, loose, brown, 70% coarse gravel, 15% medium sand, 15% fines. @9.6 feet: 1.5 inch pocket of white coarse grained material. 10.0 - 12.7 feet: ORGANIC SOIL [decomposed wood fibers], wet, soft, brown, 100% fines. Moderate H2S-like odor. Contains whitish fragments of anthropogenic material. 12.7 - 13.6 feet: SILTY GRAVEL (GM), wet, loose, brown, 50% fine to coarse gravel, 40% fines, 10% medium sand. 13.6 - 15.0 feet: WOOD FRAGMENTS WITH SILT, 10% fines, moderate H2S-like odor.		PG18-GP-15-09-11-20180305 PCDD/PCDF, TS PG18-GP-15-11-13-20180305 Archive PG18-GP-15-13-15-20180305 PCDD/PCDF, TS
15		End of Boring @15 feet.		

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Notes: FD = field duplicate
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TS = total solids

Soil Boring Log
GP-16

Sheet 1 of 1

Project: **Port Gamble Supplemental RI**	Location: **Port Gamble, WA**	Method: **Geoprobe**
Project #: **170388-01.01**	N/LAT: **316744.53** E/LONG: **1211569.69**	Total Depth (ft): **15.0**
Client: **Pope Resources LP / OPG Properties LLC**	Horiz. Datum: **NAD 83 State Plane WA North US feet**	Observed Groundwater (ft BGW): **N/A**
Collection Date: **3/5/2018**	Logged By: **Evan Malczyk**	Contractor: **Holocene**
Drilling Equipment: **Geoprobe 7822 DT**	Borehole Diameter: **2.25 inch OD**	Liner Diameter: **1.5 inch**

In-situ Depth (feet)	Recovery (feet / %)	Sediment Description	Lithologic Symbol	Sample ID and Analysis
0		Samples and descriptions are corrected for length based on recovery. Cores are assumed to have uniform compaction through each 5-ft segment.		
		0 - 1.6 feet: POORLY GRADED GRAVEL WITH SILT (GP-GM), moist, loose, brownish gray, 50% fine gravel, 40% medium sand, 10% fines. @0.5 feet: same as before but moisture content is dry.		PG18-GP-16-00-01-20180305 PCDD/PCDF, TS
	3.7 / 74%	1.6 - 8.6 feet: POORLY GRADED SAND WITH GRAVEL (SP), dry, medium dense, brownish gray, 85% medium sand, 15% fine gravel, trace fines.		PG18-GP-16-01-03-20180305 PCDD/PCDF, TS
				PG18-GP-16-03-05-20180305 PCDD/PCDF, TS
5				PG18-GP-16-05-07-20180305 PCDD/PCDF, TS
	2.5 / 50%			PG18-GP-16-07-09-20180305 Archive
		@8.5 - 8.7 feet: contains trace shell hash.		
		8.6 - 15.0 feet: WOOD FRAGMENTS WITH SAND, alternating layers of wood fragments, wood/sand mixtures, decomposed organics [sawdust], and poorly graded sand. Slight H2S-like odor. Wood fragments are reddish with cedar-like odor. Trace anthropogenics (black charcoal-like) in thin layer @8.6 feet.		PG18-GP-16-09-11-20180305 PCDD/PCDF, TS
10				PG18-GP-16-11-13-20180305 Archive
	2.4 / 48%	@12.7 feet: 2 coarse angular gravel.		
				PG18-GP-16-13-15-20180305 PCDD/PCDF, TS
15		End of Boring @15 feet.		

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Notes: PCDD/PCDF = polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans
TS = total solids

Soil Boring Log
GP-17

Sheet 1 of 1

Project: **Port Gamble Supplemental RI**	Location: **Port Gamble, WA**	Method: **Geoprobe**
Project #: **170388-01.01**	N/LAT: **316931.38** E/LONG: **1211426.70**	Total Depth (ft): **15.0**
Client: **Pope Resources LP / OPG Properties LLC**	Horiz. Datum: **NAD 83 State Plane WA North US feet**	Observed Groundwater (ft BGW): **13.0**
Collection Date: **3/5/2018**	Logged By: **Evan Malczyk**	Contractor: **Holocene**
Drilling Equipment: **Geoprobe 7822 DT**	Borehole Diameter: **2.25 inch OD**	Liner Diameter: **1.5 inch**

In-situ Depth (feet)	Recovery (feet / %)	Sediment Description	Lithologic Symbol	Sample ID and Analysis
0		Samples and descriptions are corrected for length based on recovery. Cores are assumed to have uniform compaction through each 5-ft segment.		
		0 - 2.0 feet: POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), dry, loose, grayish brown, 50% medium sand, 40% fine to coarse gravel, 10% fines.		PG18-GP-17-00-01-20180305 PCDD/PCDF, TS
				PG18-GP-17-01-03-20180305 PCDD/PCDF, TS
	2.0 / 40%	2.0 - 5.0 feet: POORLY GRADED SAND (SP), moist, loose, gray, 100% medium sand.		
				PG18-GP-17-03-05-20180305 PCDD/PCDF, TS
5		5.0 - 7.4 feet: POORLY GRADED SAND (SP), moist, loose, dark grayish brown, 90% medium sand, 10% fine gravel, trace fines, moderate wood fragments. Slight HC-like odor.		PG18-GP-17-05-07-20180305 PCDD/PCDF, TS
		@6.8 feet: 2 inch layer of dark brown wood fragments and anthropogenic material (black, fissile, vitreous).		
	3.9 / 78%	7.4 - 10.0 feet: WOOD FRAGMENTS, red to dark reddish brown. Slight H2S-like odor.		PG18-GP-17-07-09-20180305 Archive
				PG18-GP-17-09-11-20180305 PCDD/PCDF, TS
10		10.0 - 13.0 feet: WOOD FRAGMENTS WITH SAND, dark reddish brown and gray. Slight H2S-like odor.		
		@11.0 feet: 2 inch layer of poorly graded sand.		PG18-GP-17-11-13-20180305 Archive
	2.0 / 40%			
		13.0 - 15.0 feet: SILTY SAND WITH GRAVEL (SM), wet, loose, gray, 50% fine sand, 30% fine to coarse gravel, 20% fines. Gravel is angular.		PG18-GP-17-13-15-20180305 PCDD/PCDF, TS
15		End of Boring @15 feet.		

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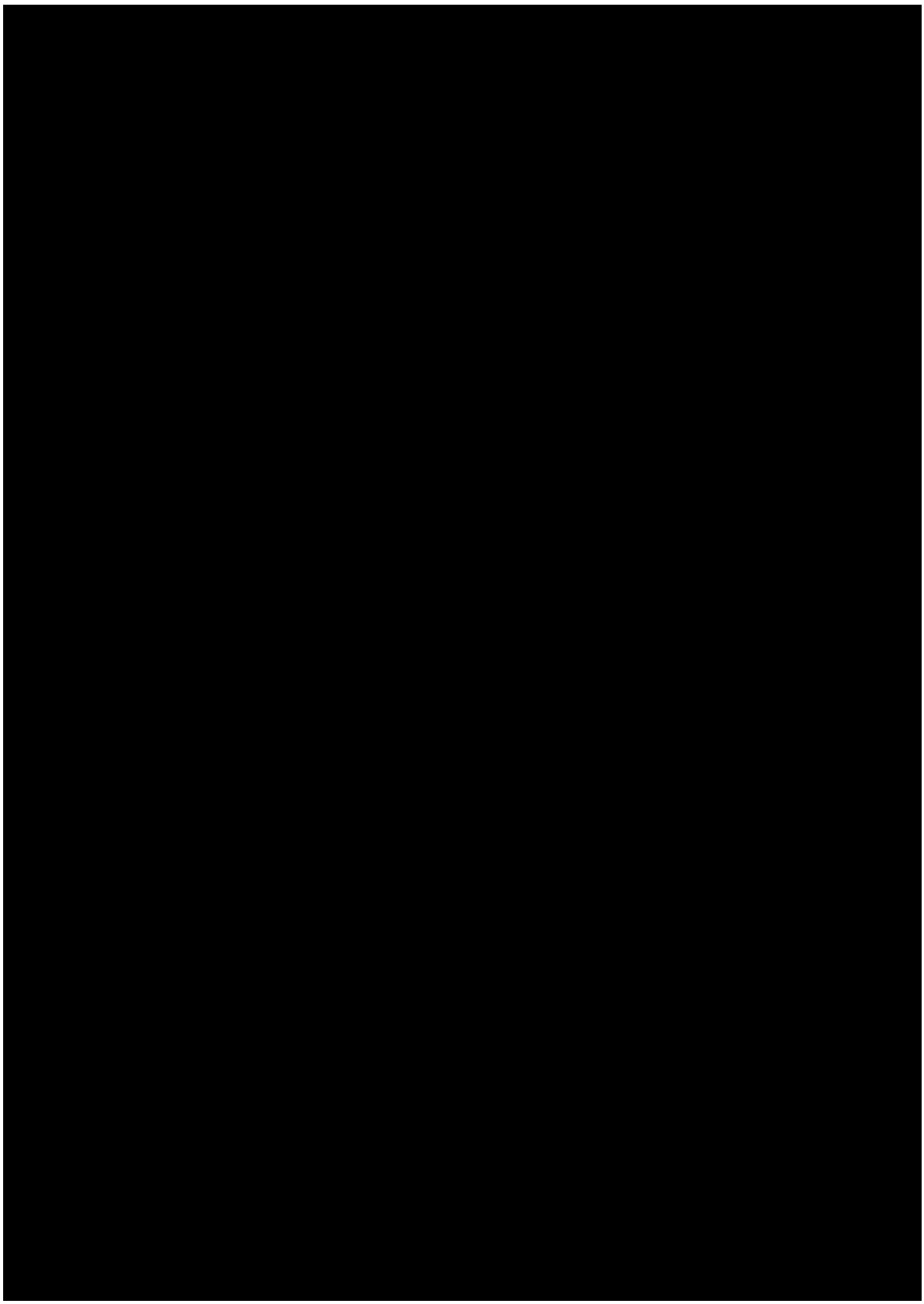
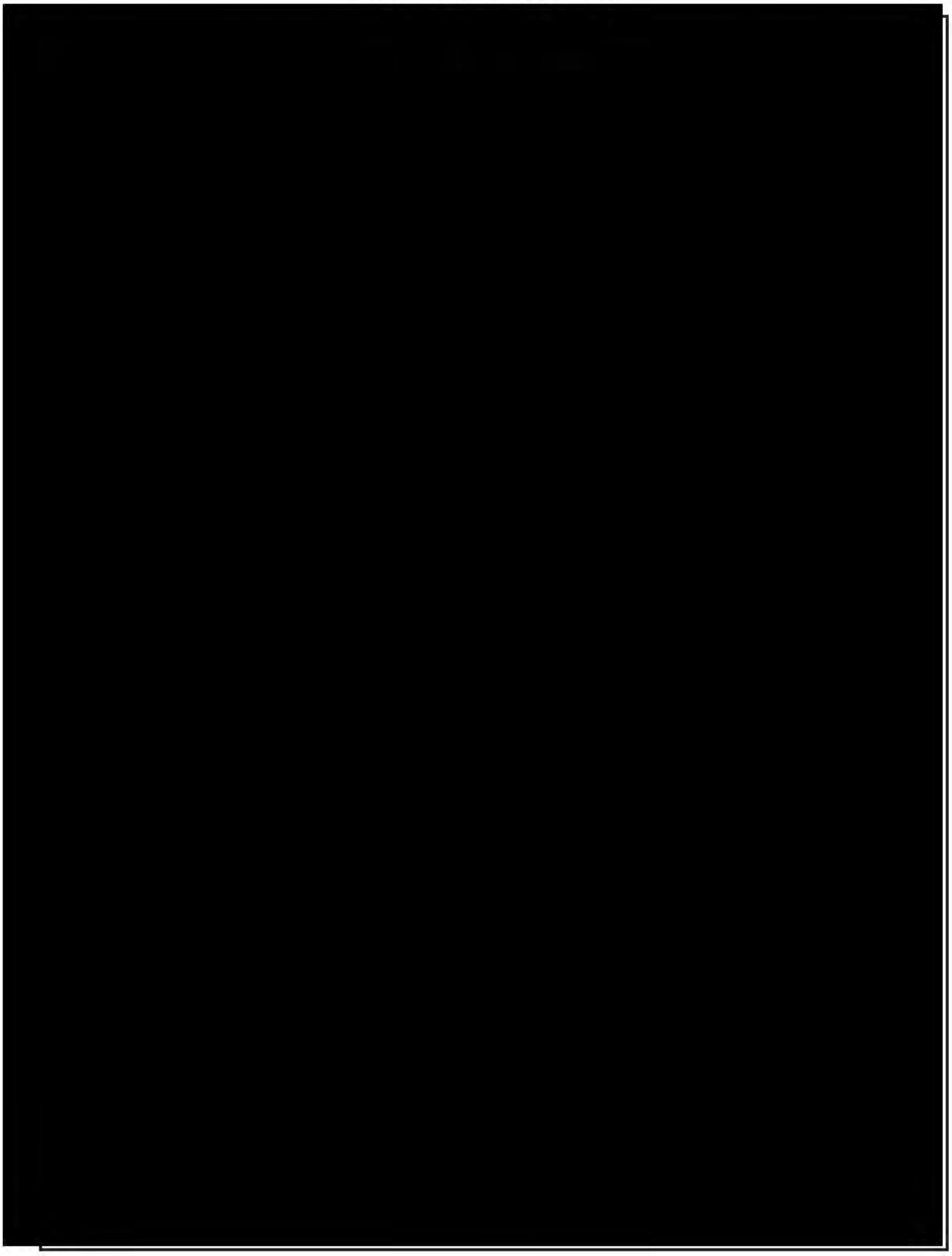
Notes: PCDD/PCDF = polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans
TS = total solids

AERIAL PHOTOGRAPH



CROSS-SECTION 1 of 2



DRAFT

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ANCHOR QEA

Memorandum

September 9, 2022

To: Linda Berry-Maraist, Pope Resources, LP/OPG Properties LLC

From: Barbara Bundy, Anchor QEA, LLC

cc: Clay Patmont, Anchor QEA

Re: Cultural Resources Assessment, Port Gamble Bay Habitat Restoration

Introduction

The Port Gamble Bay Habitat Restoration (the Project) is proposed within a portion of the Port Gamble Bay and Mill Site, located in Port Gamble, Washington (Figure 1). The Project requires a Nationwide Permit 38 from the U.S. Army Corps of Engineers (USACE) and, therefore, must demonstrate compliance with Section 106 of the National Historic Preservation Act. Section 106 requires federal agencies to take into account the effects of their undertakings on historic properties. This memorandum assists USACE in fulfilling requirements of Section 106.

Project Description

The Project includes a shoreline restoration at a portion of the Port Gamble Bay and Mill Site, located in Port Gamble, Washington (Sections 5 and 8 of Township 27 North, Range 2 East, Willamette Meridian). The Project will take place at the former upland sawmill area (Mill Site), owned by Pope Resources, LP/OPG Properties LLC. Restoration activities (Figures 2, 3, and 4) will include the following:

- **Southern Mill Site Shoreline Restoration.** This 9-acre project includes laying back intertidal slopes of the southern portion of the former sawmill facility shoreline to restore near-natural beach grades and placing intertidal cap and habitat layers including a lower 1-foot-thick layer of angular cobble-sized armor, a middle 1-foot-thick layer of rounded cobble/gravel beach substrate, and an upper 1-foot-thick layer of sand/gravel habitat substrate. A habitat feeder berm will also be placed in the beach backshore. Near-surface hardscape will be removed within a 150-foot shoreline buffer, followed by soil treatments and native plantings.
- **Western Bay Nearshore Thin Layer Sand Cover.** This project includes placing a sand cover layer over a minimum of 11 acres of lower intertidal to shallow subtidal zones within former log rafting areas in the western Port Gamble Bay to restore benthic habitat functions and concurrently provide suitable substrate in areas where eelgrass is absent or growing at very sparse densities.

- **Western Bay Nearshore Eelgrass Transplanting.** Eelgrass will be transplanted into western Port Gamble Bay areas where there is currently little or no eelgrass, including on and adjacent to the thin-layer sand cover.

No structures will be modified or demolished as part of the Project. Although the Project is within the external boundaries of Port Gamble National Historic Landmark, the Mill Site is not a contributing feature to the landmark. The Project will occur within view of contributing historic structures but not result in any changes to the viewshed as compared to its current condition; therefore, potential effects to historic and cultural preservation are limited to areas where ground disturbance could affect archaeological materials.

Regulatory Context

Under Section 106 and its implementing regulations at 36 Code of Federal Regulations (CFR) 800, USACE is required to consider the effects of its undertakings on historic properties in the Area of Potential Effects (APE). A historic property is "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places" (NRHP; 36 CFR 800.16[l][1]). Traditional cultural properties and cultural landscapes may also be historic properties. Under the Section 106 process, USACE must consult with interested and affected Native American Tribes and the State Historic Preservation Officer on potential impacts to cultural and historic resources. To be eligible for inclusion in the NRHP, a historic property must have significance under at least one of four criteria and retain integrity.

This report assists USACE in fulfilling its obligations under Section 106 by doing the following:

- Recommending the Project's APE
- Evaluating whether historic properties are present in the APE
- Recommending whether any such properties are eligible for listing in the NRHP
- Recommending the Project's effects on any NRHP-eligible properties
- Recommending mitigation for potential adverse effects to NRHP-eligible properties

The APE is "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties" (36 CFR 800.16(d)). The recommended APE is shown in Figure 5.

Environmental and Cultural Context

The environmental and cultural context of Port Gamble Bay has been extensively documented, primarily for projects within and adjacent to the Project area, in the last 12 years. Relevant reports include the following:

- *Cultural Resources Overview for the Port Gamble Bay Cleanup and Restoration Project, Kitsap County, Washington* (Sharley et al. 2010)

- *Port Gamble Bay Cultural Resources Assessment Plan* (Ecology 2013)
- *Cultural Resources StudyPlan, Port Gamble Bay Cleanup* (SWCA and Anchor QEA 2014)
- *Cultural Resources Survey Report, Port Gamble Bay Cleanup* (Bundy 2014)
- *Port Gamble Redevelopment Project: Archaeological Resources Discipline Report, Kitsap County SEPA EIS* (Piper et al. 2014)
- *Technical Report of Archaeological Field Investigations to Support the Port Gamble Redevelopment Plan SEPA EIS, Kitsap County, Washington* (Rinck et al. 2018)
- *Cultural Resources Survey Report Addendum, Port Gamble Upland Mill Site Cleanup Action* (Bundy 2019)

Information from these reports that is relevant to the Project is briefly summarized here. A review of environmental conditions and cultural history provides a basis for determining expected locations and types of archaeological sites.

The Project is located in an upland shoreline area adjacent to Port Gamble Bay. The bay is a shallow embayment in the central Puget Sound area at the northern end of the Kitsap peninsula near Hood Canal. During the last glacial advance, glaciers covered the Project area. Glaciers began to recede approximately 15,000 years ago, causing sea level to rise. Sea level during the late Pleistocene and early Holocene varied from 30 to 40 meters above modern sea level approximately 12,000 years ago to 60 meters below it at the end of the era of rapid isostatic rebound (Piper et al. 2014). Sea level reached its modern level during the mid- to late Holocene; therefore, Holocene shorelines available for settlement would generally be at or below modern levels. At the time of contact, the southern extent of the Project area would have been intertidal and subtidal, with the northern extent in the uplands (Figure 6).

Prior to historical and modern changes to the landscape, small and large mammals, as well as various bird species and culturally important plants, such as wapato, nettles, reeds, and cranberries, would have been present in the area (Weinmann et al. 1984). Port Gamble Bay hosted salmon, rockfish, sole, herring, sand lance, and other fish, as well as invertebrates (oysters, clams, and geoduck) and crustaceans (crab and shrimp; Sharley et al. 2010).

Archaeological sites in the Central Puget Sound region range from late Pleistocene to historic in age. Table 1 briefly summarizes the archaeological context. Generally, there is a long-term trend through the Holocene toward increasing population density, greater variety and complexity of artifacts, increasing exploitation of coastal resources, and greater sedentism.

Table 1
Central Puget Sound Archaeological Phases

Phase(s)	Date Range	Notable Cultural Features and Sites
Paleoindian, Clovis	Late Pleistocene, circa 13,000 to 10,000 years ago	Scarce (and usually undated) sites include the Manis Mastodon site near Sequim. Focus on upland big game hunting.
Olcott	9,000 to 5,000 years ago	Scarce (and usually undated) sites, usually found in upland context, generally on stream terraces. Characterized by leaf-shaped projectile points and cobble tools. Focus remains on upland big game hunting.
Mid-Holocene	5,000 to 3,000 years ago	Numerous sites in the region—and major expansion of artifact types and classes—corresponds to increasing population and a diversifying subsistence base. Evidence of significant exploitation of maritime and littoral resources.
Late Holocene	3,000 to about 200 years ago	Archaeological correlates of ethnographically reported cultures. Large, semisedentary villages located at river mouths and confluences and on protected shorelines. Increasingly complex and specialized artifact toolkits. Long-term food storage.
Proto-Historic and Historic	A.D. 1792 to A.D. 1972[1]	Villages and towns, homesteads, lumber mills, canneries, refuse scatters and dumps, irrigation infrastructure, shipwrecks and abandoned vessels, utilities infrastructure, etc.

Note:

1. Resources must be 50 years old to be considered under Section 106.

At the time of Euroamerican contact, Port Gamble Bay and the surrounding area was home to Southern Coast Salish peoples, who spoke dialects of the Twana and Lushootseed languages (Twana and Klallam communities, respectively). Southern Coast Salish place names have been recorded in the Project vicinity, including for the village of Little Boston at Point Julia.

As Euroamerican presence in the area grew in the mid-1800s, tribes were pressured to sign treaties. The Point No Point Treaty, which assigned the S'Klallam, Chemakum, and Skokomish peoples (among others) to their respective reservations, was signed in January 1855 (Ruby and Brown 1986). The village of Little Boston at Point Julia was owned by the Pope & Talbot Lumber Mill (Mill) and settled largely by Mill workers of S'Klallam and Chemakum descent (Sharley et al. 2010). Little Boston residents were relocated by government agencies to a new village on the bluff overlooking Point Julia after the establishment of the Port Gamble Indian Reservation in 1934 (Sharley et al. 2010). Today, Southern Coast Salish people with ties to the Port Gamble area are members of the Port Gamble S'Klallam, Skokomish, Lower Elwha Klallam, Jamestown S'Klallam, and Suquamish tribes.

The earliest documented Euroamerican contact with Port Gamble Bay communities was Captain George Vancouver's 1792 mapping expedition. More regular contact began in the 1820s, when the establishment of Fort Nisqually brought fur traders to the region (Sharley et al. 2010). The Mill was constructed at Teekalet (the S'klallam name of Port Gamble) between July 1853 and September 1853 and operated "almost without pause" until 1995 (Eakins 1997). During this 142-year

period, a wide variety of structures were built, torn down, rebuilt, replaced, and otherwise altered. The Mill also expanded its footprint into the intertidal and subtidal waters of Port Gamble Bay through deposition of fill and riprap. The current eastern extent of the Port Gamble shoreline is approximately 250 feet east (waterward) of its pre-Mill location (Sharley et al. 2010).

Most Mill buildings were removed after the Mill closed in 1995. From 1999 through 2001, Pope Resources, LP/OPG Properties LLC completed multiple soil and groundwater investigations at the Mill Site. These investigations informed a 2002 interim remedial action that included excavation of 20,460 tons of soil impacted by mercury from 10 upland areas and a subsequent 2004 to 2005 removal of an additional 5,850 tons of soil from two upland areas. Some soils that had mercury concentrations lower than cleanup levels were reused as deep backfill. A shoreline and in-water cleanup in 2015 to 2017 included removal of derelict docks, piles, and other structures, as well as dredging and capping in the bay and limited excavation in the intertidal zone. The area for the shoreline portion of that cleanup significantly overlaps with the current Project APE (Figure 7).

Site 45KP274 was a collection of in-water features, primarily pilings and concrete, along the Mill Site shoreline. It was determined not eligible for the NRHP in 2015. The site was removed in the 2015 to 2017 in-water cleanup.

Evaluation Methods

Archaeological potential is evaluated by determining the likely location of sediments that may contain precontact or historic archaeological materials and comparing to project plans to assess whether ground disturbance will occur within those sediments.

[redacted]

The location of those sediments with archaeological potential will be estimated using the results of previous archaeological investigations, geotechnical information, historical maps, and documentation of prior disturbance.

Results

Analysis focused on comparing the extent of ground disturbance to areas of archaeological potential. The Project includes the following ground disturbance:

- Up to 1 foot below the mudline in the in-water eelgrass transplanting area
- Up to 8 feet below the existing ground surface in the intertidal excavation area
- Up to 3 feet below the existing ground surface in the hardscape removal and planting area

Pedestrian surveying conducted along the coastline of the Mill Site for the 2015 to 2017 cleanup did not identify any in-water resources in the current Project vicinity (intertidal or shallow subtidal), except for the pilings designated 45KP274, which have been removed. No resources are likely to be disturbed by placement of a thin sand cover layer and eelgrass transplanting along the Western Bay.

[redacted] Historic maps indicate that the intertidal excavation area was built up with fill and debris during mill operations, and this is consistent with observations made during monitoring (Figure 7). [redacted]

In the upland area, planting [redacted] will occur. Environmental testing completed for the Mill Site Remedial Investigation and Feasibility Study revealed 10 to 18 feet of fill above native sands in the area (Figure 8). Planting and hardscape removal will occur within fill.

Excavation for the Project is unlikely to encounter intact native [redacted]. Precontact artifacts or materials are unlikely

to be encountered. [redacted]

Recommendations

Based on previous archaeological fieldwork and geotechnical testing, it is unlikely that the Project will encounter intact, significant archaeological materials. It is recommended that USACE determines no historic properties will be affected by the Project.

An Inadvertent Discovery Plan will be in place during construction in the event that potentially significant archaeological materials are encountered.

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Figures

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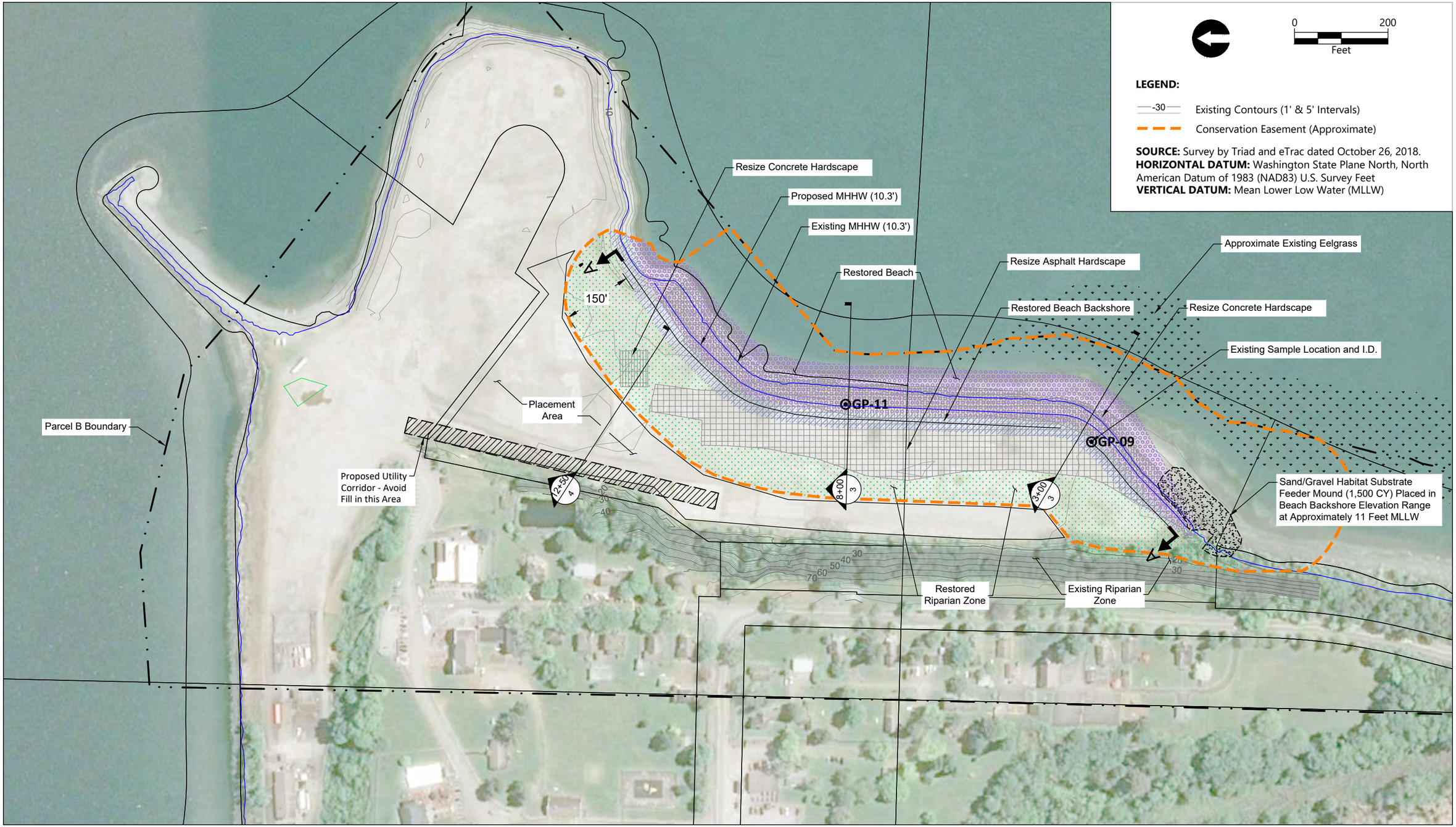
Filepath: Q:\Jobs\PopeResources_0388\PortGamble\Maps\Reports\Cultural_Resources\2019_CRA\AQ_PG_Site_Vicinity_CRA Figure 1.mxd

ANCHOR QEA

Figure 1
Site Vicinity Map
Cultural Resources Survey Report Addendum
Upland Area of the Port Gamble Bay and Mill Site



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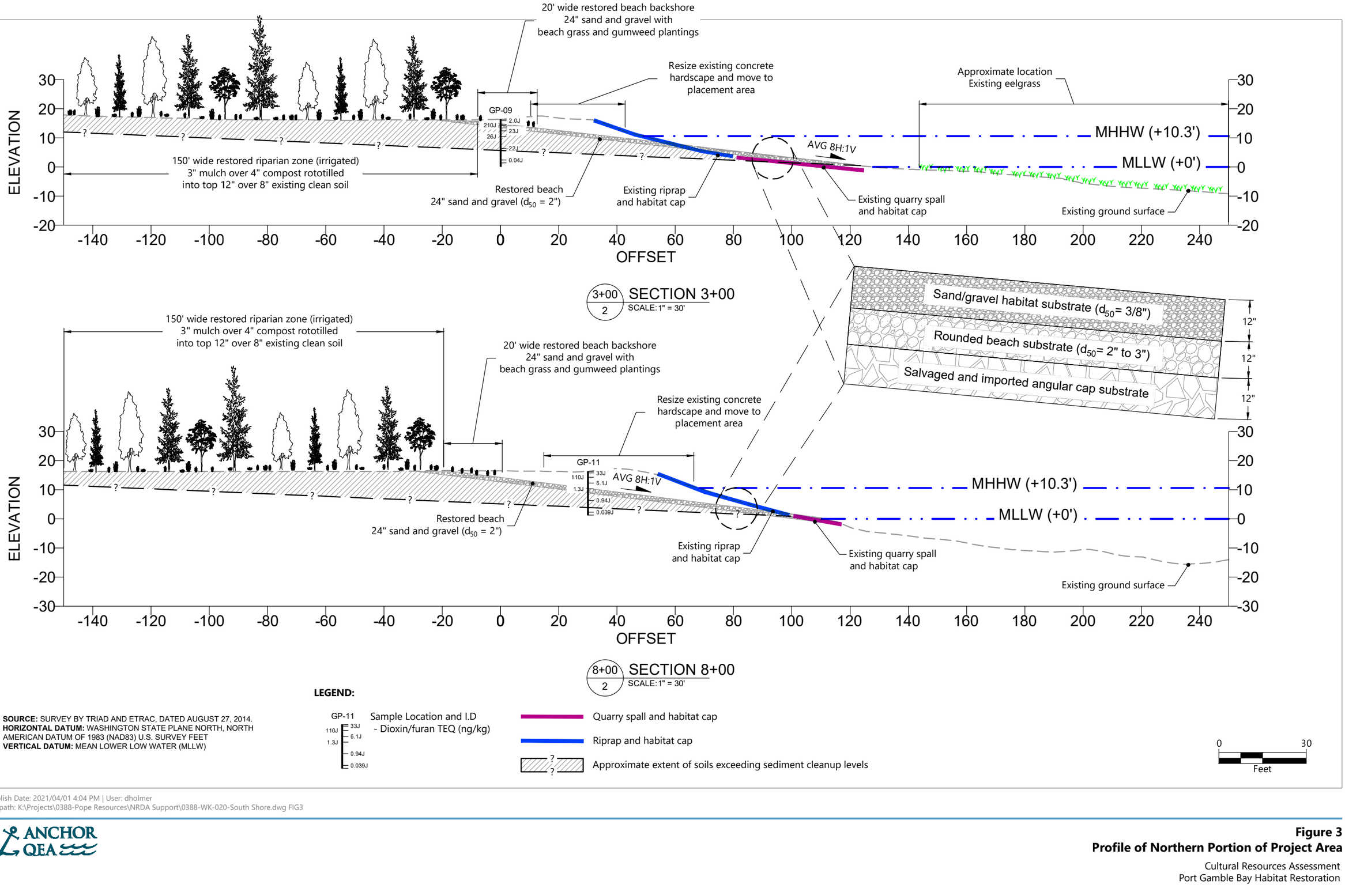
Filepath: K:\Projects\0388-Pope Resources\NRDA Support\0388-RP-005-South Shore.dwg FIG2

ANCHOR QEA

Figure 2
Northern Portion of Project Area

Cultural Resources Assessment
Port Gamble Bay Habitat Restoration



SOURCE: SURVEY BY TRIAD AND ETRAC, DATED AUGUST 27, 2014.
HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH, NORTH AMERICAN DATUM OF 1983 (NAD83) U.S. SURVEY FEET
VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW)

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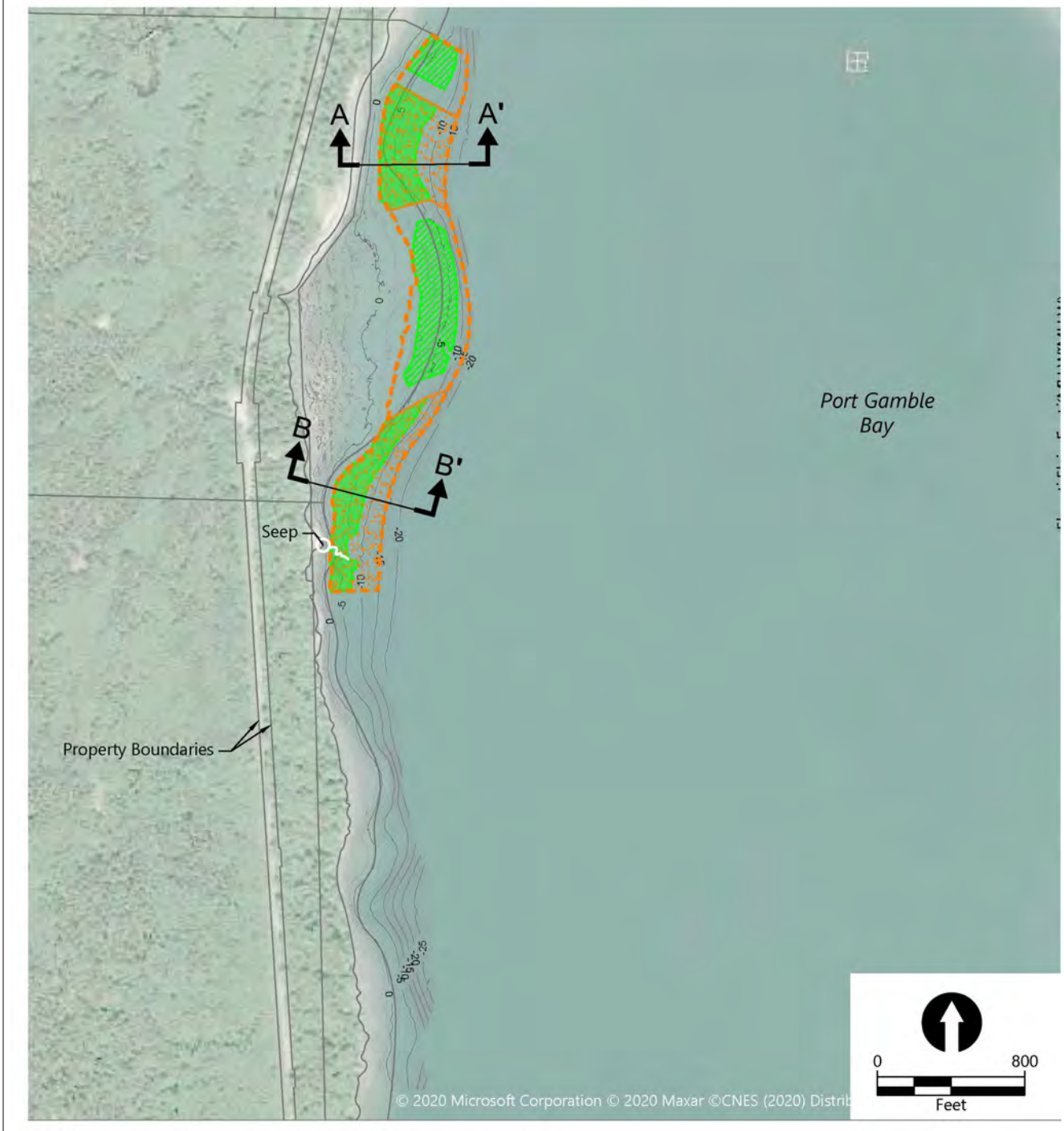
Filepath: K:\Projects\0388-Pope Resources\NRDA Support\0388-WK-020-South Shore.dwg FIG3

ANCHOR QEA

Figure 3
Profile of Northern Portion of Project Area

Cultural Resources Assessment
Port Gamble Bay Habitat Restoration



SOURCE: Survey by eTrac dated June 30, 2020.
HORIZONTAL DATUM: Washington State Plane North, North American Datum (NAD83), U.S. Survey Feet
VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

- Current Eelgrass Beds (July 2021)
- Sand Cover Placement Area
- Prospective Eelgrass Restoration Area
- 5 Existing Contours (1' & 5' Intervals)
- Conservation Easement (Approximate)

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ANCHOR QEA

Figure 4
Southern Portion of Project Area
Cultural Resources Assessment
Port Gamble Bay Habitat Restoration

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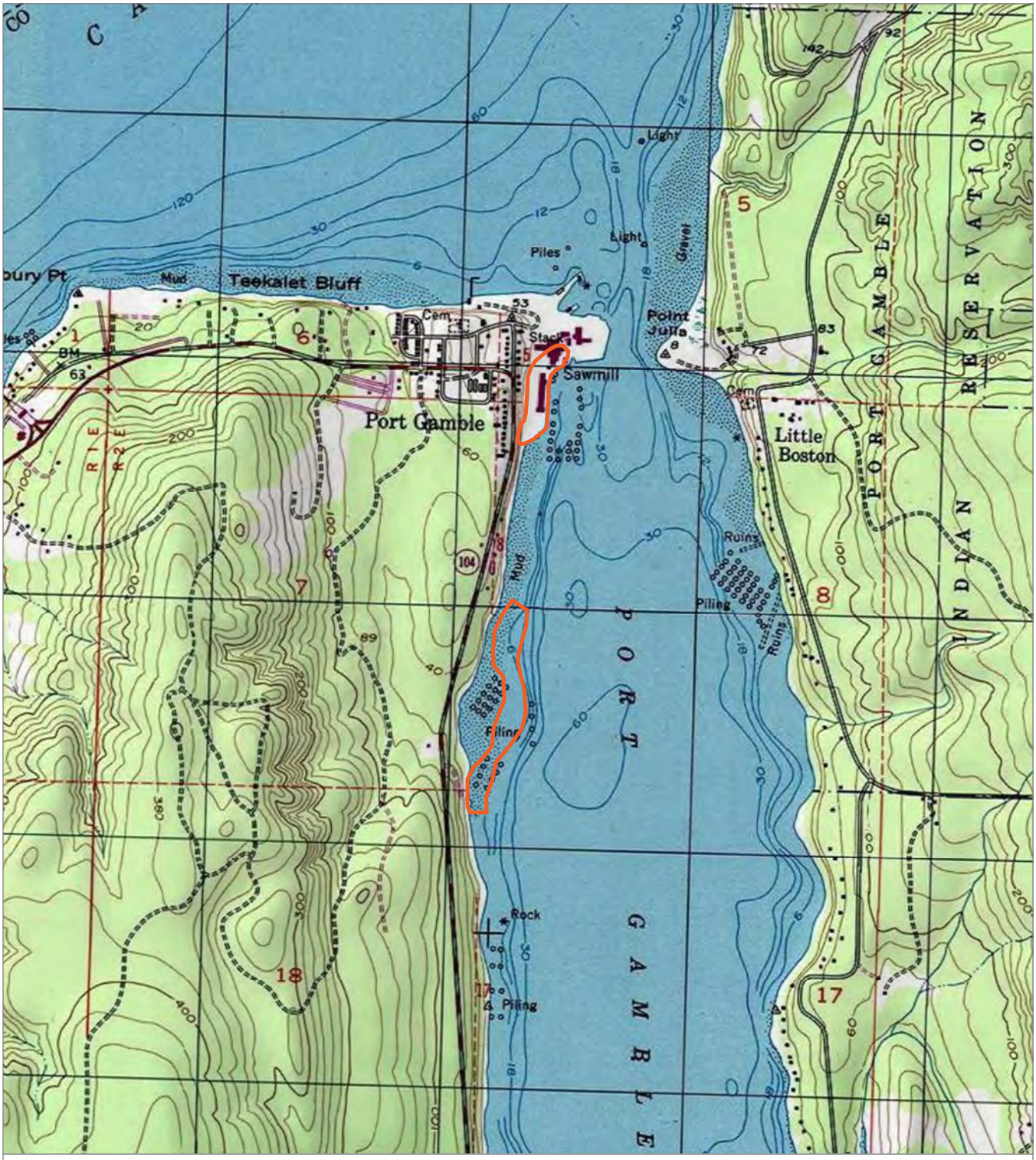

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Figure 5
Area of Potential Effects
Cultural Resources Assessment
Port Gamble Bay Habitat Restoration

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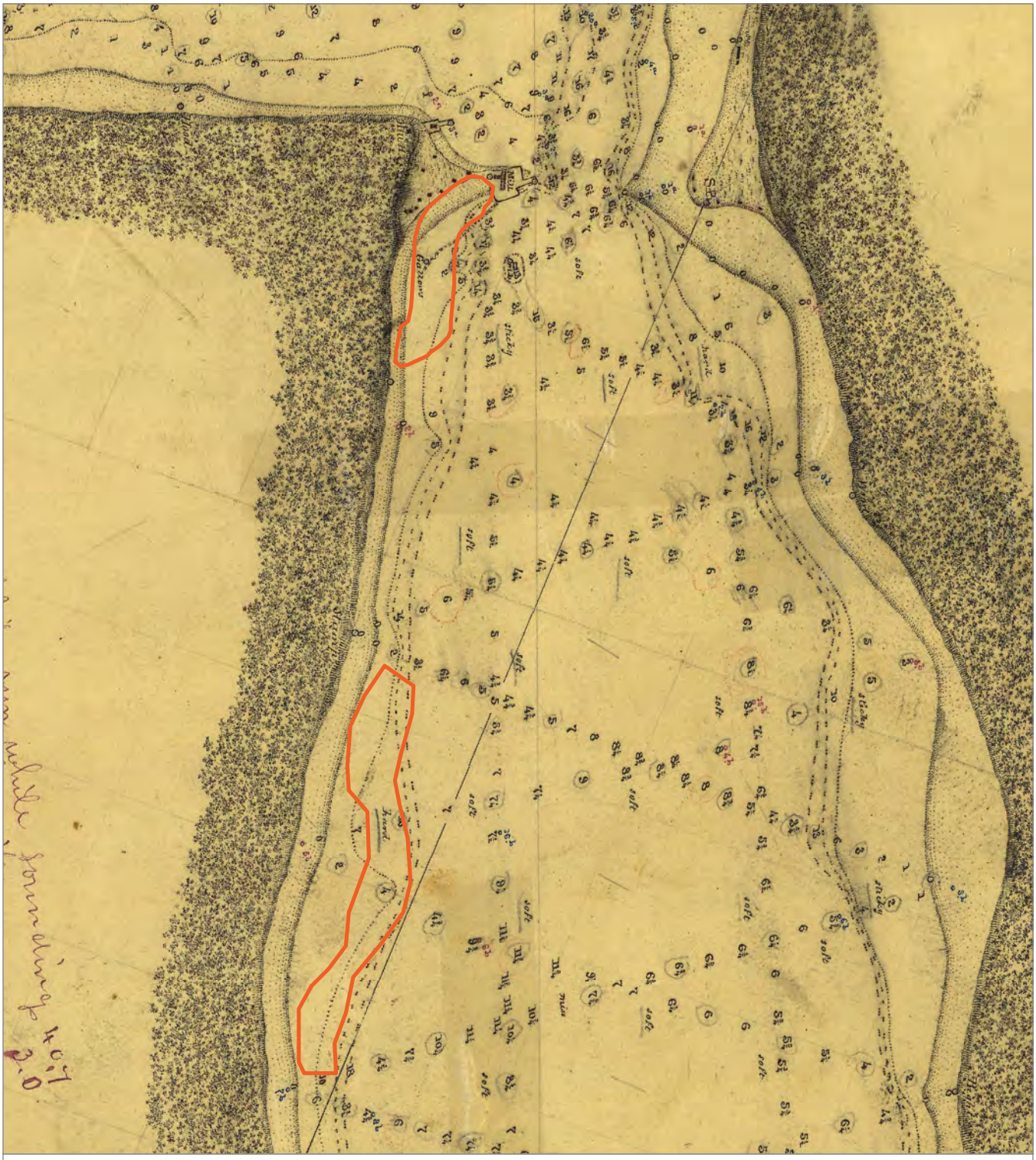

Area of Potential Effects

0 940
Feet

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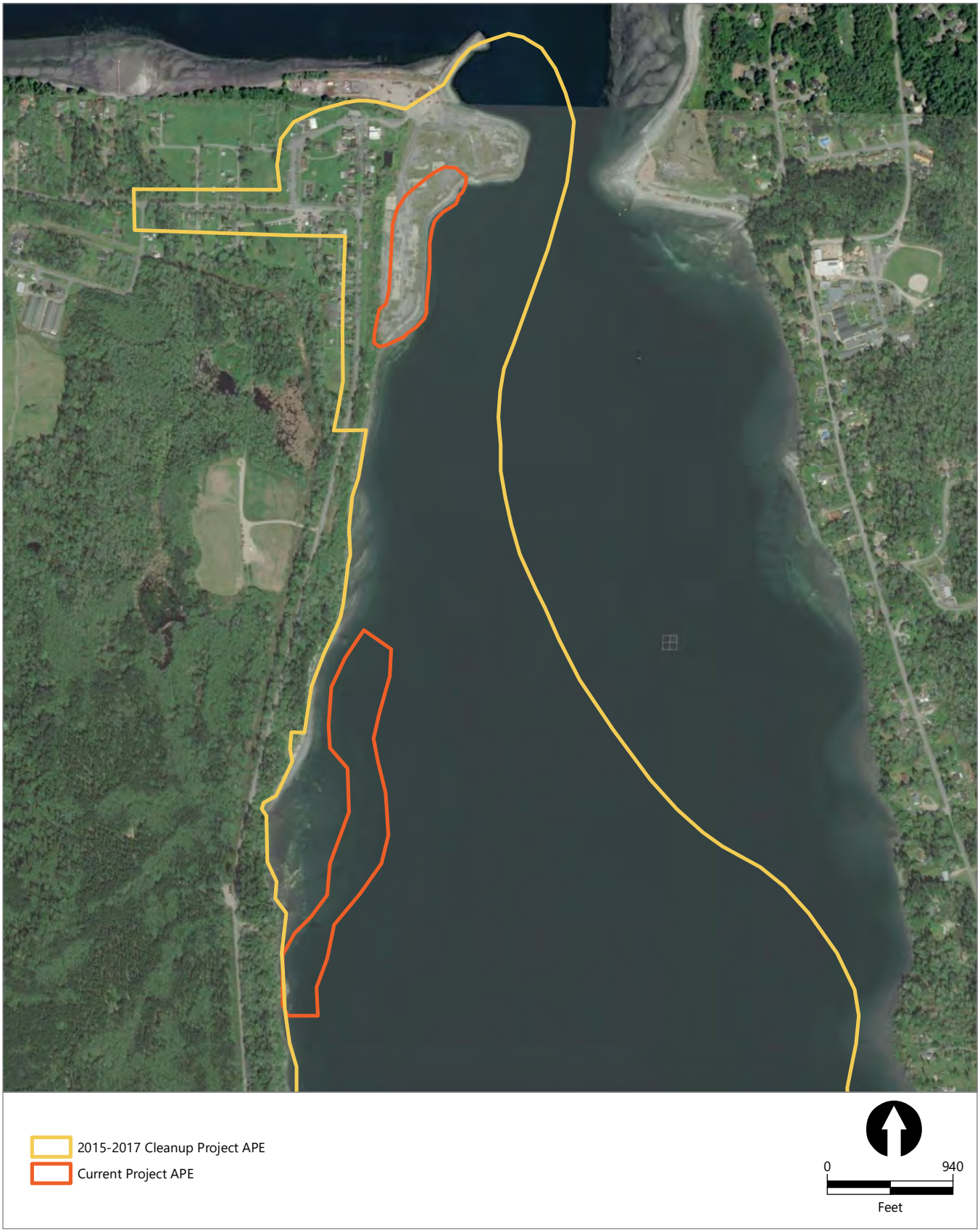
ANCHOR QEA

Figure 6
1855 U.S. Coast Survey Map
Cultural Resources Assessment
Port Gamble Bay Habitat Restoration



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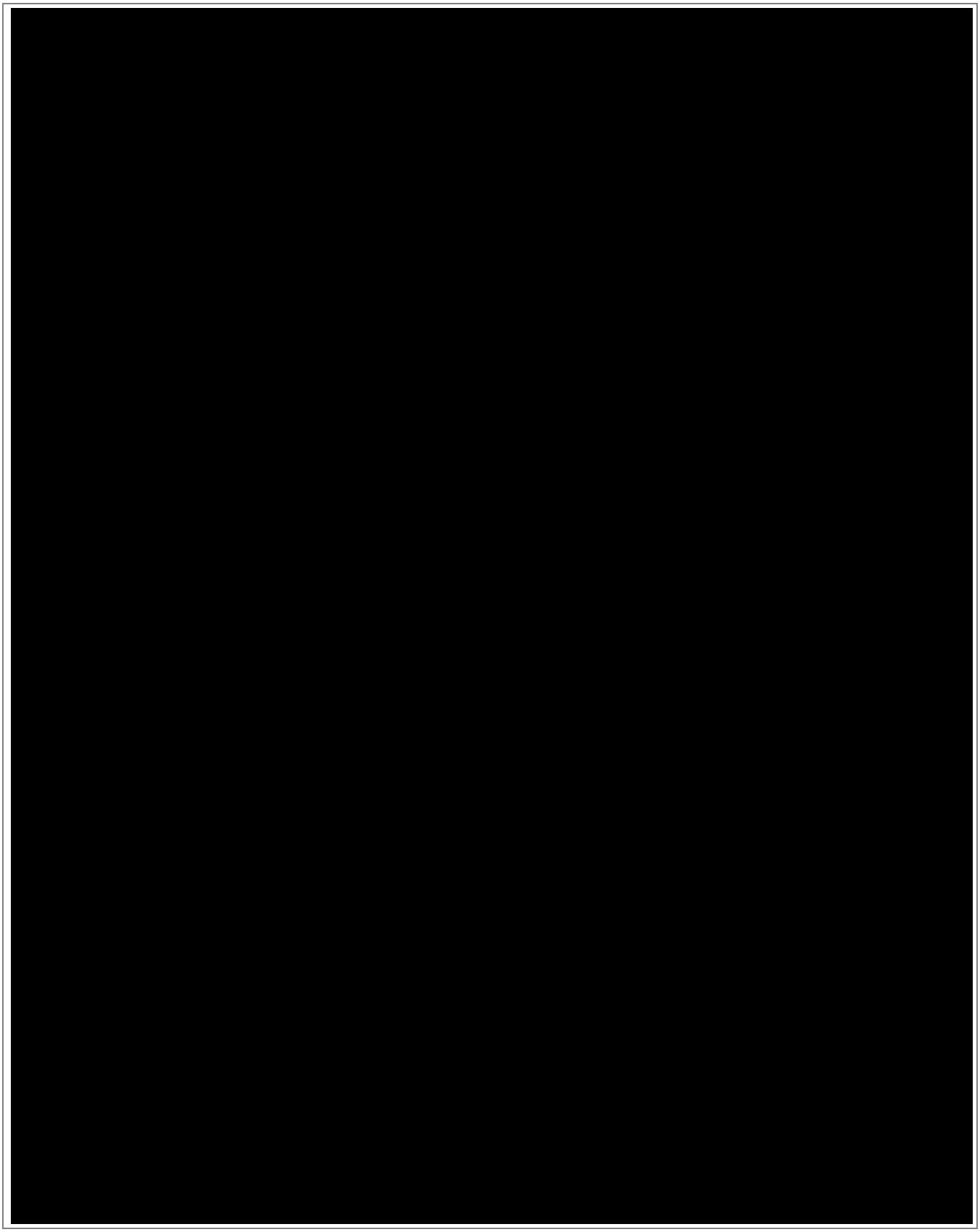
ANCHOR QEA

Figure 7
Current Project APE and 2015-2017 Cleanup Project APE
Cultural Resources Assessment
Port Gamble Bay Habitat Restoration



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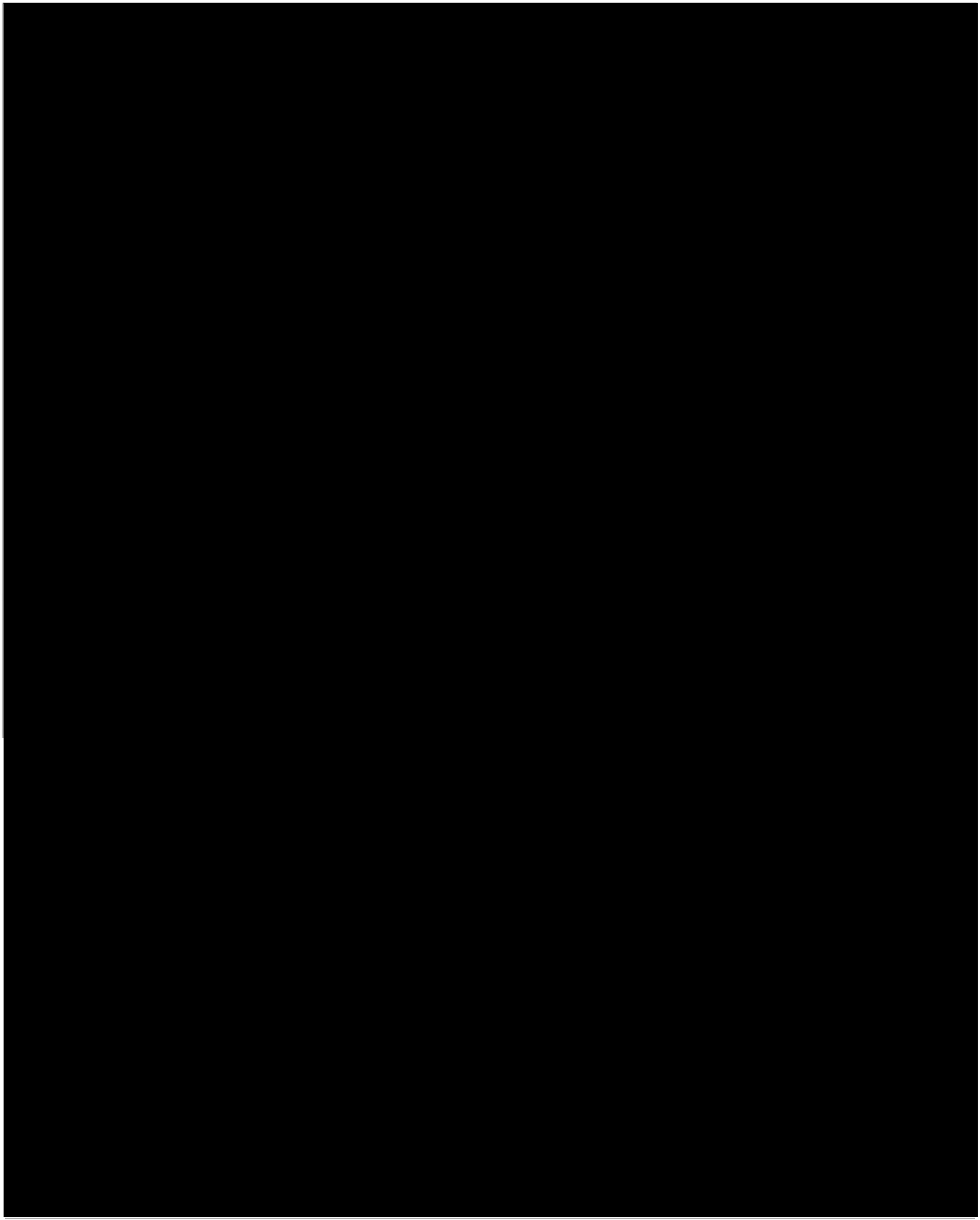
ANCHOR QEA

Figure 8
Intertidal Conditions in the Project Area: October 2015
Cultural Resources Assessment
Port Gamble Bay Habitat Restoration



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ANCHOR QEA

Figure 9
Subsurface Profile
Cultural Resources Assessment
Port Gamble Bay Habitat Restoration

Appendix C
Driftwood Key Sediment Suitability

1201 3rd Avenue, Suite 2600
Seattle, Washington 98101
206.287.9130

Data Summary Memorandum

October 17, 2022

To: Port Gamble Bay Natural Resource Trustees
Corey King, Washington State Department of Ecology Toxic Cleanup Program

From: Clay Patmont and Jason Cornetta, Anchor QEA, and Scott Maharry, Grette Associates

cc: Adrian Miller, Linda Berry-Maraist, and Jamie Northup, Rayonier
John Nielsen, Driftwood Key Club

Re: Supplemental Pre-Design Data: Western Port Gamble Bay Restoration

This memorandum summarizes supplemental pre-design data to inform habitat restoration projects in Port Gamble Bay. These projects will be performed as part of a forthcoming natural resource damage settlement agreement between Rayonier and the Port Gamble Bay Natural Resource Trustees (Trustees) to restore shoreline processes and enhance habitat for benthos, forage fish, shellfish, and juvenile salmonids. The data summarized in this memorandum address the following two Western Port Gamble Bay projects:

- **Nearshore Wood Debris Cover**. A 6-inch sand cover will be placed in shallow subtidal zones of former log rafting areas to restore benthic habitat functions and concurrently provide suitable substrate in areas where eelgrass is absent or growing at very sparse densities.
- **Eelgrass Transplanting**. Eelgrass will be transplanted into areas where there is currently little or no eelgrass. Eelgrass transplanting will be performed following placement and consolidation of the cover, informed by monitoring and adaptive management methods patterned after those used successfully at other western Washington sites.

Supplemental data collection following Trustee-approved plans (Anchor QEA 2021) to refine designs of the Western Port Gamble Bay restoration projects are discussed in the following sections:

- Western Port Gamble Bay Diver Survey
- Western Port Gamble Bay Surface Sediment Characterization
- Driftwood Key Beneficial Reuse Sediment Characterization

Western Port Gamble Bay Diver Survey

From July 12 to 15, 2021, Grette Associates (Grette) conducted scuba diver surveys in Western Port Gamble Bay. The focus of the diver surveys was the assessment of a common eelgrass (*Zostera marina*) meadow along the western shoreline of Port Gamble Bay, as well as transect surveys north and south of the meadow to assess habitat conditions in the area.

Grette divers surveyed transects oriented perpendicular to shore between approximately 0 to -18 feet below mean lower low water (MLLW) within and adjacent to the meadow and parallel to shore along the -7 feet MLLW contour (Figure 1). Ten transects were surveyed. The northern three transects and southern three transects within the meadow were spaced approximately 100 feet apart, and the two transects in the interior of the meadow were spaced approximately 200 feet apart.

Eighteen eelgrass density measurements were collected along the six transects within the meadow using a 1.6-foot-square quadrat (0.25 square meter [m^2]). The density counts were collected at high, medium, and low elevations within the meadow. Coordinates of the boundaries of the meadow and other eelgrass patches in the area were recorded. Divers also recorded qualitative observations of substrate conditions, macroalgae presence, macroinvertebrate presence and use of the areas, along with other notable observations relating to potential eelgrass colonization of the area. Divers conducted underwater videography along most transects during the survey effort.

Visibility during the dive survey was variable, ranging from 2 to 3 feet in shallower depths (less than 6 feet from the surface) to 8 to 10 feet in deeper water. Substrate elevations within the meadow ranged from approximately -2 to -8 feet MLLW. Several eelgrass patches were noted outside the meadow along -7 feet MLLW (Figure 1). While most patches were relatively small (measuring approximately 2 to 3 m^2 or less), a larger eelgrass patch was observed in the northern portion of the survey area. A relatively small patch of dwarf eelgrass (*Zostera japonica*) was observed in the southern end of the meadow at depths between approximately -2 and -3 feet MLLW.

Eelgrass Density

Eelgrass density within the meadow averaged 240 shoots per m^2. Eelgrass density in the deeper depths of this bed (approximately -8 feet MLLW) averaged 163 shoots per m^2; the middle depths of this bed (approximately -5 feet MLLW) averaged 295 shoots per m^2; and the shallower depths of this bed (approximately -2 feet MLLW) averaged 261 shoots per m^2 (Figure 1).

Eelgrass density in the northern patch averaged 86 shoots per m^2 based on two density counts conducted within the interior of that bed at approximately -5 and -7 feet MLLW (Figure 1). Eelgrass densities in the smaller patches were less than 5 shoots per m^2.

Substrate Conditions

Surface substrate within the meadow consisted primarily of relatively dense fine sand with silt and shell hash in places. Substrate within the northern patch consisted primarily of silty sand, with shell hash and scattered wood debris (bark). Scattered wood debris in the form of bark, branches, and logs were also present in deeper depths of the survey area below approximately -7 feet MLLW.

Macroalgae and Invertebrates

Macroalgae observed along the transects consisted primarily of *Ulva* sp., which was particularly dense in most areas of the shoreline along the -7 feet MLLW contour. Also present to a lesser extent were *Saccharina latissima*, *Gracilaria* sp., *Cryptosiphonia woodii*, and an unidentified filamentous green alga.

Invertebrates observed within the meadow included Dungeness crab (*Cancer magister*), red rock crab (*Cancer productus*), kelp crab (*Pugettia producta*), and graceful crab (*Metacarcinus gracilis*). Moon snails (*Euspira pallida*) and moon snail egg casings were observed throughout the shoreline along the -7 feet MLLW contour.

Scattered horse clam (*Tresus* sp.) and cockle (*Clinocardium nuttallii*) shells were observed throughout the survey area, and several horse clam siphons were observed. Geoduck siphons were also observed, though rarely.

Diver Survey Summary

Areas of Western Port Gamble Bay contain habitat suitable for eelgrass, as evidenced by the community thriving in approximately 4.9 acres of the meadow and northern patch. While eelgrass was observed outside of these two beds, the other patches observed were mostly small and sparse, typically consisting of only a few shoots.

Substrate conditions within the meadow and northern patch were firmer and more consolidated than outside of these two eelgrass beds. Additionally, *Ulva* was relatively dense in most areas to the north and south of the meadow, possibly contributing to a lack of eelgrass establishment in these areas.

Western Port Gamble Bay Surface Sediment Characterization

On August 9 and 10, 2021, surface sediment grab samples (0 to 10 centimeters [cm]) were collected from the following 26 stations along the western shoreline of Port Gamble Bay as depicted in Figure 2:

- 11 shallow subtidal stations offshore of the former log transfer facility south of the meadow
- 6 shallow subtidal stations within former log storage areas north of the meadow
- 3 deep subtidal stations offshore of the former log transfer facility south of the meadow
- 3 shallow subtidal stations within the main body of the meadow
- 2 shallow subtidal stations in a former log storage area south of the former log transfer facility
- 1 intertidal seep station immediately offshore of the former log transfer facility

Field observations at each of the 26 sampling stations included the following:

- Station coordinates
- Volumetric percentage of wood debris

- Presence of white filamentous bacteria (*Beggiatoa* sp.) indicative of a high production of hydrogen sulfide (H_2S) from bacterial sulfate reduction
- Presence of eelgrass (*Zostera* sp.).

All 26 surface sediment samples were analyzed for the following target wood debris and degradation product indicators using methods approved by the Trustees (Anchor QEA 2021) and the Washington State Department of Ecology (Ecology) under the Operations, Maintenance, and Monitoring Plan (OMMP) for the Port Gamble Bay Site (Anchor QEA 2018):

- Porewater H_2S (see Attachment 1)
- Total organic carbon (TOC)
- Grain size (% fines)

Western Port Gamble Bay surface sediment characterization data are summarized in Table 1. None of the 2021 samples had a volumetric percentage of wood debris exceeding the 10% screening value developed by the Trustees to determine degraded sediment habitat functions (Anchor QEA 2021). However, 22[1] of the 26 samples had porewater H_2S concentrations exceeding 0.07 milligrams per liter (mg/L), the risk-based benchmark developed by Ecology for the Port Gamble Bay Site (Podger 2006; Anchor QEA 2018).[2] Relatively lower porewater H_2S concentrations (up to approximately 0.12 mg/L, only marginally above the benchmark) were detected in deep subtidal stations offshore of the former log transfer facility and in the former log storage lease area south of the former transfer facility. Relatively higher porewater H_2S concentrations (up to 3.98 mg/L) were detected in shallow subtidal zones of the former log rafting areas, including within the eelgrass meadow and northern patch. *Beggiatoa* sp. were only observed at Station PG-NRD-30 within the meadow, consistent with an elevated porewater H_2S concentration (1.59 mg/L) at that location. Notably, the 2021 porewater H_2S concentration measured at Station PG-NRD-38 (1.05 mg/L) was nearly identical to the concentration measured in 2020 (1.06 mg/L), confirming the accuracy of these determinations.

The sediment characterization data summarized in Table 1 are consistent with the persistence of porewater H_2S from historical wood debris degradation in shallow subtidal sediments. These data are also consistent with literature reviews suggesting that some benthic organisms (e.g., crustaceans) are more sensitive to porewater H_2S than eelgrass (Podger 2006). As noted by the diver survey observations summarized previously, eelgrass distributions within Western Port Gamble Bay appear to be primarily correlated with a relatively narrow euphotic zone depth range (-2 to -8 feet MLLW) and with sediment conditions (e.g., relatively lower percent fines and TOC; Table 1) that promote a more consolidated substrate.

[1] The binding gel in sample PG-NRD-28 could not be retrieved from the passive sampling assembly, so no porewater H_2S determination was performed on this sample (see Attachment 1).

[2] Confirmatory sediment bioassays previously performed in Western Port Gamble Bay met Ecology sediment quality objectives, obviating the need for cleanup in this area.

Taken together, the diver survey and surface sediment characterization data, along with restoration experiences throughout Puget Sound and beyond, confirm the likely success of the Western Port Gamble Bay restoration project. Placement of a 6-inch sand cover over a total of approximately 11.1 acres in former log rafting areas within the -2 to -15 feet MLLW depth range (Figure 2) would reduce surface sediment (0 to 10 cm) porewater H_2S concentrations and restore benthic habitat functions in the shallow subtidal zone. If the nearshore wood debris cover is constructed using materials with low percent fines and TOC to promote consolidation, the cover could concurrently provide suitable substrate for eelgrass transplanting in the upper depths of the shallow subtidal zone (-2 to -8 feet MLLW). The northern and southern sand cover placement areas depicted in Figure 2 incorporate 10-foot offsets of cover placement from the edges of the meadow and northern patch to avoid impacts to existing eelgrass beds[3].

Driftwood Key Beneficial Reuse Sediment Characterization

As practicable, cover sediments for the Western Port Gamble Bay restoration project will be beneficially reused from prospective maintenance dredging of the nearby Driftwood Key navigation channel(s) to optimize restoration functions.

On August 11, 2021, prospective Driftwood Key outer channel maintenance dredging sediments (Areas 1 and 2; see Figure 3) were sampled to characterize their suitability for aquatic habitat restoration and beneficial reuse in Western Port Gamble Bay. Concurrently, finer-grained inner bay maintenance dredging sediments (Area 3) were sampled to assess their suitability for potential upland beneficial reuse as topsoil, either at the former Port Gamble Mill Site or another suitable location. Near-surface[4] sediments within all three areas were sampled from nine stations (three stations in each area) using a hand-driven push core.

The approximate grain size distribution of each sample collected from Areas 1 and 2 was determined by wet sieving in the field to verify prospective suitability as sand cover. Samples from Area 3 were not submitted for grain size analysis as samples were finer-grained and collected for potential use as upland topsoil. All six samples collected from Areas 1 and 2 had a similar grain size (at or below roughly 10% fines) and were combined as composites for each sampling area. Aliquots of the individual samples were also archived for possible follow-on analyses as needed.

The Driftwood Key near-surface sediment composite samples, one each from Areas 1, 2, and 3, were analyzed for more than 120 target analytes using methods approved by the Trustees and Ecology as

[3] During the 2015 to 2017 Port Gamble Bay cleanup action, cap and cover materials were successfully placed 10 feet from the edge of eelgrass meadows without impacts to these beds, accounting for contractor accuracy with the type of equipment used for in-water construction in the shallow subtidal zone, optimizing overall habitat development.

[4] Recovery depths in individual cores ranged from approximately 1 to 2 feet; each core provided equal volumes to the sample composite.

part of the OMMP for the Port Gamble Bay Site, as well as Puget Sound Dredged Material Management Program (DMMP) protocols (Anchor QEA 2018, 2021).

Final validated characterization data are summarized in Table 2. These data confirm that prospective Driftwood Key maintenance dredging sediments have chemical concentrations that are suitable for beneficial reuse (well below Port Gamble Bay cleanup levels and DMMP open-water disposal criteria). Prospective maintenance dredging sediments from the outer Driftwood Key navigation channel (Areas 1 and 2) are predominantly sands with low percent fines (5.7% to 7.6%) and TOC (0.22% to 0.58%) that would promote consolidation and provide suitable substrate for eelgrass transplanting[5]. Inner Driftwood Key sediments are predominantly sandy silts with low TOC (0.56%) that are likely suitable for potential upland beneficial reuse as topsoil[6], either at the former Port Gamble Mill Site or another suitable location.

Project Schedule

As practicable, habitat restoration within Port Gamble Bay will be coordinated with Port Gamble Mill Site cleanup activities to achieve a protective and cost-effective integrated remedy.

[5] Because thriving eelgrass beds are present within and adjacent to Areas 1 and 2, eelgrass seeds are likely also present in prospective outer channel maintenance dredging sediments, providing additional benefits for eelgrass restoration in Port Gamble Bay.

[6] Like previous Port Gamble Bay dredging and beneficial reuse projects, sparging may be necessary to reduce porewater salinity in these materials prior to their beneficial reuse as topsoil.

References

Anchor QEA (Anchor QEA, LLC), 2018. *Operations, Maintenance, and Monitoring Plan, Port Gamble Bay Cleanup Project.* Prepared for Pope Resources, LP/OPG Properties, LLC. January 2018.

Anchor QEA, 2021. *Supplemental Pre-Design Work Plan – Port Gamble Natural Resource Damage Restoration*. Prepared for Port Gamble Bay Natural Resource Trustees and Rayonier. August 2021.

Podger, D., 2006. *Sulfide Effects on Aquatic Organisms – Literature Review*. Prepared for Port Gamble Bay Natural Resource Trustees by Washington State Department of Ecology. July 2006.

Tables

Table 1

Western Port Gamble Surface Sediment Characterization Data Sammary

Area	Station ID	Sampling Date	Mudline (feet; MLLW)	*Zostera marina*	Surface Sediment (0 to 10 cm) Observations and Data				
					Wood Debris (% by volume)	*Beggiatoa*	Porewater H_2S (mg/L)	TOC (% dry weight)	% Fines (% wet weight)
Preliminary Screening Level					**10%**		**0.07** [a]		
Former Log Storage Area North of Eelgrass Meadow									
	PG-NRD-24	9-Aug-21	-6	Yes	< 0.5%	No	3.53	0.69%	12.1%
	PG-NRD-25	9-Aug-21	-8	Yes	< 0.5%	No	3.98	0.66%	12.0%
	PG-NRD-26	9-Aug-21	-6	Yes	< 0.5%	No	0.95	1.07%	11.8%
	PG-NRD-27	9-Aug-21	-10	Yes	< 0.5%	No	2.67	0.75%	14.9%
	PG-NRD-28	9-Aug-21	-4	No	< 0.5%	No	-- [b]	0.77%	9.3%
	PG-NRD-29	9-Aug-21	-11	No	< 0.5%	No	1.67	0.73%	14.0%
Primary Eelgrass Meadow									
	PG-NRD-30	9-Aug-21	-6	Yes	2% to 5%	Yes	1.59	0.46%	9.1%
	PG-NRD-31	9-Aug-21	-6	Yes	< 0.5%	No	3.84	0.58%	12.8%
	PG-NRD-32	9-Aug-21	-6	Yes	< 0.5%	No	1.73	0.38%	7.6%
Former Log Transfer Facility Area South of Eelgrass Meadow									
	PG-NRD-33	9-Aug-21	-8	No	< 0.5%	No	0.19	0.41%	9.9%
	PG-NRD-34	10-Aug-21	-9	No	< 0.5%	No	0.21 [c]	0.90%	13.8%
	PG-NRD-35	10-Aug-21	-20	No	< 0.5%	No	0.12	0.89%	17.0%
	PG-NRD-36	10-Aug-21	-7	No	< 0.5%	No	1.41	1.48%	13.1%
	PG-NRD-37	10-Aug-21	-13	No	< 0.5%	No	0.12	1.46%	17.9%
	PG-NRD-38 (12ACT)	11-Sep-20	-8	No	0% to 40%	No	1.06	--	--
	PG-NRD-38	10-Aug-21	-8	No	< 0.5%	No	1.05 [c]	4.98%	16.4%
	PG-NRD-39	10-Aug-21	-20	No	< 0.5%	No	0.12	0.83%	10.3%
	PG-NRD-40	10-Aug-21	-13	No	0.5% to 1%	No	0.42	1.58%	17.2%
	PG-NRD-41	10-Aug-21	-20	No	1% to 2%	No	0.05	1.43%	21.7%
	PG-NRD-42	10-Aug-21	-7	Yes	< 0.5%	No	1.82	1.50%	16.5%
	PG-NRD-43	10-Aug-21	-12	No	< 0.5%	No	0.27	1.33%	14.6%
	PG-NRD-44	10-Aug-21	-6	No	< 0.5%	No	0.16	1.13%	13.7%

Table 1

Western Port Gamble Surface Sediment Characterization Data Sammary

Area	Station ID	Sampling Date	Mudline (feet; MLLW)	*Zostera marina*	Surface Sediment (0 to 10 cm) Observations and Data				
					Wood Debris (% by volume)	*Beggiatoa*	Porewater H_2S (mg/L)	TOC (% dry weight)	% Fines (% wet weight)
Preliminary Screening Level					**10%**		**0.07** [a]		
	PG-NRD-45	10-Aug-21	-9	No	< 0.5%	No	0.25	0.56%	13.8%
	PG-NRD-46	10-Aug-21	-10	No	< 0.5%	No	0.18	0.82%	13.3%
Former DNR Log Storage Lease Area									
	PG-NRD-47	10-Aug-21	-14	No	< 0.5%	No	0.03 [d]	1.33%	20.5%
	PG-NRD-48	10-Aug-21	-27	No	5% to 10%	No	0.03 [d]	4.98%	39.5%
Seep in Former Log Transfer Facility Area									
	PG-NRD-49	10-Aug-21	4	No	< 0.5%	No	0.18	0.20%	28.4%

Notes:

Highlighted cells indicate exceedance of preliminary screening levels identifying degraded sediment benthic habitat functions (see text).

a. Risk-based sediment porewater H_2S benchmark developed by Ecology for Port Gamble Bay (Podger 2006; Anchor QEA 2018).

b. The binding gel in sample PG-NRD-28 could not be retrieved from the passive sampling assembly (see Attachment 1).

c. Average of sample duplicates (see Attachment 1)

d. Method detection limit (see Attachment 1)

Table 2
Driftwood Key Near-Surface Sediment Characterization Data Summary

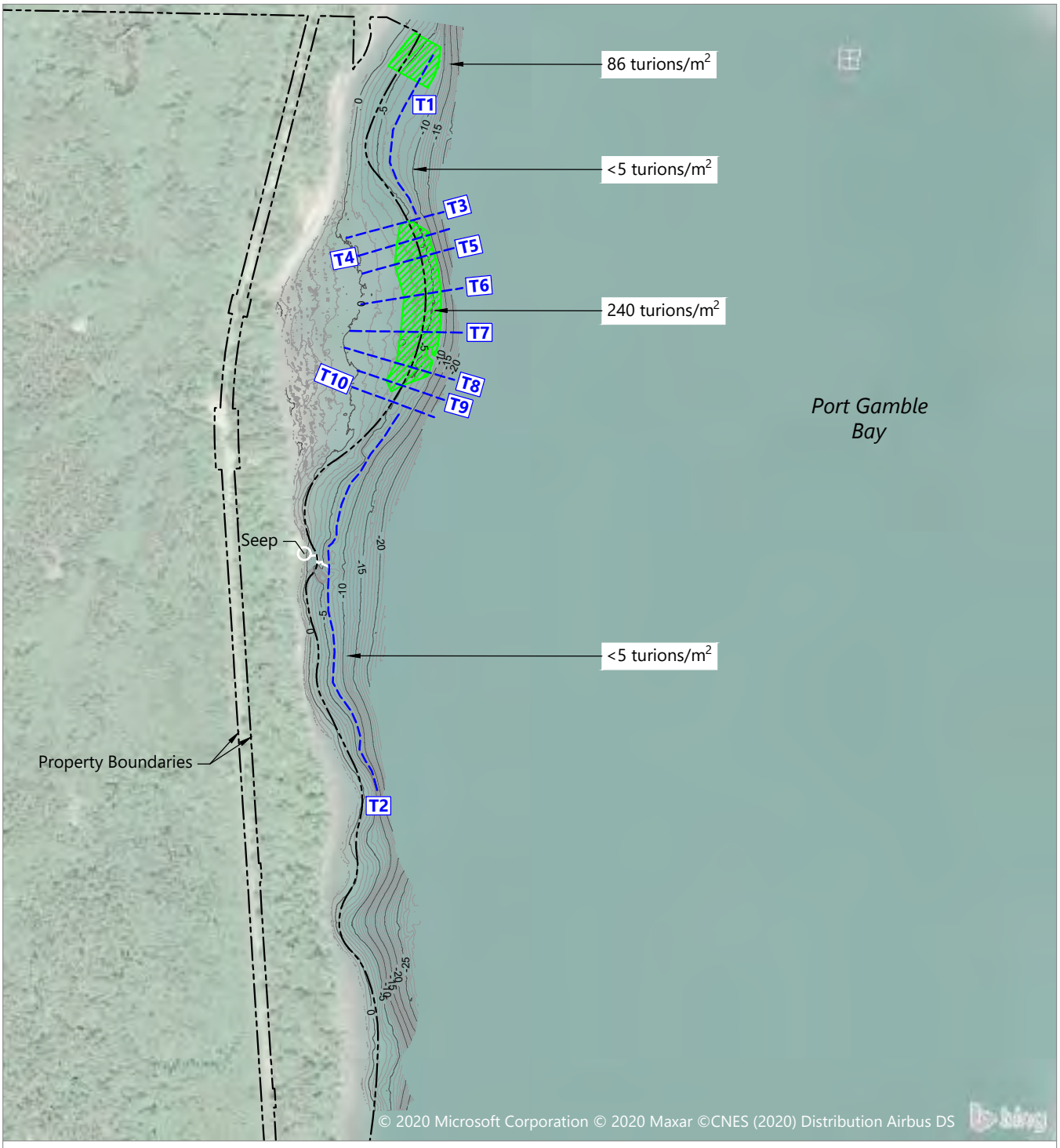
Chemical	Port Gamble Bay Cleanup Level	DMMP Screening Level	Location ID Sample Date	PG-DWK-COMP01 8/11/2021	PG-DWK-COMP02 8/11/2021	PG-DWK-COMP03 8/11/2021
Conventional Parameters (pct)						
Total organic carbon	--	--		**0.22**	**0.58**	**0.53**
Total Solids	--	--		**75.92**	**74.94**	**68.15**
Grain Size (pct)						
Gravel	--	--		**6.1**	**4.5**	NA
Gravel, very coarse	--	--		**3.5**	**2.7**	NA
Gravel, coarse	--	--		**0.5**	**0.3**	NA
Gravel, medium	--	--		**2.1**	**1.5**	NA
Sand	--	--		**86.5**	**89.9**	NA
Sand, very coarse	--	--		**2.6**	**2.2**	NA
Sand, coarse	--	--		**15.1**	**17.2**	NA
Sand, medium	--	--		**39.3**	**38.1**	NA
Sand, fine	--	--		**19.2**	**20.6**	NA
Sand, very fine	--	--		**10.3**	**11.8**	NA
Silt	--	--		**5.4**	**4.1**	NA
Silt, coarse	--	--		**1.4**	**1.7**	NA
Silt, medium	--	--		**1.9**	**1.3**	NA
Silt, fine	--	--		0.10 U	**0.3**	NA
Silt, very fine	--	--		**2.1**	**0.8**	NA
Clay	--	--		**2.2**	**1.6**	NA
Clay, coarse	--	--		**1.5**	**1**	NA
Clay, medium	--	--		**0.7**	**0.6**	NA
Clay, fine	--	--		0.10 U	0.10 U	NA
Percent Fines (silt + clay)	--	--		**7.6**	**5.7**	NA
Metals (mg/kg)						
Antimony	--	150		0.26 U	0.26 U	0.27 U
Arsenic	--	57		**2.65**	**2.06**	**2.1**
Cadmium	3	5.1		**0.22**	**0.09 J**	**0.11 J**
Chromium	--	260		**18.1**	**18.7**	**18.9**
Copper	--	390		**6.88**	**6.93**	**6.94**
Lead	--	450		**1.2**	**1.11**	**1.08**
Mercury	--	0.41		**0.00845 J**	**0.00813 J**	**0.00819 J**
Selenium	--	3		**0.58 J**	**0.38 J**	**0.38 J**
Silver	--	6.1		**0.03 J**	**0.03 J**	0.27 U
Zinc	--	410		**22.2**	**41.9**	**23.2**
Semivolatile Organics (µg/kg)						
1,2,4-Trichlorobenzene	--	31		20.0 U	19.9 U	19.9 U
1,2-Dichlorobenzene	--	35		20.0 U	19.9 U	19.9 U
1,4-Dichlorobenzene	--	110		20.0 U	19.9 U	19.9 U
2,4-Dimethylphenol	--	29		20.0 U	19.9 U	19.9 U
2-Methylphenol (o-Cresol)	--	63		20.0 U	19.9 U	19.9 U
4-Methylphenol (p-Cresol)	--	670		20.0 U	19.9 U	**12.6 J**
Benzoic acid	--	650		200 UJ	199 UJ	199 UJ
Benzyl alcohol	--	57		20.0 U	19.9 U	19.9 U
bis(2-Ethylhexyl)phthalate	--	1300		49.9 U	49.8 U	**11.6 J**
Butylbenzyl phthalate	--	63		20.0 U	19.9 U	19.9 U
Diethyl phthalate	--	200		49.9 U	**43.8 J**	49.9 U
Dimethyl phthalate	--	71		20.0 U	19.9 U	19.9 U
Di-n-butyl phthalate	--	1400		20.0 U	19.9 U	19.9 U
Di-n-octyl phthalate	--	6200		20.0 U	19.9 U	19.9 U
Hexachlorobenzene	--	22		20.0 U	19.9 U	19.9 U
n-Nitrosodiphenylamine	--	28		20.0 U	19.9 U	19.9 U
Pentachlorophenol	--	400		99.8 UJ	99.6 UJ	99.7 UJ
Phenol	--	420		20.0 U	19.9 U	**6.8 J**
Polycyclic Aromatic Hydrocarbons (µg/kg)						
1-Methylnaphthalene	--	--		**2.31 J**	**2.27 J**	**6.52**
2-Methylnaphthalene	--	670		**3.68 J**	**1.85 J**	**9.58**
Naphthalene	--	2100		**9.98**	**4.24 J**	**19.7**
Acenaphthene	--	500		**1.16 J**	4.99 U	**4.87 J**
Acenaphthylene	--	560		**2.31 J**	4.99 U	**4.90 J**
Fluorene	--	540		**1.27 J**	**0.69 J**	**5.57**
Phenanthrene	--	1500		**7.3**	**5.37**	**19.1**
Anthracene	--	960		**1.96 J**	**1.24 J**	**4.28 J**
Benzo(a)anthracene	--	1300		4.98 U	4.99 U	5.0 U
Benzo(a)pyrene	--	1600		4.98 U	4.99 U	5.0 U
Benzo(b)fluoranthene	--	--		**2.40 J**	**1.92 J**	**9.8**
Benzo(b,j,k)fluoranthenes	--	--		**3.68 J**	9.98 U	**15.7**
Benzo(g,h,i)perylene	--	670		4.98 U	4.99 U	**7.47**
Benzo(j)fluoranthene	--	--		4.98 U	4.99 U	5.0 U
Benzo(k)fluoranthene	--	--		4.98 U	4.99 U	5.0 U
Carbazole	--	--		20.0 U	19.9 U	19.9 U
Chrysene	--	1400		4.98 U	4.99 U	**10.1**
Dibenzo(a,h)anthracene	--	230		4.98 U	4.99 U	5.0 U
Dibenzofuran	--	540		**1.84 J**	4.99 U	**5.8**
Fluoranthene	--	1700		**7.74**	**7.77**	**29.7**
Indeno(1,2,3-c,d)pyrene	--	600		4.98 U	4.99 U	5.0 U
Pyrene	--	2600		**8.72**	**9.35**	**38.4**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 0)	16	--		**0.608 J**	**0.192 J**	**2.65**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 1/2 max	16	--		**4.12 J**	**4.21 J**	**6.15**
Total HPAH	--	12000		**20.14 J**	**17.12**	**101.37**
Total LPAH	--	5200		**23.98 J**	**11.54 J**	**58.42 J**

Table 2
Driftwood Key Near-Surface Sediment Characterization Data Summary

Chemical	Port Gamble Bay Cleanup Level	Location ID / Sample Date / DMMP Screening Level	PG-DWK-COMP01 8/11/2021	PG-DWK-COMP02 8/11/2021	PG-DWK-COMP03 8/11/2021
Pesticides (µg/kg)					
2,4'-DDD (o,p'-DDD)	--	--	1.00 U	1.00 U	1.00 U
2,4'-DDE (o,p'-DDE)	--	--	1.00 U	1.00 U	3.00 U
2,4'-DDT (o,p'-DDT)	--	--	1.00 UJ	1.00 UJ	1.00 UJ
4,4'-DDD (p,p'-DDD)	--	16	1.00 U	1.00 U	1.00 U
4,4'-DDE (p,p'-DDE)	--	9	1.00 U	1.00 U	1.00 U
4,4'-DDT (p,p'-DDT)	--	12	1.00 U	1.00 U	1.00 U
Total DDT	--	--	1.00 U	1.00 U	1.00 U
Aldrin	--	9.5	0.50 U	0.50 U	0.50 U
Chlordane, alpha- (Chlordane, cis-)	--	--	0.50 U	0.50 U	0.50 U
Chlordane, beta- (Chlordane, trans-)	--	--	0.50 U	0.50 U	0.50 U
Total Chlordane	--	2.8	1.00 U	3.99 U	3.00 U
Dieldrin	--	1.9	1.00 U	1.00 U	1.00 U
Endrin ketone	--	--	1.00 U	1.00 U	1.00 U
Heptachlor	--	1.5	0.50 U	0.50 U	0.50 U
Hexachlorobenzene	--	22	0.50 U	0.50 U	0.50 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene)	--	11	0.50 U	0.50 U	0.50 U
Nonachlor, cis-	--	--	1.00 U	1.00 U	1.00 U
Nonachlor, trans-	--	--	1.00 U	1.00 U	1.00 U
Oxychlordane	--	--	1.00 U	3.99 U	3.00 U
Dioxin Furans (ng/kg)					
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	--	--	0.488 U	0.494 U	0.495 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	--	--	2.44 U	2.47 U	2.47 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	--	--	2.44 U	2.47 U	2.47 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	--	--	2.44 U	**0.237 J**	**0.321 J**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	--	--	2.44 U	2.47 U	**0.304 J**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	--	--	**2.94**	**3.67**	**7.87**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	--	--	**20.4**	**27.5**	**65.6**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	--	--	0.488 U	0.494 U	**0.226 J**
Total Pentachlorodibenzo-p-dioxin (PeCDD)	--	--	2.44 U	2.47 U	2.47 U
Total Hexachlorodibenzo-p-dioxin (HxCDD)	--	--	**1.5 J**	**2.06 J**	**3.44 J**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	--	--	**9.46**	**12.1**	**26.5**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	--	--	0.488 U	0.494 U	0.495 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	--	--	2.44 U	2.47 U	2.47 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	--	--	2.44 U	2.47 U	2.47 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	--	--	2.44 U	2.47 U	2.47 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	--	--	2.44 U	2.47 U	2.47 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	--	--	2.44 U	2.47 U	2.47 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	--	--	2.44 U	2.47 U	2.47 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	--	--	**0.336 J**	**0.337 J**	**0.635 J**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	--	--	2.44 U	2.47 U	2.47 U
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	--	--	**0.572 J**	**0.38 J**	**1.54 J**
Total Tetrachlorodibenzofuran (TCDF)	--	--	0.488 U	0.494 U	0.495 U
Total Pentachlorodibenzofuran (PeCDF)	--	--	2.44 U	2.47 U	2.47 U
Total Hexachlorodibenzofuran (HxCDF)	--	--	**0.464**	**0.515**	**0.85 J**
Total Heptachlorodibenzofuran (HpCDF)	--	--	**0.811 J**	**0.817 J**	**1.54 J**
Total Dioxin/Furan (U = 0)	--	--	**24.2 J**	**32.1 J**	**76.3 J**
Total Dioxin/Furan (U = 1/2 max limit)	--	--	**38.2 J**	**45.0 J**	**87.9 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	5	4	**0.0391 J**	**0.0721 J**	**0.168 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2 max limit)	5	4	**2.80 J**	**2.74 J**	**2.71 J**
PCB Aroclors (µg/kg)					
Aroclor 1016	--	--	20.0 U	19.7 U	19.9 U
Aroclor 1221	--	--	20.0 U	19.7 U	19.9 U
Aroclor 1232	--	--	20.0 U	19.7 U	19.9 U
Aroclor 1242	--	--	20.0 U	19.7 U	19.9 U
Aroclor 1248	--	--	20.0 U	19.7 U	19.9 U
Aroclor 1254	--	--	20.0 U	19.7 U	19.9 U
Aroclor 1260	--	--	20.0 U	19.7 U	19.9 U

Notes:
Bold: Detected result
J: Estimated value
U: Compound analyzed for, but not detected above detection limit
UJ: Compound analyzed for, but not detected above estimated detection limit
DMMP = Dredged Material Management Program
Total LPAH = Sum of Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, and Anthracene in accoradance with the Dredged Material Management Program 2021 Dredged Material Evaluation and Disposal Procedures User Manual (2021 DMMP User Manual).
Total HPAH = Sum of Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Total Benzofluoranthenes, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene (2021 DDMP User Manual).
Total DDT = Sum of 4,4'-DDD, DDE, and DDT (2021 DDMP User Manual).
Total Chlordane = Sum of cis-chlordane, trans-chlordane, cis-nonachlor, trans-nonachlor, and oxychlordane (2021 DDMP User Manual).
Non-detect results are not included in the group summations.
µg/kg: micrograms per kilogram
mg/kg: milligrams per kilogram
ng/kg: nanograms per kilogram
pct: percent
NA: Not analyzed do to insufficent sediment recovered.

Figures



SOURCE: Survey by eTrac dated June 30, 2020.
HORIZONTAL DATUM: Washington State Plane North, North American Datum (NAD83), U.S. Survey Feet
VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

- Current Eelgrass Beds (July 2021)
- 2021 Eelgrass Survey Transect Location
- 5 — Existing Contours (1' & 5' Intervals)

0 800
Feet

Publish Date: 2021/09/29 12:31 PM | User: jbigsby
Filepath: K:\Projects\0388-Pope Resources\2020 Long Term Monitoring\0388-RP-011 (2021 Eelgrass Survey Transects).dwg Figure 1

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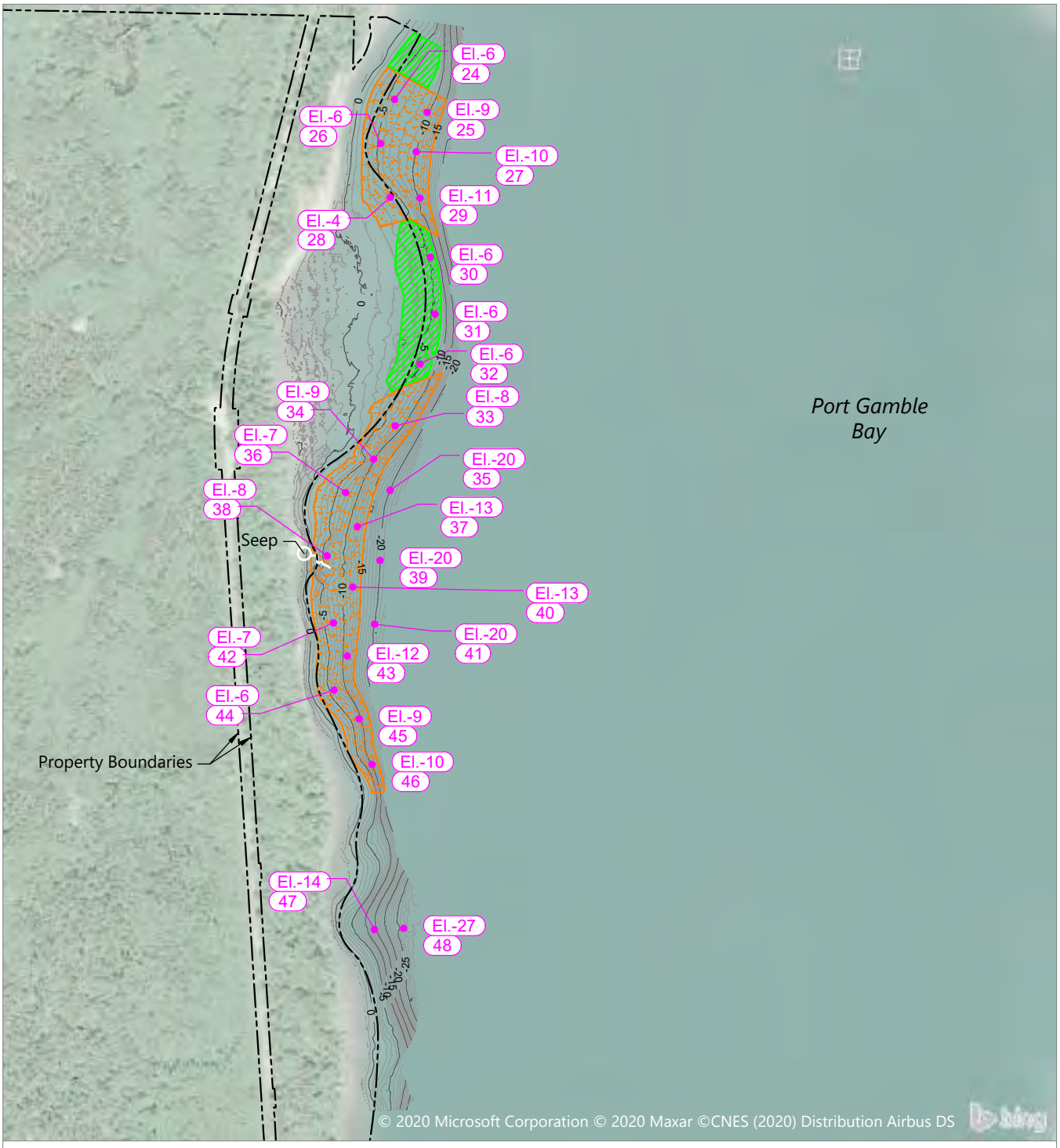
Figure 1
Western Port Gamble Bay 2021 Eelgrass Survey Transects
Port Gamble Bay Habitat Restoration



SOURCE: Survey by eTrac dated June 30, 2020.
HORIZONTAL DATUM: Washington State Plane North, North American Datum (NAD83), U.S. Survey Feet
VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

- Current Eelgrass Beds (July 2021)
- Sand Cover Placement Area
- 5 — Existing Contours (1' & 5' Intervals)
- 2020 Wood Debris Sampling Stations Re-Sampled in 2021

0 800
Feet

Publish Date: 2021/09/29 12:24 PM | User: jbigsby
Filepath: K:\Projects\0388-Pope Resources\2020 Long Term Monitoring\0388-RP-010 (2021 Resample).dwg Figure 2

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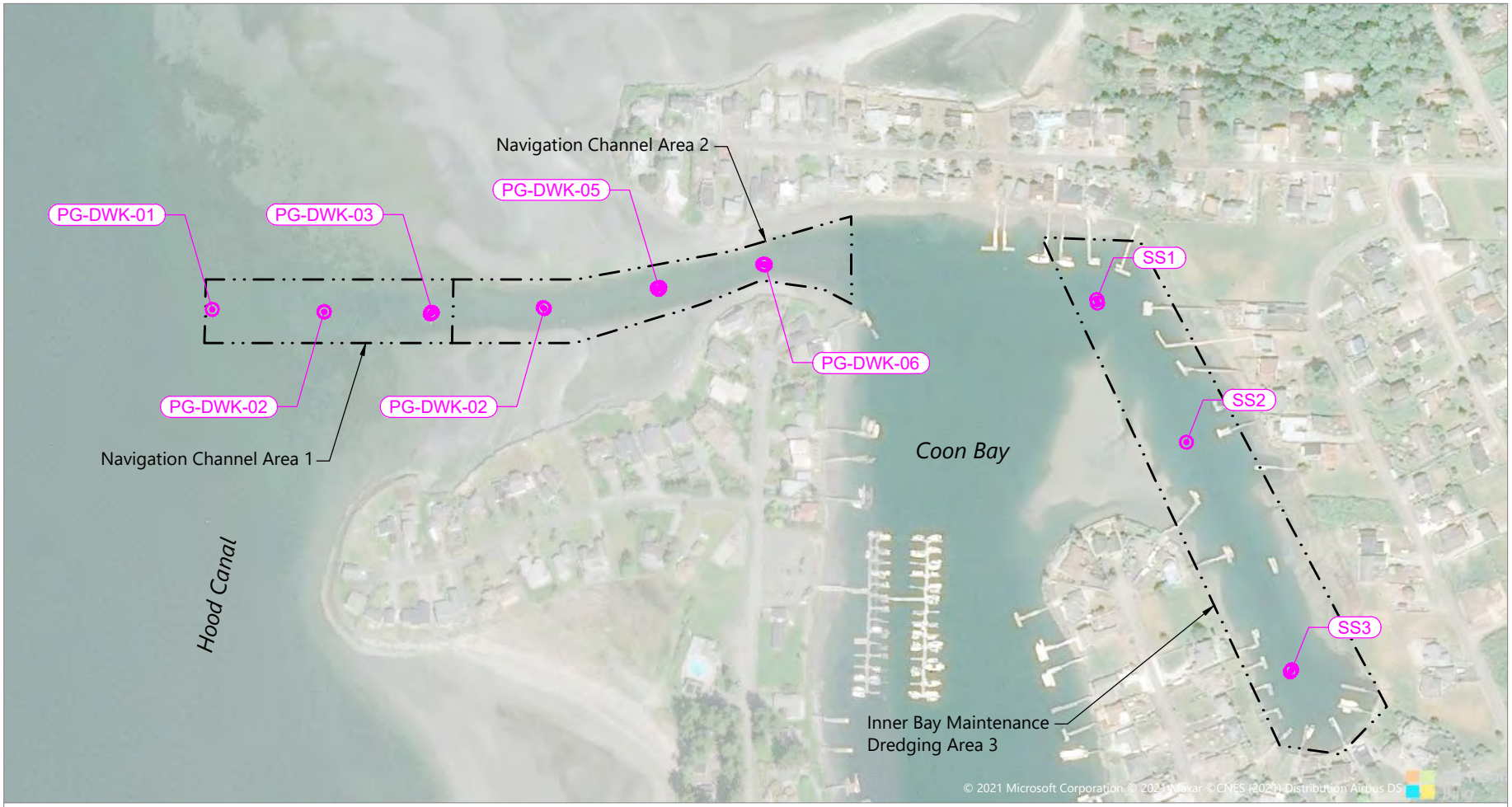
Figure 2
Western Port Gamble Bay Wood Debris Sampling Locations
Port Gamble Bay Habitat Restoration



SOURCE: Aerial ©2021 Microsoft Corporation
©2021 Maxar ©CNES (2021) Distribution Airbus DS
HORIZONTAL DATUM: Washington State Plane, North Zone, NAD83, U.S. Survey Feet

LEGEND:

- 2021 Near-Surface Sediment Sampling Station

0 400
Feet

Publish Date: 2021/09/28 11:09 AM | User: jbigsby
Filepath: K:\Projects\0388-Pope Resources\2020 Long Term Monitoring\0388-RP-010 (2021 Resample).dwg Figure 3

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Figure 3
Driftwood Key Near-Surface Sediment Sample Locations (Inner Bay and Navigation Channel Areas)
Port Gamble Bay Habitat Restoration

Attachment 1
Sulfide Measurement in Porewater Using Diffusive Gradients in Thin Films

6720 South Macadam Avenue, Suite 125
Portland, Oregon 97219
503.670.1180

Memorandum

September 21, 2021

To: Clay Patmont, Anchor QEA, LLC

From: Masa Kanematsu, Anchor QEA, LLC

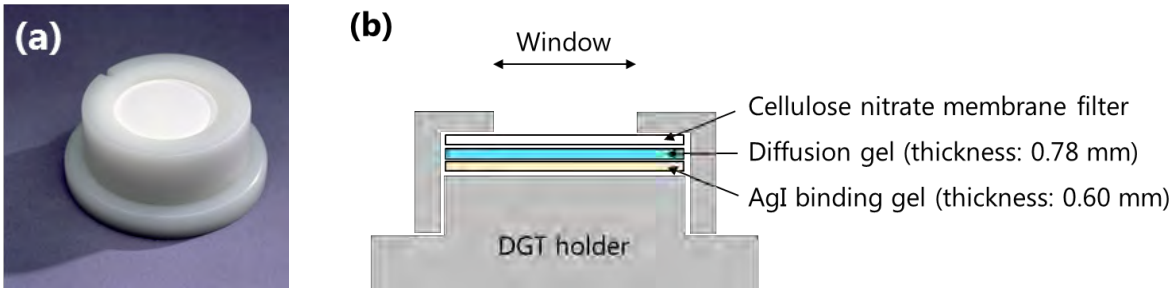
Re: Sulfide Measurement in Porewater Using Diffusive-Gradients-in-Thin-Films (DGT)

This memorandum summarizes dissolved sulfide measurements in sediment porewater samples collected August 8 and 9, 2021, within Western Port Gamble Bay. Dissolved sulfide concentrations were determined using the diffusive gradients in thin-films (DGT) method based on the reaction of sulfide with silver iodide (AgI), a white powder impregnated in a gel to produce silver sulfide (Ag_2S), a black solid (Teasdale et al. 1999; Rearick et al. 2005). The intensity of the black color developed is correlated with the amount of sulfide accumulated in the gel. A calibration curve between optical densitometry and dissolved sulfide concentration was previously developed by Anchor QEA's Environmental Geochemistry Laboratory over a wide range of dissolved sulfide concentrations.

Materials and Methods

DGT piston devices were obtained from DGT Research.[1] The DGT samplers, preloaded for sulfide measurement, consist of a standard DGT holder containing a 0.60-millimeter (mm)-thick silver iodide (AgI) impregnated binding gel layer, overlain by a 0.78-mm-thick polyacrylamide diffusive gel, held in place by a 0.45-micrometer (µm)-cellulose nitrate membrane filter (Figure 1). The window size of the DGT sampler was 2.54 square centimeters. Prior to deployment, the DGT assemblies were deoxygenated by immersion in a 0.3 molar sodium chloride solution purged with high-purity nitrogen gas overnight to remove any residual oxygen.

Figure 1
DGT Piston Assembly (a) and Cross-Section View (b)



Note:
Source of image (a): http://www.dgtresearch.com/

[1] DGT Research information is available at http://www.dgtresearch.com.

DGT sampler assemblies were deployed in surface sediment samples for a 24.0 ± 0.2-hour exposure period, after which the DGT assemblies were retrieved and rinsed with deionized (DI) water. After retrieval, the DGT assemblies were immediately shipped on ice to the Anchor QEA Environmental Geochemistry Laboratory in Portland, Oregon. The binding gel layers were then retrieved from the DGT assemblies and rinsed with DI water (the DGT binding gel in sample PG-NRD-28 could not be retrieved from the DGT assembly). The binding gels were laid on a thin cellophane sheet (Bio-Rad) and covered with a second cellophane sheet. The sheet assembly was placed in a vacuum gel dryer (Bio-Rad, Model 583) and dried for 2 hours at 80°C. The dried sheet assembly was then digitally scanned (Konica Minolta BizHub-C364) and saved as a gray-scale image. Gel analysis software (UN-SCAN-IT Gel Version 7.1) was used to measure and record the gray-scale intensity of each binding gel on the scanned image.

Results

Images of the retrieved binding gels are presented in Figure 2. Total dissolved sulfide concentrations in porewater ($H_2S_{(aq)} + HS^- + S^{2-}$) determined by the DGT method are tabulated in Table 1. Based on field measurements of pH (summarized in Table 1), salinity (9.2 ±1.3 parts per thousand), and temperature (11.9°C ± 1.4°C) obtained at each sampling location, dissolved concentrations of hydrogen sulfide ($H_2S_{(aq)}$) were also calculated and tabulated in Table 1 (Millero et al. 1988; Phillips et al. 1997). Measured concentrations of $H_2S_{(aq)}$ ranged from the detection limit of 0.03 milligrams per liter (mg/L) to 3.98 mg/L. Duplicate analyses were performed on samples PG-NRD-34 (coefficient of variation [CV] = 3%) and PG-NRD-38 (CV = 53%).

Figure 2
Retrieved DGT Binding Gels Deployed at the Site for Approximately 24 Hours

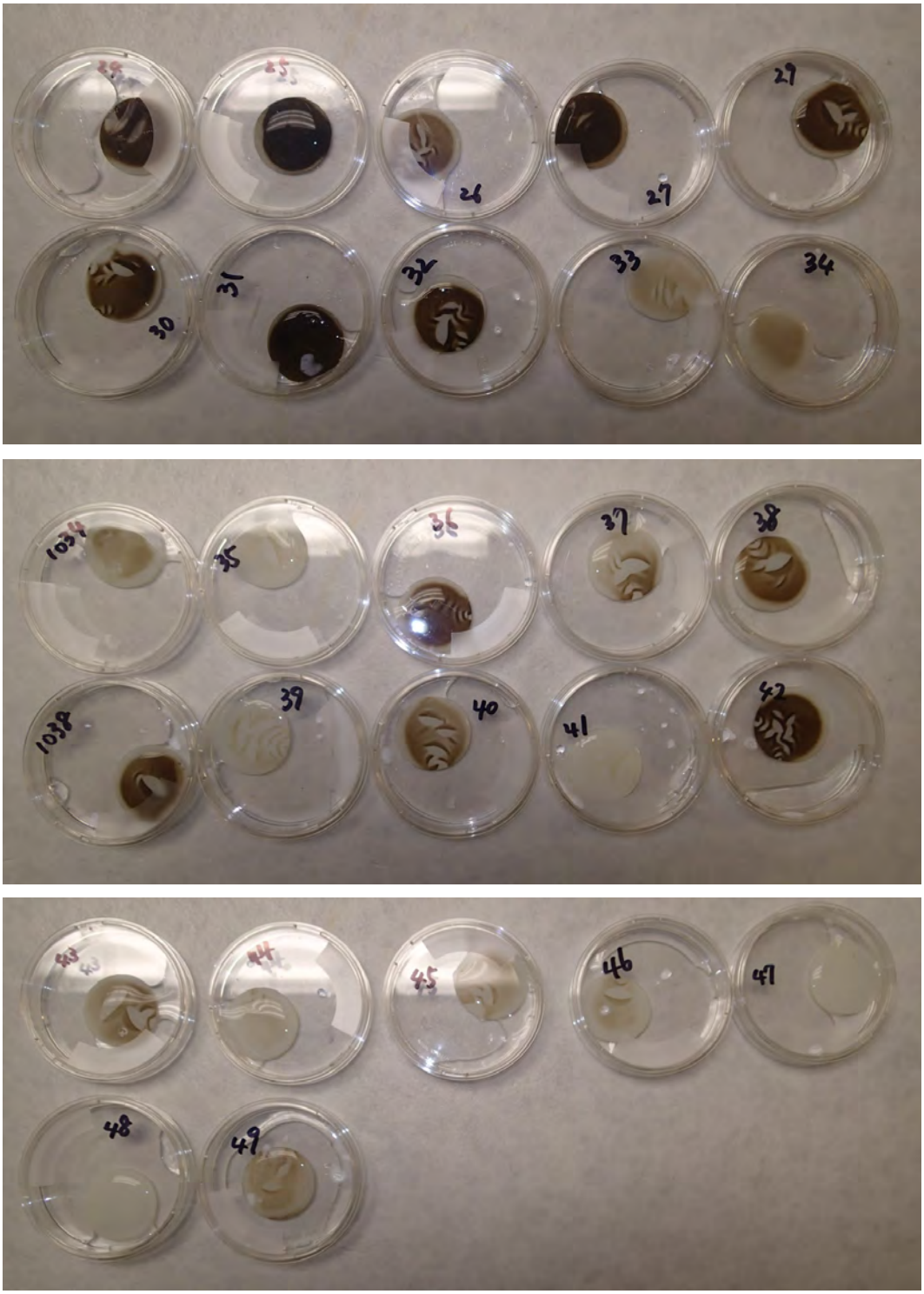


Table 1
Total Dissolved Sulfide Concentrations Determined by the DGT Method and Calculated Hydrogen Sulfide ($H_2S_{(aq)}$) Concentrations in Porewater

Sample ID	Porewater Total Dissolved Sulfide Concentration (mg/L)	pH (standard units)	Porewater $H_2S_{(aq)}$ Concentration (mg/L)
PG-NRD-24-DGT-210810	4.70	6.36	3.53
PG-NRD-25-DGT-210810	5.67	6.44	3.98
PG-NRD-26-DGT-210810	1.20	6.27	0.95
PG-NRD-27-DGT-210810	4.86	6.69	2.67
PG-NRD-28-DGT-210810	-	6.79	-
PG-NRD-29-DGT-210810	3.08	6.75	1.67
PG-NRD-30-DGT-210810	2.88	6.72	1.59
PG-NRD-31-DGT-210810	5.76	6.52	3.84
PG-NRD-32-DGT-210810	2.51	6.48	1.73
PG-NRD-33-DGT-210810	0.35	6.77	0.19
PG-NRD-34-DGT-210810	0.50	6.96	0.21
PG-NRD-1034-DGT-210810	0.48	6.96	0.20
PG-NRD-35-DGT-210810	0.29	6.99	0.12
PG-NRD-36-DGT-210810	2.82	6.84	1.41
PG-NRD-37-DGT-210810	0.31	7.05	0.12
PG-NRD-38-DGT-210810	1.44	6.91	0.66
PG-NRD-1038-DGT-210810	3.17	6.91	1.45
PG-NRD-39-DGT-210810	0.26	6.94	0.12
PG-NRD-40-DGT-210811	0.85	6.87	0.42
PG-NRD-41-DGT-210811	0.10	6.91	0.05
PG-NRD-42-DGT-210811	2.86	6.61	1.82
PG-NRD-43-DGT-210811	0.58	6.92	0.27
PG-NRD-44-DGT-210811	0.29	6.79	0.16
PG-NRD-45-DGT-210811	0.52	6.91	0.25
PG-NRD-46-DGT-210811	0.32	6.77	0.18
PG-NRD-47-DGT-210811	0.06	6.91	0.03
PG-NRD-48-DGT-210811	0.05	6.84	0.03
PG-NRD-49-DGT-210811	0.34	6.88	0.18

Notes:
The method detection limit is 0.03 mg/L H_2S.
The DGT binding gel in sample PG-NRD-28 could not be successfully retrieved from the DGT assembly.

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Appendix D
Coastal Engineering Design Criteria

January 2024
Port Gamble Integrated Cleanup and Habitat Restoration Design

ANCHOR QEA

Appendix D Coastal Engineering Design Criteria

Prepared for Washington State Department of Ecology and Port Gamble Natural Resource Trustees

January 2024
Port Gamble Integrated Cleanup and Habitat Restoration Design

Coastal Engineering Design Criteria

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1 Introduction

The main body and other appendices of this Engineering Design Report (EDR) describe the approach and criteria for the engineering design of sediment cleanup actions in Port Gamble Bay that will be implemented in accordance with the requirements of Consent Decree (CD) 13-2-02720-0 between OPG Port Gamble LLC; Pope Resources, a Delaware Limited Partnership; and OPG Properties LLC (collectively, the Companies) and the Washington State Department of Ecology (Ecology). Habitat restoration actions are set forth in the Bay Habitat Restoration Statement of Work (SOW; Anchor QEA 2023), and in accordance with the pending Natural Resource Damage (NRD) CD between the Companies and the Port Gamble S'Klallam Tribe (PGST); the Suquamish Tribe; the Skokomish Indian Tribe; the Jamestown S'Klallam Tribe; the Lower Elwha Klallam Tribe; the U.S. Department of the Interior; and Ecology (collectively, the Natural Resource Trustees).

The Port Gamble Integrated Cleanup and Habitat Restoration Design project includes excavating approximately 15,000 cy of fill over 1,450 lineal feet of the southern Mill Site shoreline to lay back upper intertidal slopes to achieve an average slope of approximately 8 Horizontal (H):1 Vertical (V).To support technical evaluations of the shoreline restoration design, Anchor QEA previously performed several detailed coastal evaluations of the project site, including development of a wave transformation model for the site and vicinity. This appendix provides a summary of the model development and initial summary of model results.

The coastal design criteria for the shoreline restoration work (Work Zone 3) include the following:

- Wave conditions in the project area were based on wind hindcasting for 20-, 50-, and 100-year recurrence interval events based on wind from the NOAA station WPOW1 in West Point, Washington. The wave hindcast was completed using predicted wind speeds from 45-degree (northeast), 105-degree (west southwest), and 165-degree (south southwest) directions, which represent the most relevant trajectories of wave attack in the project area (Anchor QEA 2015). Nearshore wave heights for the 100-year recurrence interval were evaluated using a wave transformation model to optimize armor rock size for that event.
- Stable sediment and armor sizes for shoreline areas impacted by waves were calculated using guidance in the USACE (2002) Coastal Engineering Manual.
- The impacts of predicted sea level rise for the years 2050 and 2100 on predicted wave heights and proposed stable rock sizes for remedial actions

2 Site Description and Background

Port Gamble Bay (Bay) is in Kitsap County, Washington, and encompasses more than 2 square miles of subtidal and shallow intertidal habitat just south of the Strait of Juan de Fuca. The Port Gamble Project Site (Site) is in the northwest portion of Puget Sound at the northern end of Hood Canal. The north shoreline faces Puget Sound (Hood Canal) and the east and south shorelines face Port Gamble Bay. The Bay and surrounding areas support diverse aquatic and upland habitats, as well as resources for fishing, shellfish harvesting, and other aquatic uses. The area surrounding the Bay remains largely rural in nature, though more than 100 acres of the basin are currently in commercial land use, largely in the Gamble Creek watershed. The PGST Reservation is located on the eastern shoreline of the Bay; tribal members use the Bay for shellfish harvesting, fishing, and other resources. The Mill Site is located on a sand spit that was filled to create the upland area for the former sawmill in the northwest portion of the Bay.

In January 2017, Pope Resources/Olympic Property Group (PR/OPG) completed in-water elements of the bay-wide cleanup of Port Gamble Bay, as required by the consent decree with Ecology. As part of the design, shoreline slopes were protected with armor at slopes of 3 Horizontal (H) to 1 Vertical (V) (3H:1V).

Construction of the bay-wide cleanup occurred over two construction seasons. Prior to the completion of the slope armor caps, a small portion of the amor and filter layers along the north side of the Port Gamble Mill Site Uplands were damaged during construction. As described in the Final Cleanup Action Report – Season 2 (Anchor QEA, 2018a), damage was potentially a result of propeller wash and/or localized groundwater seepage. The damaged cap areas were backfilled with larger salvaged stone to restore the 3H:1V slope and additional wave modeling was performed to address wave induced scour associated with changes to the jetty breakwater. Results of the modeling prompted the replacement of original Type 1 armor material with Type 2 armor material. In addition to the northern portion of the Mill Site, cap repairs were made during construction to a portion of the northern end of the jetty. Erosion had been observed exposing untreated pilings within the cap footprint. The cap was modified and repaired and the armor material replaced from Type 1 to Type 2 stone.

Cap maintenance activities were performed following the 2018 Year-1 survey and inspection as described in the 2018 Intertidal Cap Maintenance Recommendations Memorandum (Anchor QEA 2018b). These maintenance activities were limited to an area (approximately 300 linear feet) on the eastern end of the SMA-2 intertidal cap (north facing shoreline along the north side of the site) in the upper portion of the 3H:1V slope (above +5 MLLW). Along a 25- to 30-foot section of slope, armor material was displaced revealing underlying filter material. Adjacent areas of about 20 to 40 feet on either side of the exposed filter material showed some armor material movement but no

underlying filter material was exposed. The repairs made involved a total area of approximately 3,700 square feet. In an effort provide increased protection while still maintaining habitat benefit by not overly increasing the rock size the armor rock size used for these repairs was increased from a median diameter of 9 inches to a size ranging from 12 to 18 inches (with no material smaller than 12 inches). In the area where filter layer was exposed, armor rock was underlain with 0.5 to 1 foot of quarry spall sized filter material.

Following repairs in 2018, the winter storm season of 2018 to 2019 had many high wind and water level events, many for extended time periods. Tidal data and observations are summarized in the *Port Gamble Bay Cleanup Project – Coastal Engineering Evaluation of Shoreline Erosion* memorandum (Anchor QEA 2019). Three main wind directions produce waves and higher tides along the shorelines at Port Gamble: north, southeast, and south. Wind events observed from November 2018 to April 2019 ranged in intensity from a typical annual event to an approximate 10-year storm event, with high winds lasting for long periods of time. These large storm durations resulted in storm surges and elevated tides along the shoreline for long periods of time. The end of November (November 27 to 30) experienced tides 1 to 1.5 feet higher than predicted. Mid-December (December 12 through 24) experienced tides 1 to 2 feet higher than predicted. The highest tides of January (January 14 through 21) were 1 to 1.5 feet higher than predicted. The highest tides of February (February 11 through 15) were 1 foot higher than predicted. Based on the historical wind data collected from NOAA station WPOW1 at West Point, Washington, the Site experienced one 10-year storm event, several 2-year storm events, and several typical annual storm events over a 5-month period. Many of these storms were also characterized by higher-than-normal tides (storm surge) and unexpectedly long durations (i.e., 72 to 96 hours). Following this series of storm events, refined modeling was performed to resize the armor rock. Anchor QEA made a series extensive repairs to reinforce erosion protection in various areas, including placing filter material and armor rock in numerous portions of the slopes where significant erosion and scour had been observed. These repairs included a larger filter layer as well as two layers of armor rock along portions of the northern shoreline, eastern facing shoreline, and southern facing shoreline of the Mill Site uplands, as well as spot repairs to grade slopes using a “triangle” or armor rock in pockets of scour.

3 Water Levels

National Oceanic and Atmospheric Administration (NOAA) Station 9445016 at Foulweather Bluff, located 5.75 miles north of Port Gamble, was used to estimate tides at the project Site. Table D-1 shows the tide levels for the gauge. Elevations are presented relative to the Mean Lower Low Water (MLLW) level vertical datum.

Table D-1
Tidal Datums – Port Gamble

Datum	Elevation in feet MLLW
Mean Higher High Water (MHHW)	10.0
Mean High Water (MHW)	9.2
Mean Tide Level (MTL)	5.9
Mean Sea Level (MSL)	5.9
Mean Low Water (MLW)	2.7
North American Vertical Datum of 1988 (NAVD88)	2.1
Mean Lower Low Water (MLLW)	0.0

4 Wind Wave Hindcast

This section summarizes previous technical evaluations that were performed for the site as well as previous construction and maintenance that has been performed at the Mill Site.

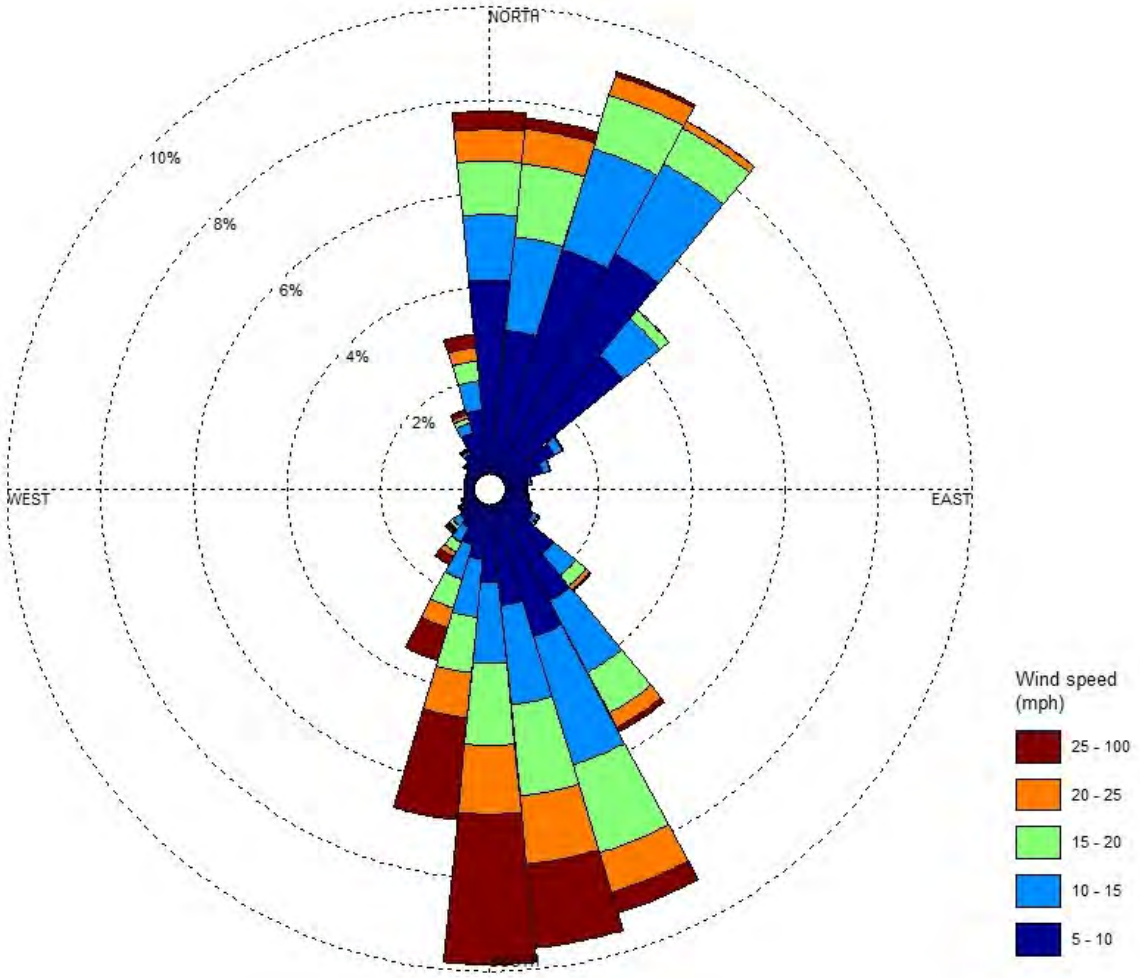
4.1 Coastal Evaluation (2015)

As part of the 2015 Port Gamble Cleanup Project, a coastal engineering evaluation was conducted to provide predictions of extreme wave conditions along the shoreline at the Site to inform the remedial design. Long-term wind data from a nearby wind gauge was used to estimate the 2-, 10-, 20-, 50-, and 100-year storm events for the area from a variety of wind directions. These extreme wind speeds, fetch lengths, and average water depths were then used to estimate the storm waves that will break within the intertidal zone of Port Gamble. Predicted wave heights were used to estimate stable rock sizes and the extent of armoring required for the proposed intertidal cap areas. The effects of predicted sea level rise (SLR) for the years 2050 and 2100 (Miller et. al. 2018) on predicted wave heights and proposed stable rock sizes for remedial actions are also discussed in this evaluation.

The wave conditions near Port Gamble were estimated by applying wind wave growth formulas to wind data from NOAA station WPOW1 in West Point, Washington. The wind data encompassed hourly wind speeds (2-minute averages) for the years of 1984 to 2009. The predominant wind direction was from the south and southeast of the Bay. The extreme wind speeds were evaluated for each 30-degree wind direction bin from true north (e.g., 0 to 30 degrees, 30 to 60 degrees, etc.). The Raleigh distribution was used to develop the extreme wind speeds with R2 values equal to or greater than 0.91 for all direction bins.

The original wind data were found to have some apparent outliers, which represent significantly higher sustained wind speeds than nearby gage locations for the same time period. These data tend to skew estimates of extreme wind speeds for 150 to 210 degree directions, resulting in higher wind speeds than may be realistic. However, the original data were not altered (outliers were not removed) for this analysis, to be conservative.

Figure D1-1
West Point, Washington, Wind Speed Distribution (1984 to 2009)



Source: Wind data from NOAA station WPOW1 in West Point, Washington

Predicted values of extreme wind speeds from station WPOW1 were used as input into the Automated Coastal Engineering System (ACES) using the Windspeed Adjustment and Wave Growth module (fetch limited) to predict significant wave heights and peak wave periods generated by the extreme winds (USACE 1992). Results of the wave growth analysis are shown in Table D-2. The highest winds and waves are from the north and south. However, waves from the North will not effect the areas selected for this project, only waves from the south, southeast, and east will break on the shoreline in Work Zone 3.

A 100-year storm from south is estimated to have waves of 3.4 feet high. The east and west directions experience far less occurrence of high wind speeds; however, from the east, a 100-year storm is estimated to produce waves of 0.4 foot.

Table D-2
Wave Growth Analysis

Direction (degrees)	Average Depth (ft)	Fetch (miles)	2-year			10-year			20-year			50-year			100-year		
			Wind (mph)	Height (ft)	Period (s)	Wind (mph)	Height (ft)	Period (s)	Wind (mph)	Height (ft)	Period (s)	Wind (mph)	Height (ft)	Period(s)	Wind (mph)	Height (ft)	Period(s)
0-30	5	1.2	34	1.03	1.89	42	1.29	2.11	44	1.34	2.15	47	1.45	2.24	49	1.52	2.29
31-60	5	0.5	24	0.48	1.28	29	0.60	1.41	31	0.65	1.46	33	0.70	1.51	35	0.75	1.56
61-90	20	0.2	17	0.21	0.86	20	0.26	0.94	22	0.29	0.99	23	0.30	1.01	24	0.32	1.03
91-120	10	0.3	15	0.22	0.89	21	0.33	1.06	22	0.35	1.09	25	0.41	1.17	26	0.43	1.21
121-150	5	0.6	33	0.76	1.58	41	0.98	1.78	44	1.06	1.84	47	1.15	1.91	49	1.20	1.96
151-180	8	2.2	52	2.23	2.80	66	2.85	3.18	71	3.06	3.30	76	3.27	3.42	80	3.44	3.52
181-210	8	1.3	56	2.05	2.59	67	2.5	2.86	70	2.62	2.93	74	2.79	3.02	76	2.87	2.06
271-300	50	2.5	13	0.54	1.46	18	0.79	1.75	20	0.90	1.85	22	1.01	1.95	23	1.07	2.00
301-330	40	2.4	24	1.10	2.02	36	1.82	2.53	40	2.08	2.68	44	2.35	2.83	47	2.55	2.94
331-360	60	5.0	38	2.80	3.18	48	3.78	3.63	51	4.09	3.76	55	4.50	3.92	57	4.71	4.00

Armor rock size specified for the cap armor as part of the 2015 EDR was calculated using the Automated Coastal Engineering System (ACES) (USACE, 1992) using a damage control level of "2," which allows for some movement of armor rock under storm events. The appropriate armor size for a shoreline slope of 3H:1V was determined to have a d50 of 9 inches (Anchor QEA, 2015).

4.2 Coastal Evaluation (2019)

The winter storm season of 2018 to 2019 had many high wind and water level events, many for extended time periods. During these events, armor rock was moved along the shoreline that required repair. As a result, a re-evaluation was performed to repair the damaged slope and re-size the protective armor rock.

Based on observed winds, the site experienced one 10-year storm event, several 2-year storm events, and several typical annual storm events over a 5-month period. Many of these storms were also characterized by higher-than-normal tides (storm surge) and unexpectedly long durations (i.e. 72 to 96 hours) (Anchor QEA 2019).

Armor rock size specified for the original cap armor (9 inches) was calculated using ACES (USACE, 1992) using a damage control level of "2," which allows for some movement of armor rock under storm events. It was determined that the calculation resulted in a smaller armor rock size than using a damage control level that allows for no movement of armor rock. The expected armor rock movement at Port Gamble was likely exacerbated by the large number of storms that occurred over a relatively short time frame, as well as by long storm durations resulting in unusually high water levels (storm surge) coupled with large waves.

The armor rock sized during the re-evaluation in 2019 was calculated using ACES for non-uniform armor rock gradation using a damage level of "0," which corresponds to no movement of armor rock under storm events. Armor rock size calculated for zero movement, was determined to range from 1 to 2 feet in diameter with a median diameter of approximately 1.5 feet.

5 Intertidal Cap Armor Size

For this design, The U.S. Army Corps of Engineers (USACE) ACES Rubble Mound Revetment Design module was again used to estimate revetment armor stone sizes, thicknesses, and gradation characteristics required, as well as runup estimates (USACE 1992). This evaluation used a damage level of "2" rather than a damage level of "0" as was used for the 2019 reevaluation. A damage level of "2" is applicable for proction of slopes ranging from 1.5H:1V to 3H:1V and a damage level of "3" is applicable to slopes ranging from 3H:1V to 6H:1V. Both damage levels allow for some motion of material under storm conditions, where a damage level of "0" conservatively allows for no motion of armor materials. Because the intertidal cap slope for this design is a proposed 8H:1V slope with two additional layers of overlaying protective material, a damage level of "2" is considered conservative for this design. Table D-3 provides the median (D50) rock size that would be stable (limited to no damage) for the given waves in Table D-2 for 6H:1V, 8H:1V, and 10H:1V slopes. Wave heights from the 20-year, 50-year, and 100-year storm events were evaluated. The waves were assumed to impact the slope head-on. Armor was sized appropriately for waves approaching from the southeast to be conservative. Table D1-3 also provides the vertical runup height. The vertical runup represents the expected maximum runup found using the Ahrens and Heimbaugh method (USACE 1992).

Table D-3
Stable Armor Rock Size and Projected Wave Runup

Storm Event	Wave Height (feet)	Wave Period (feet)	6H:1V Slope		8H:1V Slope		10H:1V Slope	
			D50 (Feet)	Runup (Feet)	D50 (Feet)	Runup (Feet)	D50 (Feet)	Runup (Feet)
20-year Storm	3.06	3.30	0.5	2.3	0.4	1.6	0.4	1.5
50-year Storm	3.27	3.42	0.5	2.4	0.5	1.7	0.4	1.6
100-year Storm	3.44	3.52	0.6	2.5	0.5	1.8	0.4	1.6

Notes: Maximum wave direction from the southeast; calculated for head-on waves. The large waves from the southeast impact Reach 4 at oblique angles to the shoreline. However, the effect of oblique wave approach on armor layer stability has not been quantified. Existing studies suggest that there is not significant impact for waves up to a 60 degree angle of approach (Allsop 1995).

Because the shoreline is intended to promote habitat, the armor layer is intended to be overlain by appropriate material to establish intertidal habitat. Additional layers of protective material will be placed atop the armor. The top layer of material will be a rounded gravel material along the project shoreline. Typical gravel size would be up to 2.5 inches in diameter with placement on slopes ranging from 8H:1V to 10H:1V. The gravel beach erosion protection approach allows some movement of material under design wave conditions; this movement is typically localized and loss of material beyond localized movement is not expected under normal wave and storm conditions. However, there is uncertainty in the level of shoreline stabilization that would be provided by habitat

gravel during large storm events and prolonged storm events coupled with high tides. The movement of material in the upper layer would be stabilized by littoral drift and the material supply within the feeder berm to be placed along the southern limit of the shoreline, helping the beach reach a natural protective equilibrium profile. The lowest layer of the habitat cap is not expected to mobilize based on sizing and presence of additional overlying material.

6 Extent of Intertidal Armor Cap

The intertidal cap armor should extend upslope to the vertical extent of wave runup during the 100-year storm and Sea level Rise (SLR) based on the water level elevation at mean higher high water (MHHW) and downslope to mean lower low water (MLLW) elevation where it will tie into existing slope armoring that extends below MLLW. The highest runup elevation is found by adding the runup height (shown in Table D-3) with the elevation of MHHW at the Site (shown in Table D-1, 10 feet). The upper bounds of the armor are shown in Table D-4.

The extent of intertidal armor refers to requirements to stabilize intertidal areas within the active surf zone at the Site.

Table D-4
Upper and Lower Elevations of Armor on Intertidal Slope

Storm Event	6H:1V Slope		8H:1V Slope		10H:1V Slope	
	Lower Elevation (feet)	Upper Elevation (feet)	Lower Elevation (feet)	Upper Elevation (feet)	Lower Elevation (feet)	Upper Elevation (feet)
100-year Storm	+0	+12.5	+0	+11.8	+0	+11.6

7 Additional Cap Considerations

While the past repairs made to various portions of the Mill Site shoreline have held and not since required additional maintenance, though unexpected, there is a potential that upland cleanup design work and intertidal capping detailed in the Integrated EDR may require some maintenance in the future if a similar series of large storm events occurs over a short period of time coupled with significant tidal elevations.

Sea Level Rise (SLR) estimates for the project area were developed from data generated for the Coastal Resiliency Project Report for Projected Sea Level Rise for Washington State (Miller et. al. 2018.). Data from this report was used to create a visualization tool providing site-specific sea-level rise estimates for coastal areas in Washington State. The projections were estimated for the coastal areas in Kitsap County where the project site is located. Mid-range SLR estimates from this report are 0.7 feet to 0.8 feet by 2050 and 1.8 feet to 2.2 feet by 2100.

SLR estimates for 2050 would increase the MHHW elevation by approximately 0.7 to 0.8 foot compared to current conditions. This would have a negligible impact on predicted wave heights at the site; however, it could increase the vertical extent of wave run-up and amount of overtopping for the armored slope at the shoreline. The increase in wave run-up and overtopping based on the 0.7 to 0.8 feet of SLR is not anticipated to result in damage to the armored slope or changes to the slope design.

SLR estimates for 2100 would increase the MHHW elevation by up to approximately 2.2 feet compared to current conditions. A 2.2-foot increase in mean sea levels could result in slightly higher nearshore waves along the project shorelines. In addition, increases in wave run-up and overtopping could be significant, and may require the crest elevation of the armored slope to be increased to prevent overwash damage. The performance of the armored slope, as well as revisions to SLR estimates, should be monitored periodically over the design life of the restoration to ensure its stability.

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Appendix E
Construction Drawings

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

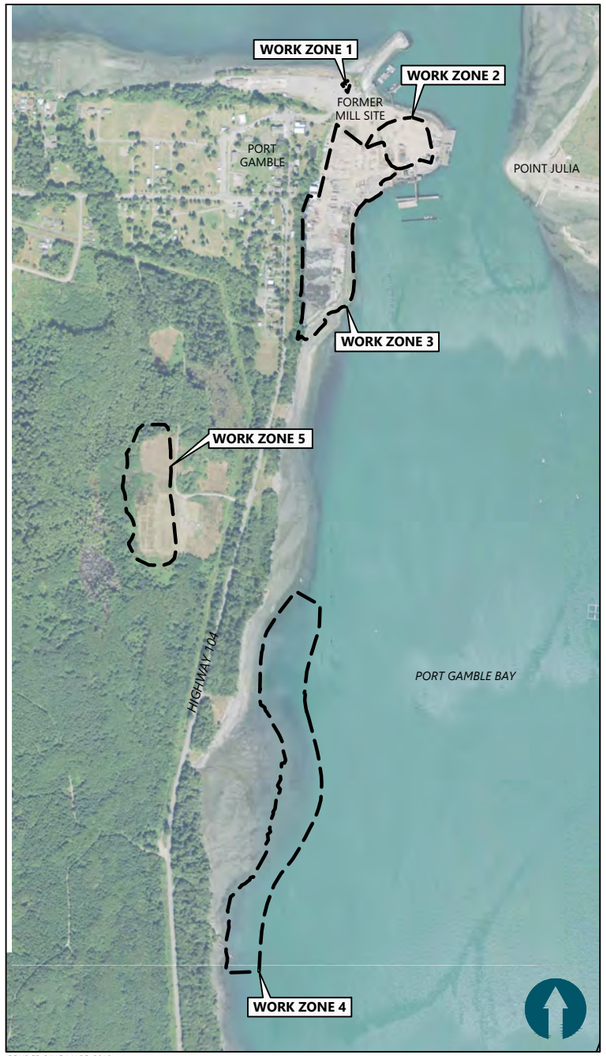
POPE RESOURCES

VICINITY MAP

SOURCE: ESRI

0 5 10
SCALE IN MILES

LOCATION MAP



SOURCE: BING MAPS, 2010

0 60 120
SCALE IN FEET

DRAWING INDEX		
SHEET	DRAWING	TITLE
1	T-01	COVER SHEET
2	T-02	GENERAL NOTES, ABBREVIATIONS, AND CONTROL POINTS
3	G-01	SITE LAYOUT AND SHEET INDEX
4	G-02.1	EXISTING CONDITIONS - FORMER MILL SITE AREA (1 OF 3)
5	G-02.2	EXISTING CONDITIONS - SHORELINE SAND COVER PLACEMENT AREA (2 OF 3)
6	G-02.3	EXISTING CONDITIONS - MODEL AIRPLANE FIELD (3 OF 3)
7	G-03	SITE STAGING AND ACCESS
8	G-04	SITE STAGING AND STOCKPILING
9	C-01	WORK ZONE 1 - EXCAVATION PLAN AND CROSS SECTION
10	C-02	WORK ZONE 2 - OVERALL EXCAVATION PLAN
11	C-02.1	WORK ZONE 2 - EXCAVATION LIFT 1: +12.0' MLLW TO GROUND SURFACE
12	C-02.2	WORK ZONE 2 - EXCAVATION LIFT 2: +8.0' TO +12.0' MLLW
13	C-02.3	WORK ZONE 2 - EXCAVATION LIFT 3: +5.5' TO +8.0' MLLW
14	C-02.4	WORK ZONE 2 - EXCAVATION LIFT 4: +1.0' TO +5.5' MLLW
15	C-02.5	WORK ZONE 2 - EXCAVATION LIFT 5: -2.0' TO +1.0' MLLW
16	C-03	WORK ZONE 2 - EXCAVATION CROSS SECTIONS
17	C-04	WORK ZONE 1 AND 2 - CAPPING PLAN
18	C-05	WORK ZONE 1 AND 2 - CAPPING AND BACKFILL CROSS SECTIONS AND DETAIL
19	C-06	MILL SITE SHORELINE COMPOSITE SITE PLAN
20	C-07	MILL SITE RESTORATION CONSTRUCTION MATERIALS PLAN
21	C-08	SOUTHERN MILL SITE OVERALL GRADING PLAN
22	C-09	MILL SITE SHORELINE RESTORATION CONSTRUCTION MATERIALS SECTIONS (1 OF 2)
23	C-10	MILL SITE RESTORATION CONSTRUCTION MATERIALS SECTIONS (2 OF 2)
24	C-11	WORK ZONE 4 - WESTERN BAY SAND CAPPING PLAN
25	C-12	WORK ZONE 4 - WESTERN BAY SAND CAPPING TYPICAL CROSS SECTIONS
26	C-13	WORK ZONE 5 - MODEL AIRPLANE FIELD UPLAND DISPOSAL PLAN
27	C-14	WORK ZONE 5 - MODEL AIRPLANE FIELD UPLAND DISPOSAL CROSS SECTION
28	C-15	TYPICAL TESC DETAILS (1 OF 2)
29	C-16	TYPICAL TESC DETAILS (2 OF 2)
30	L-01	PLANTING PLAN - MILL SITE SHORELINE
31	L-02	PLANTING PLAN - WORK ZONE 5
32	L-03	PLANTING DETAILS (1 OF 1)
33	L-04	PLANTING DETAILS (2 OF 2)

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

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Dec 08, 2023 1:32pm rfarnsworth

ANCHOR QEA

Pope Resources
A Limited Partnership

REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION

DESIGNED BY: G. CASSON
DRAWN BY: D. HOLMER
CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

COVER SHEET

T-01

SHEET NO. 1 OF 33

EXCAVATION

CONTROL POINTS - GROUND		
POINT #	NORTHING	EASTING
CP-1	317007.4	1211637.2
CP-2	316963.9	1211691.7
CP-3	316874.7	1211703.3
CP-4	316806.6	1211648.1
CP-5	316787.4	1211579.6
CP-6	316809.5	1211524.7
CP-7	316856.4	1211493.4
CP-8	316928.4	1211493.4
CP-9	316952.7	1211538.6
CP-10	316981.4	1211583.7
CP-11	316915.7	1211553.4
CP-12	316880.7	1211591.5
CP-13	316838.2	1211605.4
CP-14	316831.6	1211560.1

CONTROL POINTS - LIFT 1		
POINT #	NORTHING	EASTING
L1-1	317007.4	1211637.2
L1-2	316963.9	1211691.7
L1-3	316907.2	1211699.1
L1-4	316922.5	1211659.9
L1-5	316960.8	1211652.5
L1-6	316982.6	1211627.0
L1-7	316942.7	1211577.1
L1-8	316876.5	1211554.2
L1-9	316857.3	1211591.7
L1-10	316822.5	1211626.8
L1-11	316817.3	1211656.8
L1-12	316874.7	1211703.3
L1-13	316806.6	1211648.1
L1-14	316787.4	1211579.6
L1-15	316823.8	1211592.1
L1-16	316845.7	1211585.5
L1-17	316854.7	1211560.3
L1-18	316846.5	1211531.2
L1-19	316809.5	1211524.7
L1-20	316856.4	1211493.4
L1-21	316875.3	1211493.4
L1-22	316882.2	1211535.8
L1-23	316963.9	1211556.2
L1-24	316928.4	1211493.4
L1-25	316981.4	1211583.7

CONTROL POINTS - LIFT 2		
POINT #	NORTHING	EASTING
L2-1	317007.4	1211637.2
L2-2	316963.9	1211691.7
L2-3	316892.5	1211701.0
L2-4	316874.7	1211703.3
L2-5	316825.5	1211663.4
L2-6	316806.6	1211648.1
L2-7	316787.4	1211579.6
L2-8	316800.9	1211546.1
L2-9	316809.5	1211524.7
L2-10	316856.4	1211493.4
L2-11	316928.4	1211493.4
L2-12	316940.1	1211515.2
L2-13	316952.7	1211538.6
L2-14	316967.6	1211561.9
L2-15	316981.4	1211583.7
L2-16	316954.8	1211587.4
L2-17	316984.4	1211645.0
L2-18	316852.5	1211661.8
L2-19	316909.5	1211595.2
L2-20	316915.7	1211553.4
L2-21	316898.4	1211544.4
L2-22	316898.3	1211592.1

CONTROL POINTS - LIFT 3		
POINT #	NORTHING	EASTING
L3-1	317007.4	1211637.2
L3-2	316963.9	1211691.7
L3-4	316874.7	1211703.3
L3-5	316831.9	1211668.6
L3-6	316806.6	1211648.1
L3-7	316787.4	1211579.6
L3-8	316809.5	1211524.7
L3-9	316856.4	1211493.4
L3-10	316898.2	1211493.4
L3-11	316928.4	1211493.4
L3-12	316952.7	1211538.6
L3-14	316981.4	1211583.7
L3-15	316936.9	1211560.8
L3-16	316885.0	1211611.8
L3-17	316853.3	1211625.8

CONTROL POINTS - LIFT 4		
POINT #	NORTHING	EASTING
L4-1	317007.4	1211637.2
L4-2	316963.9	1211691.7
L4-3	316892.8	1211701.0
L4-4	316874.7	1211703.3
L4-5	316838.2	1211605.4
L4-6	316831.6	1211560.1
L4-7	316840.2	1211537.5
L4-8	316856.4	1211493.4
L4-9	316928.4	1211493.4
L4-10	316952.7	1211538.6
L4-11	316981.4	1211583.7
L4-12	316869.7	1211514.0
L4-13	316911.5	1211509.6
L4-14	316945.5	1211574.1

CONTROL POINTS- LIFT 5		
POINT #	NORTHING	EASTING
L5-1	317007.4	1211637.2
L5-2	316963.9	1211691.7
L5-3	316907.0	1211699.1
L5-4	316874.8	1211702.5
L5-6	316880.7	1211591.5
L5-7	316915.7	1211553.4
L5-8	316952.7	1211538.6
L5-9	316981.4	1211583.7
L5-10	316953.1	1211617.4
L5-11	316922.5	1211580.6
L5-12	316897.3	1211588.3
L5-13	316887.6	1211634.6

BACKFILL AND CAPPING

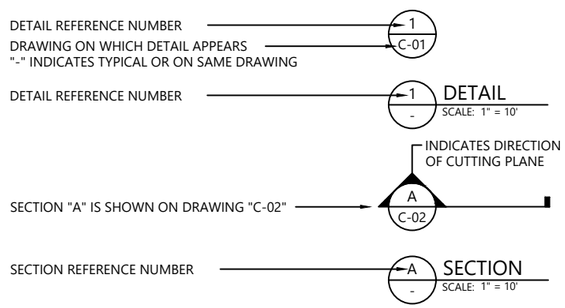
BACKFILL CONTROL POINTS		
POINT #	NORTHING	EASTING
CP-1	317039.8	1211638.5
CP-2	316979.4	1211720.4
CP-3	316852.9	1211726.8
CP-4	316842.2	1211699.7
CP-5	316791.5	1211658.0
CP-6	316767.0	1211578.7
CP-7	316792.9	1211512.2
CP-8	316850.5	1211473.8
CP-9	316938.8	1211477.1
CP-10	316956.1	1211504.7
CP-11	317010.4	1211567.6
CP-12	317424.6	1211117.9
CP-13	317386.7	1211135.6
CP-14	317332.6	1211119.3
CP-15	317395.0	1211075.0

CAP CONTROL POINTS		
POINT #	NORTHING	EASTING
CP-16	316914.6	1211268.4
CP-17	317008.2	1211321.6
CP-18	317087.8	1211432.7
CP-19	317121.2	1211529.7
CP-20	317134.5	1211630.3
CP-21	317105.5	1211719.1
CP-22	317019.9	1211758.4
CP-23	316838.0	1211796.3
CP-24	316774.2	1211778.5
CP-25	316798.8	1211691.8
CP-26	316766.3	1211672.9
CP-27	316727.5	1211530.5

ABBREVIATIONS

ABBRV	ABBREVIATION
APPROX.	APPROXIMATE/APPROXIMATELY
BMP	BEST MANAGEMENT PRACTICES
D/F	DIOXIN/FURAN
CP	CONTROL POINT
CY	CUBIC YARD
DWG	DRAWING
E	EAST
EL, ELEV	ELEVATION
FT	FOOT OR FEET
IN	INCH OR INCHES
MAX	MAXIMUM
MIN	MINIMUM
MISC	MISCELLANEOUS
MHHW	MEAN HIGHER HIGH WATER
MLLW	MEAN LOWER LOW WATER
N	NORTH
NAD	NORTH AMERICAN DATUM
NAVD	NORTH AMERICAN VERTICAL DATUM
NG/KG	NANOGRAMS PER KILOGRAM
NO.	NUMBER
OC	ON CENTER
OHP	OVERHEAD POWER
PR/OPG	POPE RESOURCES/OPG PROPERTIES LLC
S	SOUTH
SD	STORM DRAIN
SF	SQUARE FOOT OR FEET
SHT	SHEET
SPEC	SPECIFICATION
STA	STATION
STD	STANDARD
TESC	TEMPORARY EROSION AND SEDIMENT CONTROL
TYP	TYPICAL
W	WEST
WAC	WASHINGTON ADMINISTRATIVE CODE
WSDOT	WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DETAIL AND SECTION REFERENCING:



GENERAL SURVEY NOTES

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD 83, U.S. FEET.
2. VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW).
3. EXISTING GROUND SURVEYS PROVIDED BY THE FOLLOWING: ETRAC DATED JUNE 30, 2020, DAVID EVANS AND ASSOCIATES (DEA) DATED MARCH 17, 2022, ORION DATED SEPTEMBER 25, 2017, AND PUGET SOUND LIDAR CONSORTIUM, UNDATED.
4. THE ABOVE SURVEYS WERE MERGED BY ANCHOR QEA TO PROVIDE A CONTINUOUS EXISTING ELEVATIONS DATA SET.
5. EXISTING WETLAND BUFFER AND WETLAND DATA REFERENCES THE FOLLOWING: GEOENGINEERS, 2013, WETLAND AND STREAM DELINEATION REPORT, PORT GAMBLE REDEVELOPMENT PLAN, KITSAP COUNTY, WASHINGTON.
6. MEAN HIGHER HIGH WATER IS AT ELEVATION 10.30 FEET MLLW.
7. CONTRACTOR RESPONSIBLE FOR CONFIRMING LOCATION OF ALL UTILITIES AND EXISTING SITE CONDITIONS.

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

ANCHOR QEA

Pope Resources
A Limited Partnership

REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION

DESIGNED BY: G. CASSON
DRAWN BY: D. HOLMER
CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

GENERAL NOTES, ABBREVIATIONS, AND CONTROL POINTS

T-02

SHEET NO. 2 OF 33

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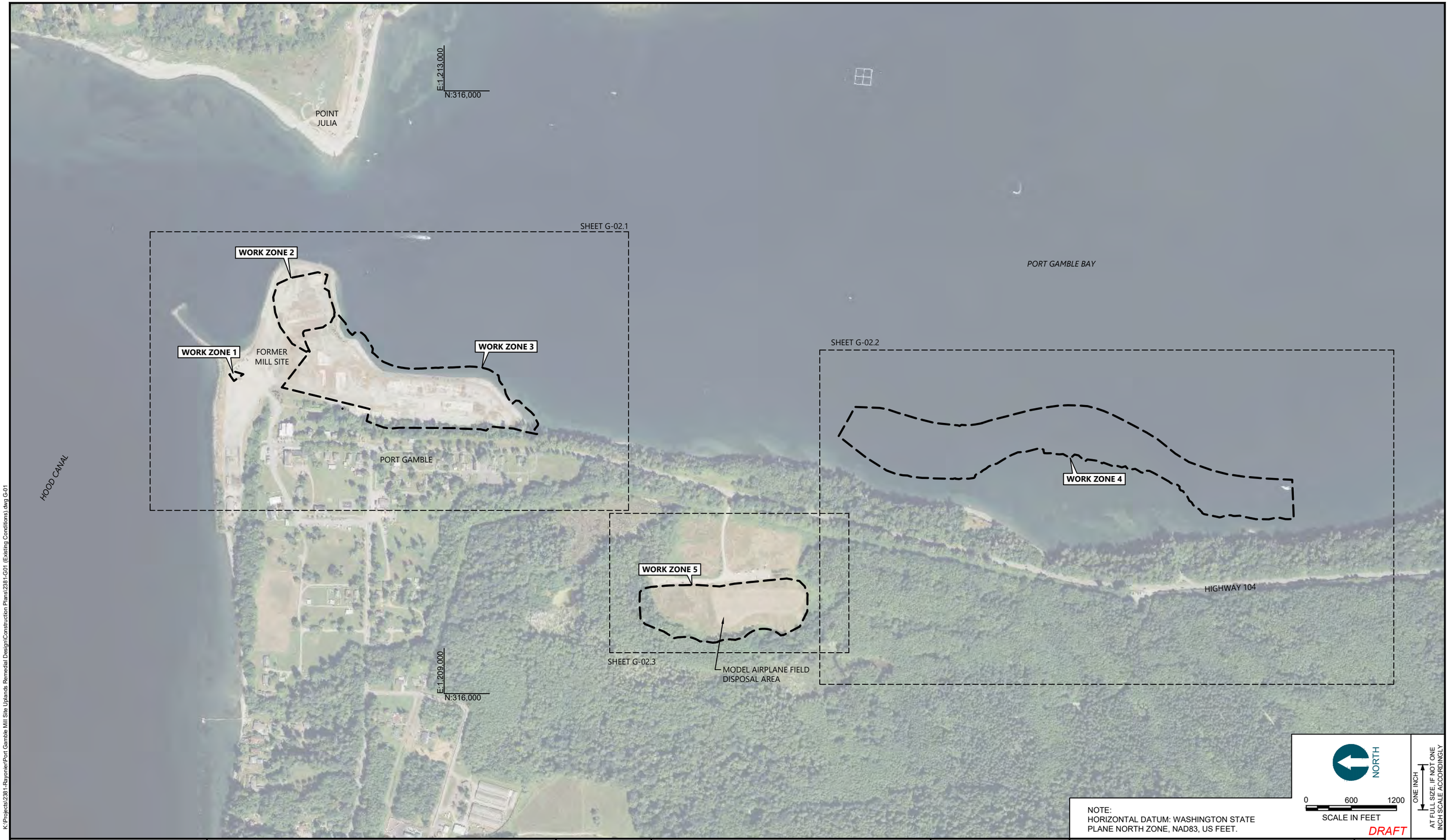
Dec 08, 2023 1:32pm rfarnsworth



NOTE:
HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD83, US FEET.

NORTH

0 600 1200
SCALE IN FEET

ONE INCH AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

K:\Projects\2381-Rayonier\Port Gamble Mill Site Uplands Remedial Design\Construction Plans\2381-G01 (Existing Conditions).dwg G-01
Dec 08, 2023 1:33pm rfarnsworth

ANCHOR QEA

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REVISIONS				
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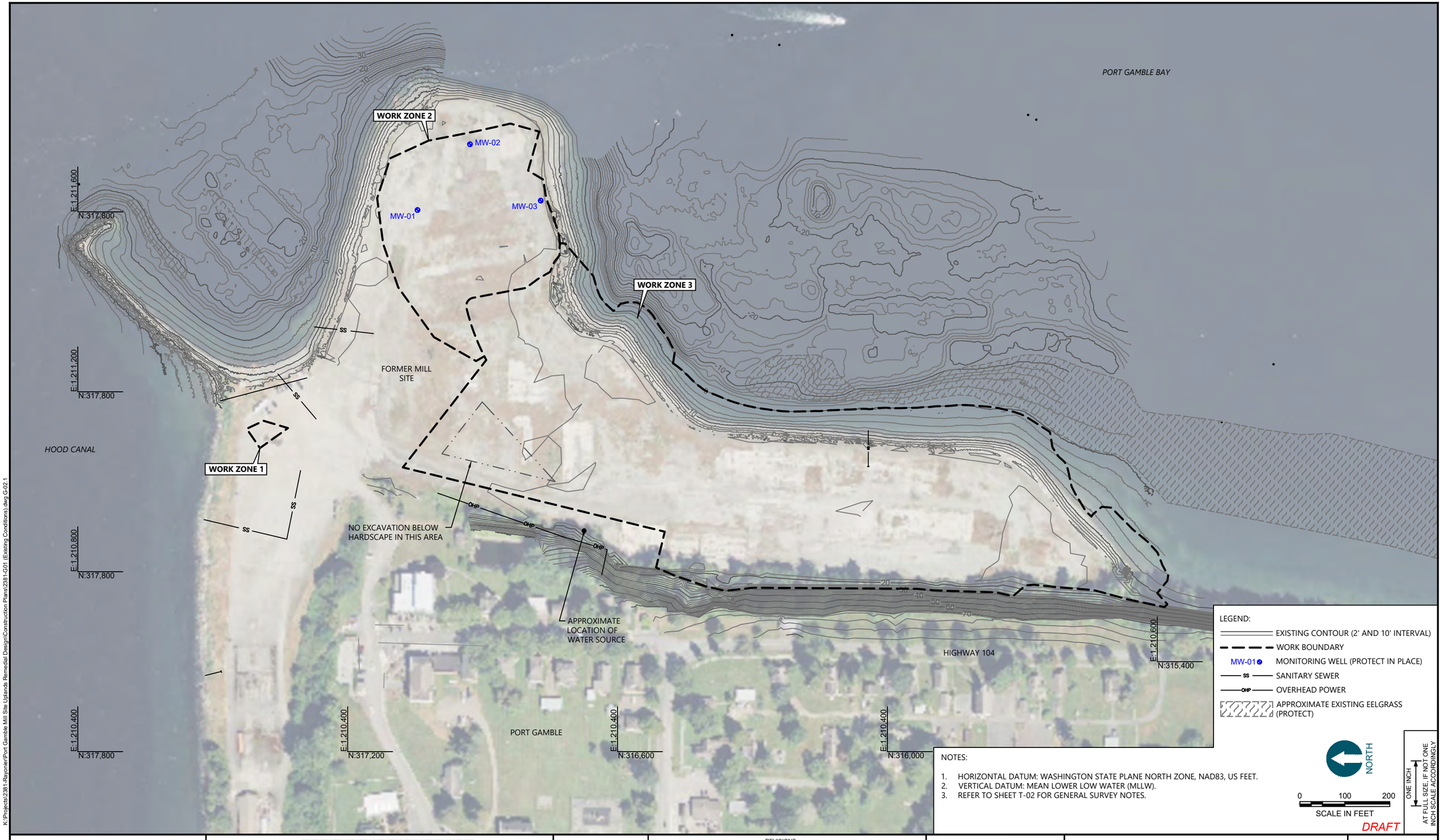
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

SITE LAYOUT AND SHEET INDEX

G-01

SHEET NO. 3 OF 33



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Dec 08, 2023 1:33pm rfarnsworth

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REVISIONS				
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DESIGNED BY: G. CASSON
DRAWN BY: D. HOLMER
CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

EXISTING CONDITIONS - FORMER MILL SITE AREA (1 OF 3)

G-02.1

SHEET NO. 4 OF 33

E:1,211,000
N:312,500

E:1,211,000
N:310,500

WORK ZONE 4

-20
-10
0
-10
PORT GAMBLE BAY
0
-20
-10
0

HIGHWAY 104

E:1,209,500
N:312,500

E:1,209,500
N:310,500

LEGEND:
- EXISTING CONTOUR (2' AND 10' INTERVAL)
- WORK BOUNDARY
- EXISTING EELGRASS BED

NOTES:
1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD83, US FEET.
2. VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW).
3. REFER TO SHEET T-02 FOR GENERAL SURVEY NOTES.

NORTH

0 120 240
SCALE IN FEET

ONE INCH
AT FULL SIZE. IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

K:\Projects\2381-Rayonier\Port Gamble Mill Site Uplands Remedial Design\Construction Plans\2381-G01 (Existing Conditions).dwg G-02.2
Dec 08, 2023 1:33pm rfarnsworth

ANCHOR QEA

Pope Resources
A Limited Partnership

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CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

EXISTING CONDITIONS - SHORELINE SAND COVER PLACEMENT AREA (2 OF 3)

G-02.2

SHEET NO. 5 OF 33

NE STATE HIGHWAY 104

30' WIDE ACCESS ROAD

WORK ZONE 5

MODEL AIRPLANE FIELD (MAF) DISPOSAL AREA

▲P-01

▲P-02

▲P-03

▲P-04

●SGP-1

●SGP-2

●SGP-3

●SGP-4

60 70 80 90 100

LEGEND:

- EXISTING CONTOURS (2' AND 10')
- MODEL AIRPLANE FIELD DISPOSAL AREA BOUNDARY
- METHANE MONITORING LOCATION (PROTECT)
- PERIMETER MONITORING WELL LOCATION (PROTECT)
- EXISTING WETLAND (GEOENGINEERS)
- 150' WETLAND BUFFER (GEOENGINEERS)

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD83, US FEET.
2. VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW).
3. REFER TO SHEET T-02 FOR GENERAL SURVEY NOTES.

NORTH

0 50 100

SCALE IN FEET

ONE INCH AT FULL SIZE. IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

K:\Projects\2381-Rayonier\Port Gamble Mill Site Uplands Remedial Design\Construction Plans\2381-G2.2 (MAF).dwg G-02.3

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ANCHOR QEA

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CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

EXISTING CONDITIONS - MODEL AIRPLANE FIELD (3 OF 3)

G-02.3

SHEET NO. 6 OF 33

POINT JULIA

PORT GAMBLE BAY

HOOD CANAL

WORK ZONE 1

WORK ZONE 2

WORK ZONE 3

WORK ZONE 4

WORK ZONE 5

STAGING AND STOCKPILE BOUNDARY (APPROXIMATE)

FORMER MILL SITE

DESIGNATED CONTRACTOR ENTRY AND EXIT

CONTRACTOR TO MAINTAIN ACCESS FOR TENANT

RAINIER AVENUE

WALKER STREET

KITSAP AVENUE

NE HIGHWAY 104

DESIGNATED CONTRACTOR ENTRY AND EXIT

MODEL AIRPLANE FIELD DISPOSAL AREA

LEGEND:

- WORK ZONE BOUNDARY
- STAGING AND STOCKPILING AREA
- EXISTING CONTOUR (5' AND 25' INTERVAL)
- POTENTIAL HAUL ROUTE

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD83, US FEET.
2. VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW).
3. REFER TO SHEET T-02 FOR GENERAL SURVEY NOTES.
4. INSTALL TEMPORARY TREE PROTECTION. TEMPORARY TREE PROTECTION SHALL CONFORM TO TREE PROTECTION WORK PLAN AND REQUIREMENTS IN SPECIFICATION 329310.

NORTH

0 200 400

SCALE IN FEET

ONE INCH AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

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DESIGNED BY: G. CASSON
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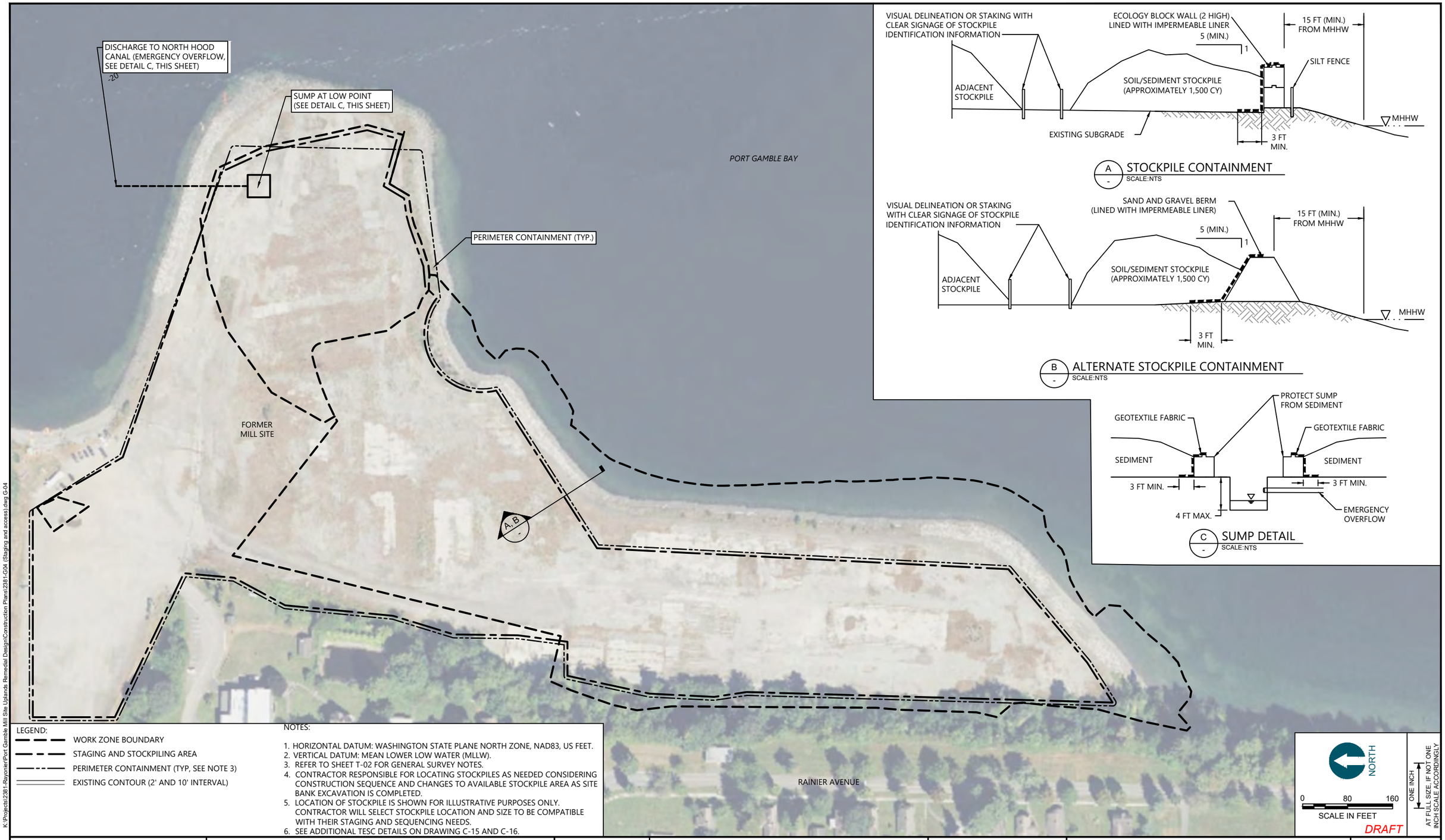
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

SITE STAGING AND ACCESS

G-03

SHEET NO. 7 OF 33



A - STOCKPILE CONTAINMENT
SCALE:NTS

B - ALTERNATE STOCKPILE CONTAINMENT
SCALE:NTS

C - SUMP DETAIL
SCALE:NTS

LEGEND:
- WORK ZONE BOUNDARY
- STAGING AND STOCKPILING AREA
- PERIMETER CONTAINMENT (TYP, SEE NOTE 3)
- EXISTING CONTOUR (2' AND 10' INTERVAL)

NOTES:
1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD83, US FEET.
2. VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW).
3. REFER TO SHEET T-02 FOR GENERAL SURVEY NOTES.
4. CONTRACTOR RESPONSIBLE FOR LOCATING STOCKPILES AS NEEDED CONSIDERING CONSTRUCTION SEQUENCE AND CHANGES TO AVAILABLE STOCKPILE AREA AS SITE BANK EXCAVATION IS COMPLETED.
5. LOCATION OF STOCKPILE IS SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. CONTRACTOR WILL SELECT STOCKPILE LOCATION AND SIZE TO BE COMPATIBLE WITH THEIR STAGING AND SEQUENCING NEEDS.
6. SEE ADDITIONAL TESC DETAILS ON DRAWING C-15 AND C-16.

NORTH

0 80 160
SCALE IN FEET

ONE INCH AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

K:\Projects\2381-Rayonier\Port Gamble Mill Site Uplands Remedial Design\Construction Plans\2381-G04 (Staging and access).dwg G-04
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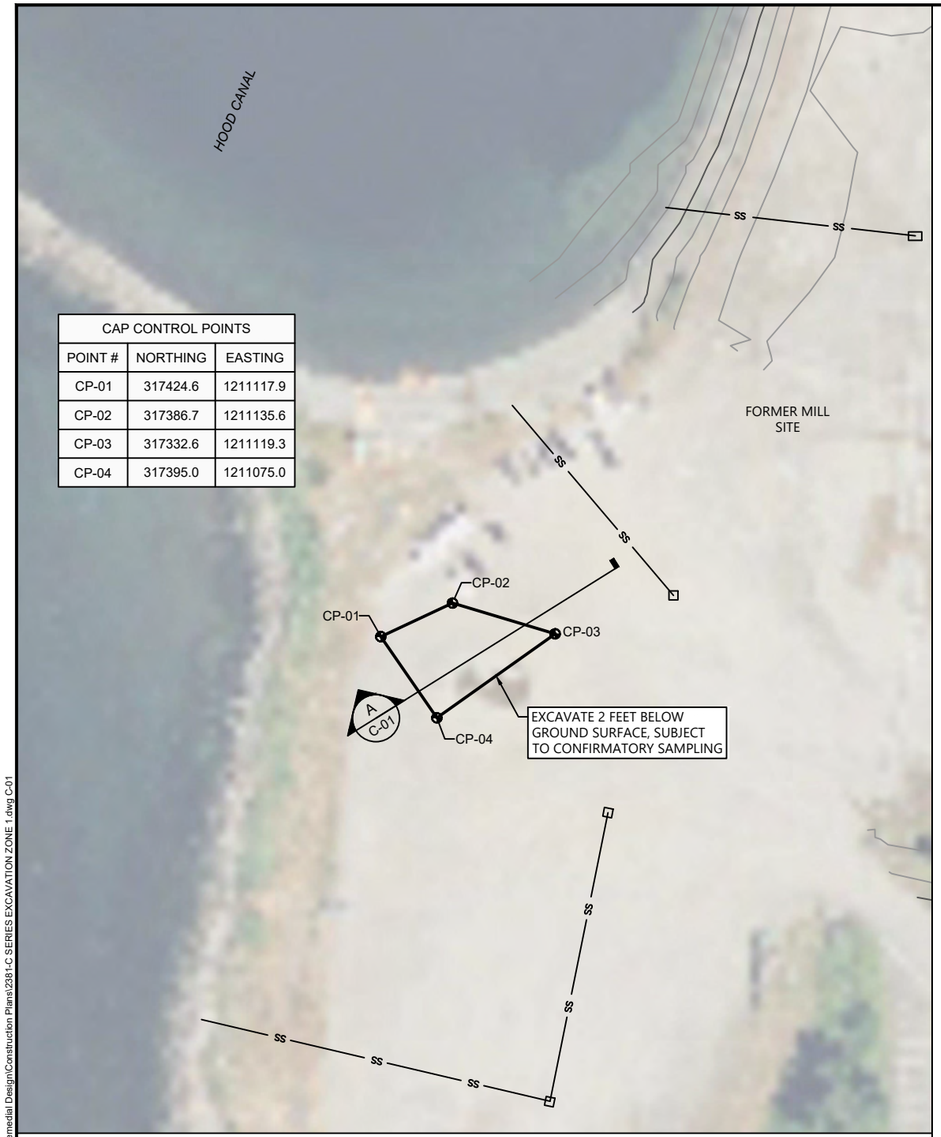
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

SITE STAGING AND STOCKPILING

G-04

SHEET NO. 8 OF 33



CAP CONTROL POINTS		
POINT #	NORTHING	EASTING
CP-01	317424.6	1211117.9
CP-02	317386.7	1211135.6
CP-03	317332.6	1211119.3
CP-04	317395.0	1211075.0

LEGEND:

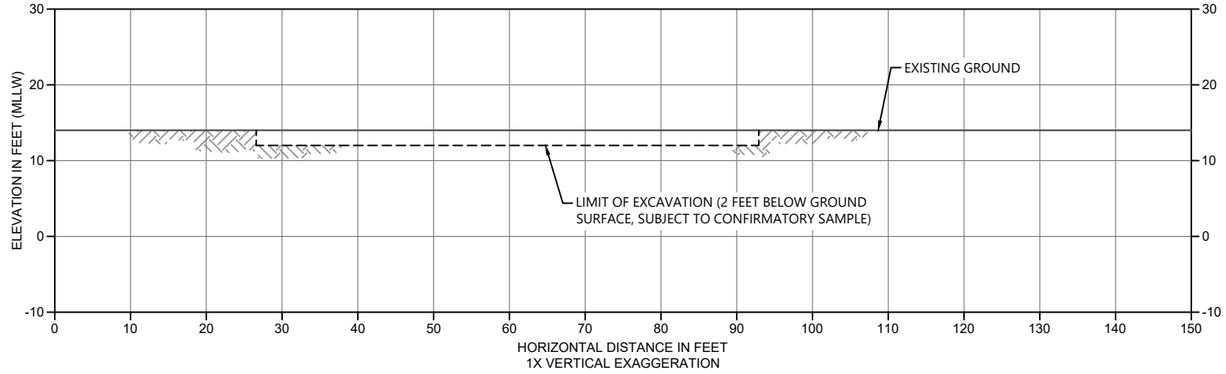
- EXISTING CONTOUR (1' AND 5' INTERVAL)
- EXCAVATION BOUNDARY
- SS — SANITARY SEWER

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD83, US FEET.
2. VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW).
3. REFER TO SHEET T-02 FOR GENERAL SURVEY NOTES.

NORTH

0 40 80
SCALE IN FEET



A
-
SECTION
SCALE: 1" = 10'

DRAFT

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

K:\Projects\2381-Rayonier\Port Gamble Mill Site Uplands Remedial Design\Construction Plans\2381-C SERIES EXCAVATION ZONE 1.dwg C-01
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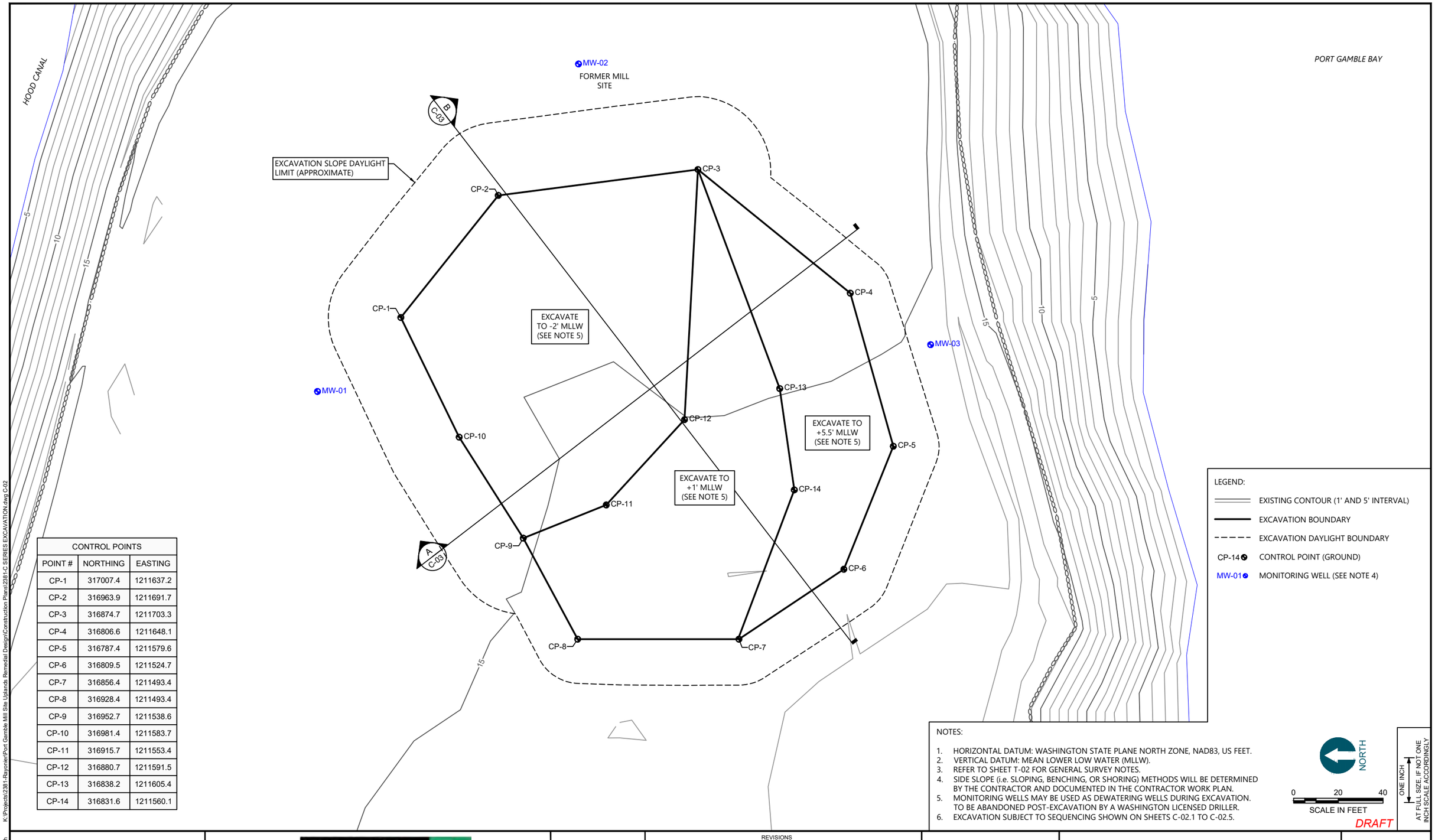
PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

WORK ZONE 1 - EXCAVATION PLAN AND CROSS SECTION

C-01

SHEET NO. 9 OF 33



CONTROL POINTS		
POINT #	NORTHING	EASTING
CP-1	317007.4	1211637.2
CP-2	316963.9	1211691.7
CP-3	316874.7	1211703.3
CP-4	316806.6	1211648.1
CP-5	316787.4	1211579.6
CP-6	316809.5	1211524.7
CP-7	316856.4	1211493.4
CP-8	316928.4	1211493.4
CP-9	316952.7	1211538.6
CP-10	316981.4	1211583.7
CP-11	316915.7	1211553.4
CP-12	316880.7	1211591.5
CP-13	316838.2	1211605.4
CP-14	316831.6	1211560.1

LEGEND:

- EXISTING CONTOUR (1' AND 5' INTERVAL)
- EXCAVATION BOUNDARY
- EXCAVATION DAYLIGHT BOUNDARY
- CP-14 CONTROL POINT (GROUND)
- MW-01 MONITORING WELL (SEE NOTE 4)

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD83, US FEET.
2. VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW).
3. REFER TO SHEET T-02 FOR GENERAL SURVEY NOTES.
4. SIDE SLOPE (i.e. SLOPING, BENCHING, OR SHORING) METHODS WILL BE DETERMINED BY THE CONTRACTOR AND DOCUMENTED IN THE CONTRACTOR WORK PLAN.
5. MONITORING WELLS MAY BE USED AS DEWATERING WELLS DURING EXCAVATION. TO BE ABANDONED POST-EXCAVATION BY A WASHINGTON LICENSED DRILLER.
6. EXCAVATION SUBJECT TO SEQUENCING SHOWN ON SHEETS C-02.1 TO C-02.5.

NORTH

0 20 40
SCALE IN FEET

ONE INCH AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

K:\Projects\2381-Rayonier\Port Gamble Mill Site Uplands Remedial Design\Construction Plans\2381-C SERIES EXCAVATION.dwg C-02

Dec 08, 2023 1:37pm rfarnsworth

ANCHOR QEA

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REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION

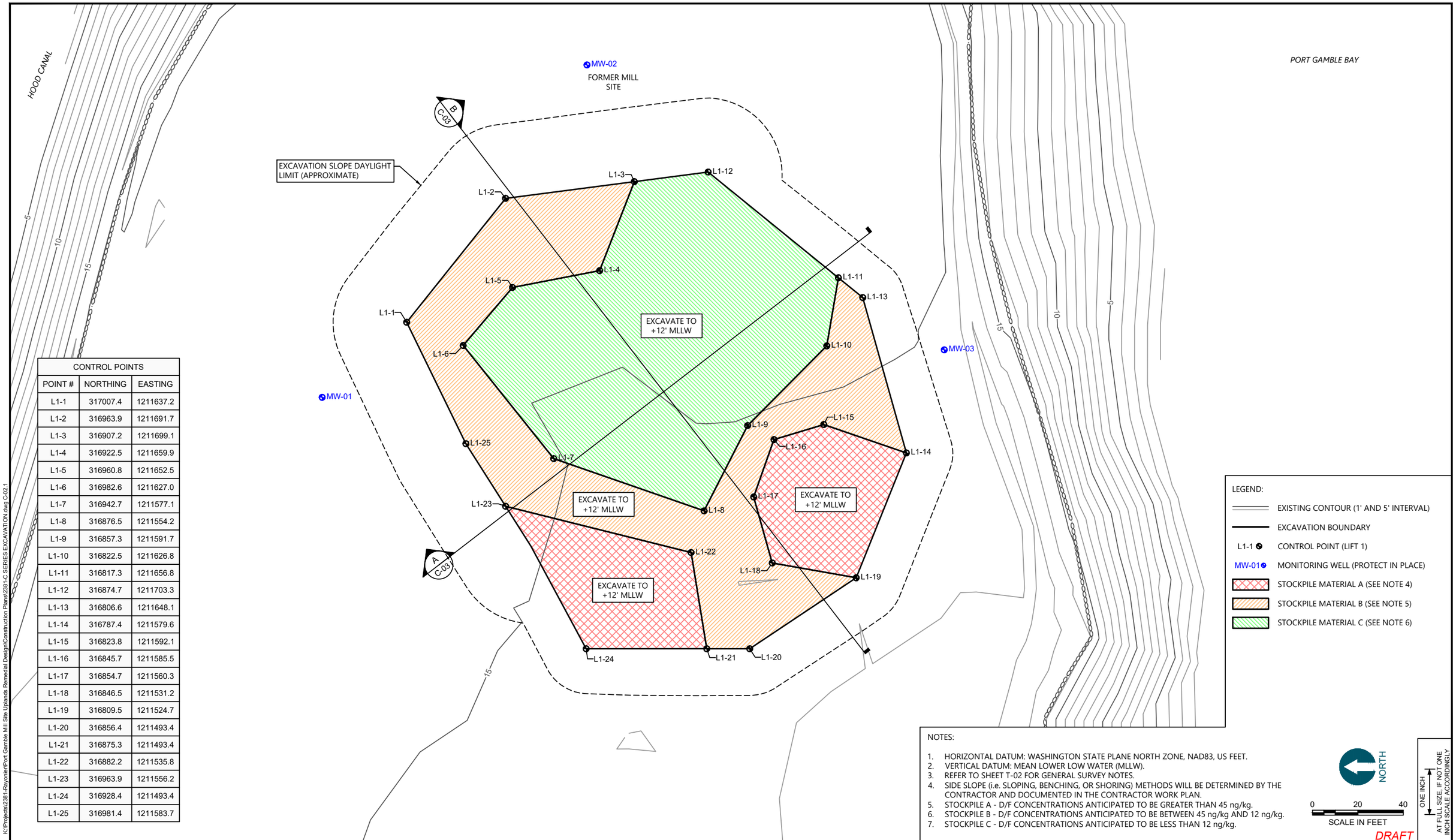
DESIGNED BY: G. CASSON
DRAWN BY: D. HOLMER
CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

WORK ZONE 2 - OVERALL EXCAVATION PLAN

C-02

SHEET NO. 10 OF 33



CONTROL POINTS		
POINT #	NORTHING	EASTING
L1-1	317007.4	1211637.2
L1-2	316963.9	1211691.7
L1-3	316907.2	1211699.1
L1-4	316922.5	1211659.9
L1-5	316960.8	1211652.5
L1-6	316982.6	1211627.0
L1-7	316942.7	1211577.1
L1-8	316876.5	1211554.2
L1-9	316857.3	1211591.7
L1-10	316822.5	1211626.8
L1-11	316817.3	1211656.8
L1-12	316874.7	1211703.3
L1-13	316806.6	1211648.1
L1-14	316787.4	1211579.6
L1-15	316823.8	1211592.1
L1-16	316845.7	1211585.5
L1-17	316854.7	1211560.3
L1-18	316846.5	1211531.2
L1-19	316809.5	1211524.7
L1-20	316856.4	1211493.4
L1-21	316875.3	1211493.4
L1-22	316882.2	1211535.8
L1-23	316963.9	1211556.2
L1-24	316928.4	1211493.4
L1-25	316981.4	1211583.7

LEGEND:

- EXISTING CONTOUR (1' AND 5' INTERVAL)
- EXCAVATION BOUNDARY
- L1-1 CONTROL POINT (LIFT 1)
- MW-01 MONITORING WELL (PROTECT IN PLACE)
- STOCKPILE MATERIAL A (SEE NOTE 4)
- STOCKPILE MATERIAL B (SEE NOTE 5)
- STOCKPILE MATERIAL C (SEE NOTE 6)

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD83, US FEET.
2. VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW).
3. REFER TO SHEET T-02 FOR GENERAL SURVEY NOTES.
4. SIDE SLOPE (i.e. SLOPING, BENCHING, OR SHORING) METHODS WILL BE DETERMINED BY THE CONTRACTOR AND DOCUMENTED IN THE CONTRACTOR WORK PLAN.
5. STOCKPILE A - D/F CONCENTRATIONS ANTICIPATED TO BE GREATER THAN 45 ng/kg.
6. STOCKPILE B - D/F CONCENTRATIONS ANTICIPATED TO BE BETWEEN 45 ng/kg AND 12 ng/kg.
7. STOCKPILE C - D/F CONCENTRATIONS ANTICIPATED TO BE LESS THAN 12 ng/kg.

NORTH

0 20 40

SCALE IN FEET

ONE INCH AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

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REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION

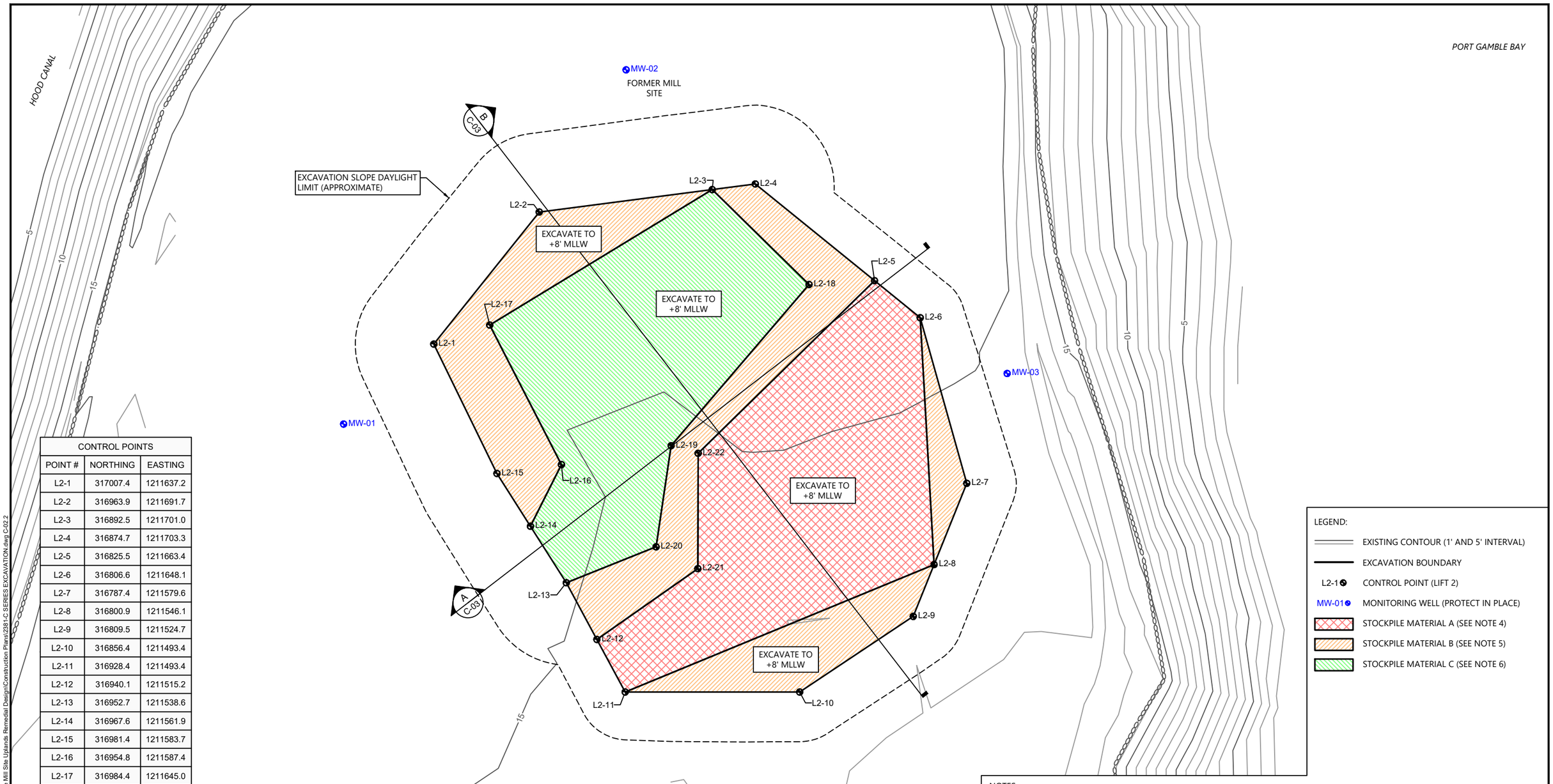
DESIGNED BY: G. CASSON
DRAWN BY: D. HOLMER
CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

WORK ZONE 2 - EXCAVATION LIFT 1: +12.0' MLLW TO GROUND SURFACE

C-02.1

SHEET NO. 11 OF 33



CONTROL POINTS		
POINT #	NORTHING	EASTING
L2-1	317007.4	1211637.2
L2-2	316963.9	1211691.7
L2-3	316892.5	1211701.0
L2-4	316874.7	1211703.3
L2-5	316825.5	1211663.4
L2-6	316806.6	1211648.1
L2-7	316787.4	1211579.6
L2-8	316800.9	1211546.1
L2-9	316809.5	1211524.7
L2-10	316856.4	1211493.4
L2-11	316928.4	1211493.4
L2-12	316940.1	1211515.2
L2-13	316952.7	1211538.6
L2-14	316967.6	1211561.9
L2-15	316981.4	1211583.7
L2-16	316954.8	1211587.4
L2-17	316984.4	1211645.0
L2-18	316852.5	1211661.8
L2-19	316909.5	1211595.2
L2-20	316915.7	1211553.4
L2-21	316898.4	1211544.4
L2-22	316898.3	1211592.1

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD83, US FEET.
2. VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW).
3. REFER TO SHEET T-02 FOR GENERAL SURVEY NOTES.
4. SIDE SLOPE (i.e. SLOPING, BENCHING, OR SHORING) METHODS WILL BE DETERMINED BY THE CONTRACTOR AND DOCUMENTED IN THE CONTRACTOR WORK PLAN.
5. STOCKPILE A - D/F CONCENTRATIONS ANTICIPATED TO BE GREATER THAN 45 ng/kg.
6. STOCKPILE B - D/F CONCENTRATIONS ANTICIPATED TO BE BETWEEN 45 ng/kg AND 12 ng/kg.
7. STOCKPILE C - D/F CONCENTRATIONS ANTICIPATED TO BE LESS THAN 12 ng/kg.

NORTH

0 20 40
SCALE IN FEET

ONE INCH
AT FULL SIZE. IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

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Dec 08, 2023 1:37pm rfarnsworth

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REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION

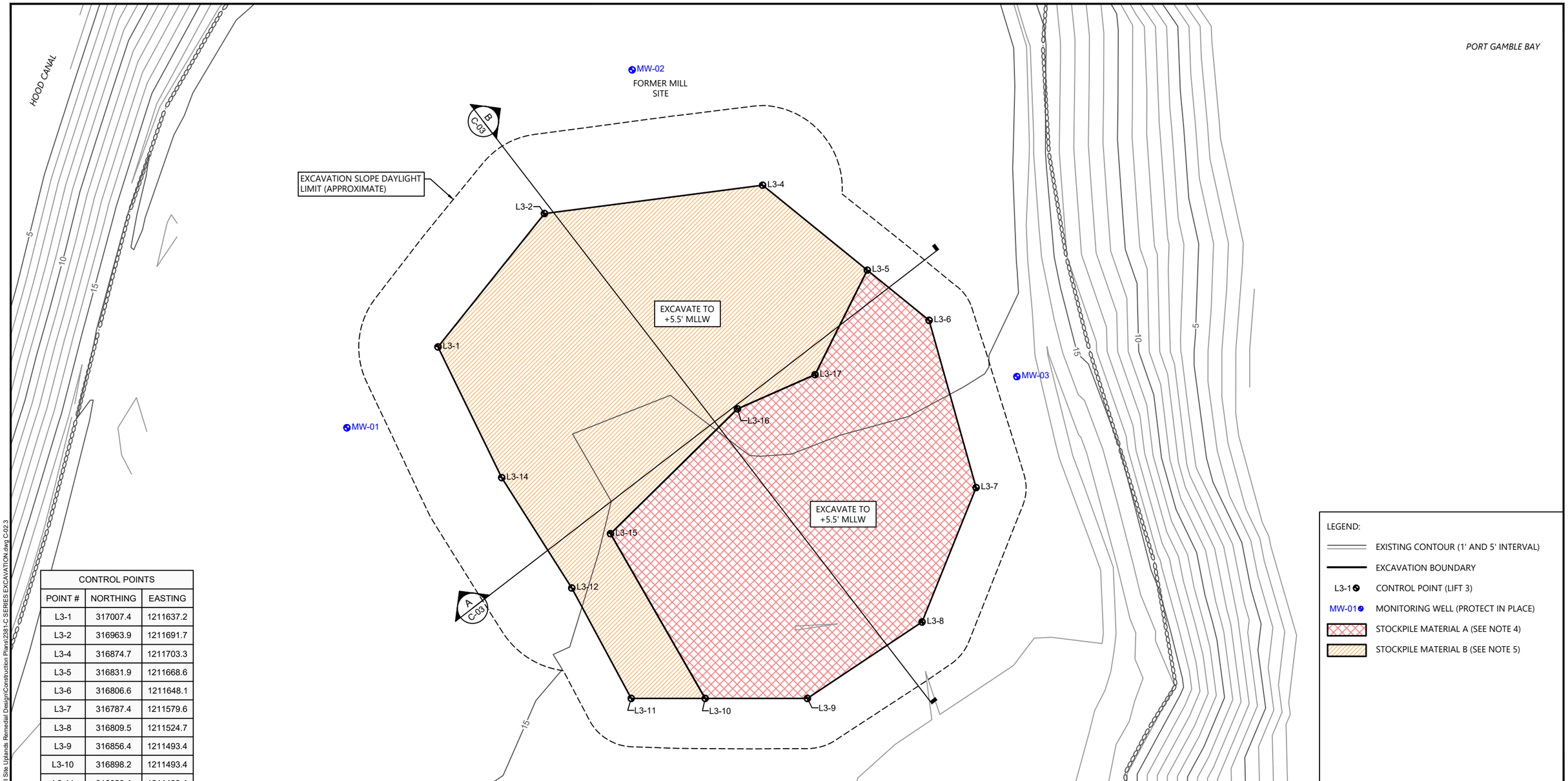
DESIGNED BY: G. CASSON
DRAWN BY: D. HOLMER
CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

WORK ZONE 2 - EXCAVATION LIFT 2: +8.0' TO +12.0' MLLW

C-02.2

SHEET NO. 12 OF 33



CONTROL POINTS		
POINT #	NORTHING	EASTING
L3-1	317007.4	1211637.2
L3-2	316963.9	1211691.7
L3-4	316874.7	1211703.3
L3-5	316831.9	1211668.6
L3-6	316806.6	1211648.1
L3-7	316787.4	1211579.6
L3-8	316809.5	1211524.7
L3-9	316856.4	1211493.4
L3-10	316898.2	1211493.4
L3-11	316928.4	1211493.4
L3-12	316952.7	1211538.6
L3-14	316981.4	1211583.7
L3-15	316936.9	1211560.8
L3-16	316885.0	1211611.8
L3-17	316853.3	1211625.8

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD83, US FEET.
2. VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW).
3. REFER TO SHEET T-02 FOR GENERAL SURVEY NOTES.
4. SIDE SLOPE (i.e. SLOPING, BENCHING, OR SHORING) METHODS WILL BE DETERMINED BY THE CONTRACTOR AND DOCUMENTED IN THE CONTRACTOR WORK PLAN.
5. STOCKPILE A - D/F CONCENTRATIONS ANTICIPATED TO BE GREATER THAN 45 ng/kg.
6. STOCKPILE B - D/F CONCENTRATIONS ANTICIPATED TO BE BETWEEN 45 ng/kg AND 12 ng/kg.

NORTH

0 20 40
SCALE IN FEET

ONE INCH AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

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Dec 08, 2023 1:37pm rfarnsworth

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REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION

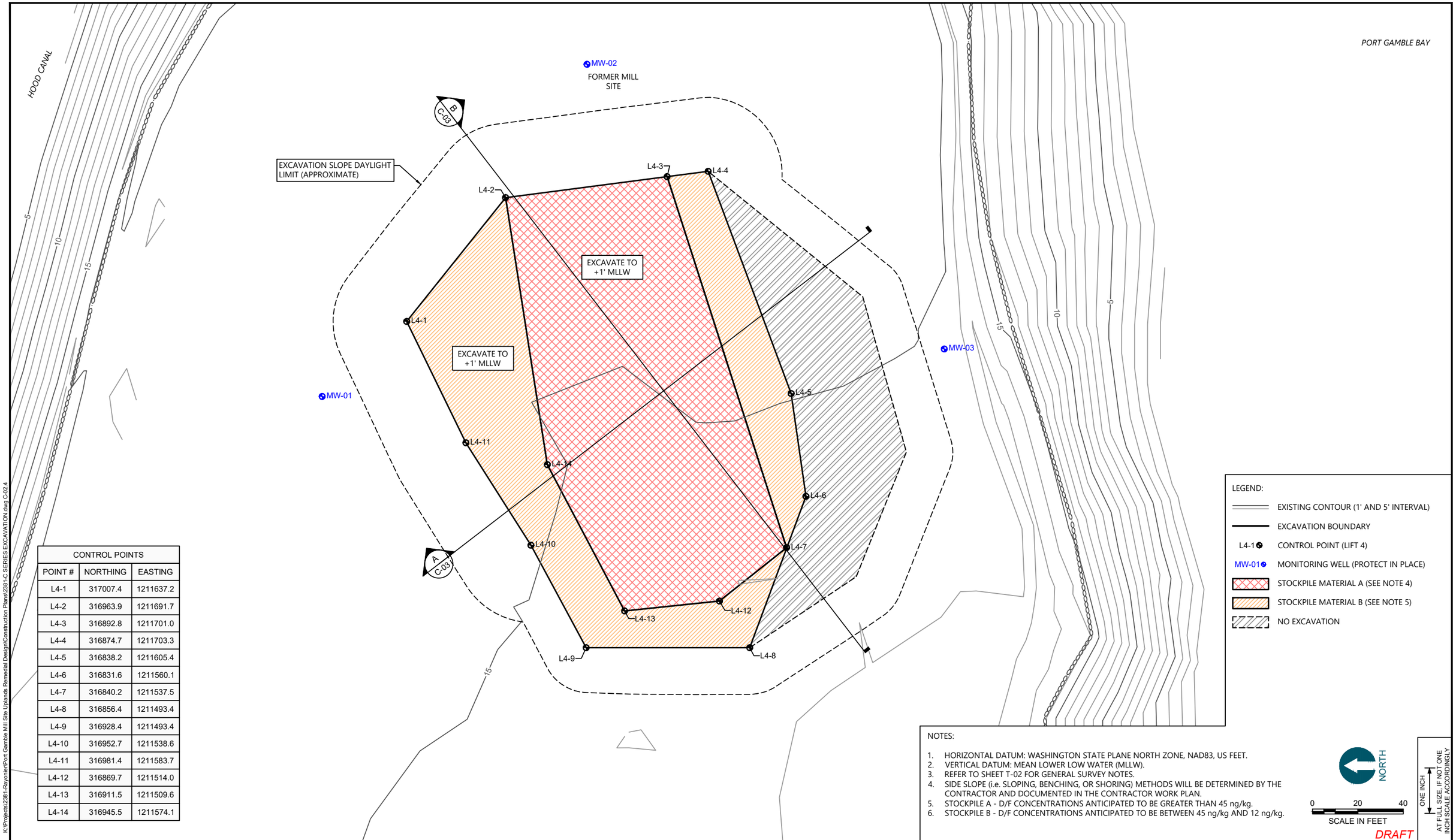
DESIGNED BY: G. CASSON
DRAWN BY: D. HOLMER
CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

WORK ZONE 2 - EXCAVATION LIFT 3: +5.5' TO +8.0' MLLW

C-02.3

SHEET NO. 13 OF 33



CONTROL POINTS		
POINT #	NORTHING	EASTING
L4-1	317007.4	1211637.2
L4-2	316963.9	1211691.7
L4-3	316892.8	1211701.0
L4-4	316874.7	1211703.3
L4-5	316838.2	1211605.4
L4-6	316831.6	1211560.1
L4-7	316840.2	1211537.5
L4-8	316856.4	1211493.4
L4-9	316928.4	1211493.4
L4-10	316952.7	1211538.6
L4-11	316981.4	1211583.7
L4-12	316869.7	1211514.0
L4-13	316911.5	1211509.6
L4-14	316945.5	1211574.1

LEGEND:

- EXISTING CONTOUR (1' AND 5' INTERVAL)
- EXCAVATION BOUNDARY
- L4-1 CONTROL POINT (LIFT 4)
- MW-01 MONITORING WELL (PROTECT IN PLACE)
- STOCKPILE MATERIAL A (SEE NOTE 4)
- STOCKPILE MATERIAL B (SEE NOTE 5)
- NO EXCAVATION

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD83, US FEET.
2. VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW).
3. REFER TO SHEET T-02 FOR GENERAL SURVEY NOTES.
4. SIDE SLOPE (i.e. SLOPING, BENCHING, OR SHORING) METHODS WILL BE DETERMINED BY THE CONTRACTOR AND DOCUMENTED IN THE CONTRACTOR WORK PLAN.
5. STOCKPILE A - D/F CONCENTRATIONS ANTICIPATED TO BE GREATER THAN 45 ng/kg.
6. STOCKPILE B - D/F CONCENTRATIONS ANTICIPATED TO BE BETWEEN 45 ng/kg AND 12 ng/kg.

NORTH

0 20 40

SCALE IN FEET

ONE INCH AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

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Dec 08, 2023 1:37pm rfarnsworth

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REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION

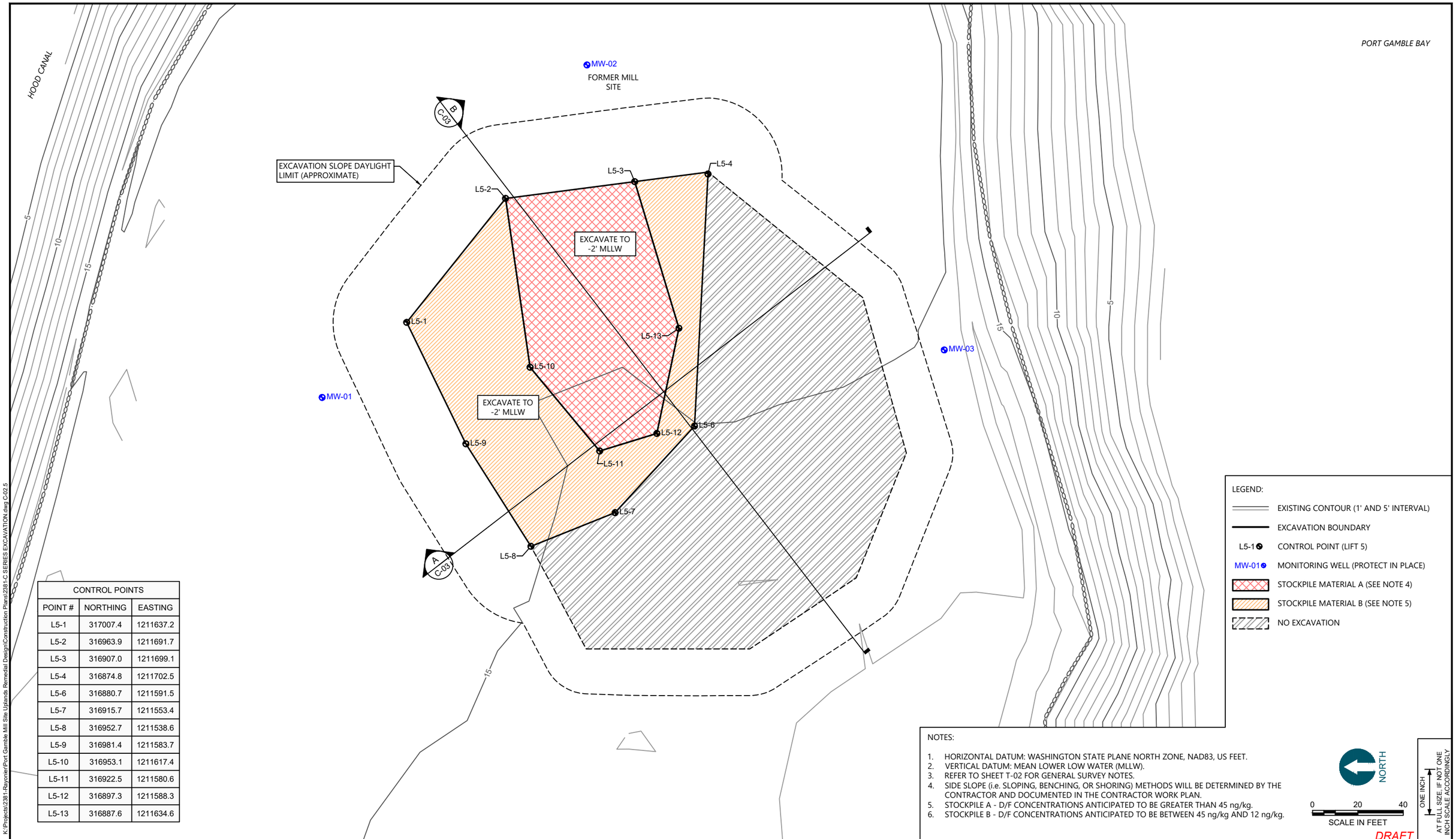
DESIGNED BY: G. CASSON
DRAWN BY: D. HOLMER
CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

WORK ZONE 2 - EXCAVATION LIFT 4: +1.0' TO +5.5' MLLW

C-02.4

SHEET NO. 14 OF 33



CONTROL POINTS		
POINT #	NORTHING	EASTING
L5-1	317007.4	1211637.2
L5-2	316963.9	1211691.7
L5-3	316907.0	1211699.1
L5-4	316874.8	1211702.5
L5-6	316880.7	1211591.5
L5-7	316915.7	1211553.4
L5-8	316952.7	1211538.6
L5-9	316981.4	1211583.7
L5-10	316953.1	1211617.4
L5-11	316922.5	1211580.6
L5-12	316897.3	1211588.3
L5-13	316887.6	1211634.6

LEGEND:

- EXISTING CONTOUR (1' AND 5' INTERVAL)
- EXCAVATION BOUNDARY
- L5-1 CONTROL POINT (LIFT 5)
- MW-01 MONITORING WELL (PROTECT IN PLACE)
- STOCKPILE MATERIAL A (SEE NOTE 4)
- STOCKPILE MATERIAL B (SEE NOTE 5)
- NO EXCAVATION

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD83, US FEET.
2. VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW).
3. REFER TO SHEET T-02 FOR GENERAL SURVEY NOTES.
4. SIDE SLOPE (i.e. SLOPING, BENCHING, OR SHORING) METHODS WILL BE DETERMINED BY THE CONTRACTOR AND DOCUMENTED IN THE CONTRACTOR WORK PLAN.
5. STOCKPILE A - D/F CONCENTRATIONS ANTICIPATED TO BE GREATER THAN 45 ng/kg.
6. STOCKPILE B - D/F CONCENTRATIONS ANTICIPATED TO BE BETWEEN 45 ng/kg AND 12 ng/kg.

NORTH

0 20 40
SCALE IN FEET

ONE INCH AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

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Dec 08, 2023 1:37pm rlamsworth

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REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION

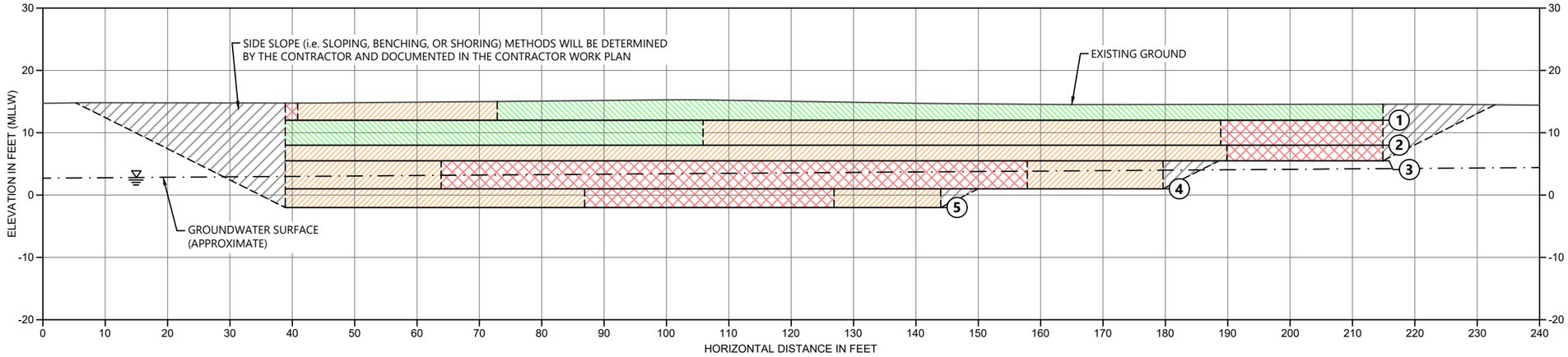
DESIGNED BY: G. CASSON
DRAWN BY: D. HOLMER
CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

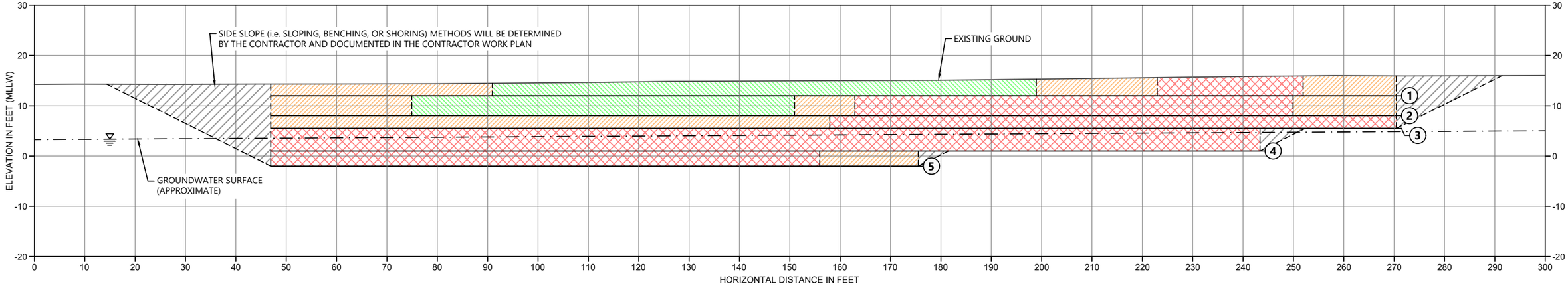
WORK ZONE 2 - EXCAVATION LIFT 5: -2.0' TO +1.0' MLLW

C-02.5

SHEET NO. 15 OF 33



A / C-02 SECTION
SCALE: 1" = 10'



B / C02 SECTION
SCALE: 1" = 10'

LEGEND:

- (1) LIFT DESIGNATION
- STOCKPILE MATERIAL A
- STOCKPILE MATERIAL B
- STOCKPILE MATERIAL C
- SIDE SLOPE EXCAVATION

NORTH

0 10 20
SCALE IN FEET

ONE INCH AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

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REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION

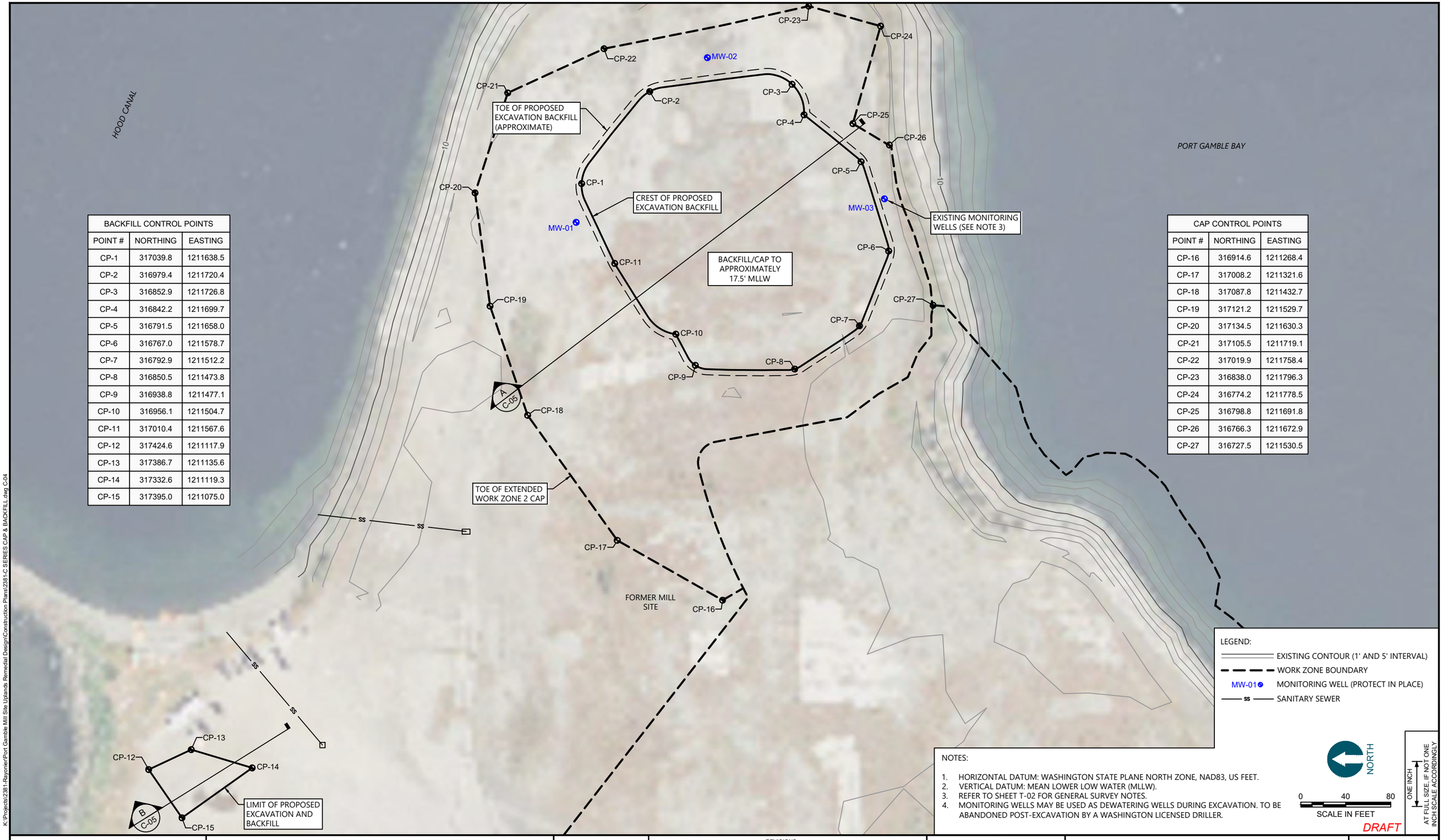
DESIGNED BY: G. CASSON
DRAWN BY: D. HOLMER
CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

WORK ZONE 2 - EXCAVATION CROSS SECTIONS

C-03

SHEET NO. 16 OF 33



BACKFILL CONTROL POINTS		
POINT #	NORTHING	EASTING
CP-1	317039.8	1211638.5
CP-2	316979.4	1211720.4
CP-3	316852.9	1211726.8
CP-4	316842.2	1211699.7
CP-5	316791.5	1211658.0
CP-6	316767.0	1211578.7
CP-7	316792.9	1211512.2
CP-8	316850.5	1211473.8
CP-9	316938.8	1211477.1
CP-10	316956.1	1211504.7
CP-11	317010.4	1211567.6
CP-12	317424.6	1211117.9
CP-13	317386.7	1211135.6
CP-14	317332.6	1211119.3
CP-15	317395.0	1211075.0

CAP CONTROL POINTS		
POINT #	NORTHING	EASTING
CP-16	316914.6	1211268.4
CP-17	317008.2	1211321.6
CP-18	317087.8	1211432.7
CP-19	317121.2	1211529.7
CP-20	317134.5	1211630.3
CP-21	317105.5	1211719.1
CP-22	317019.9	1211758.4
CP-23	316838.0	1211796.3
CP-24	316774.2	1211778.5
CP-25	316798.8	1211691.8
CP-26	316766.3	1211672.9
CP-27	316727.5	1211530.5

LEGEND:

- EXISTING CONTOUR (1' AND 5' INTERVAL)
- WORK ZONE BOUNDARY
- MW-01 MONITORING WELL (PROTECT IN PLACE)
- SS SANITARY SEWER

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD83, US FEET.
2. VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW).
3. REFER TO SHEET T-02 FOR GENERAL SURVEY NOTES.
4. MONITORING WELLS MAY BE USED AS DEWATERING WELLS DURING EXCAVATION. TO BE ABANDONED POST-EXCAVATION BY A WASHINGTON LICENSED DRILLER.

NORTH

0 40 80
SCALE IN FEET

ONE INCH AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

ANCHOR QEA

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REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION

DESIGNED BY: G. CASSON
DRAWN BY: D. HOLMER
CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

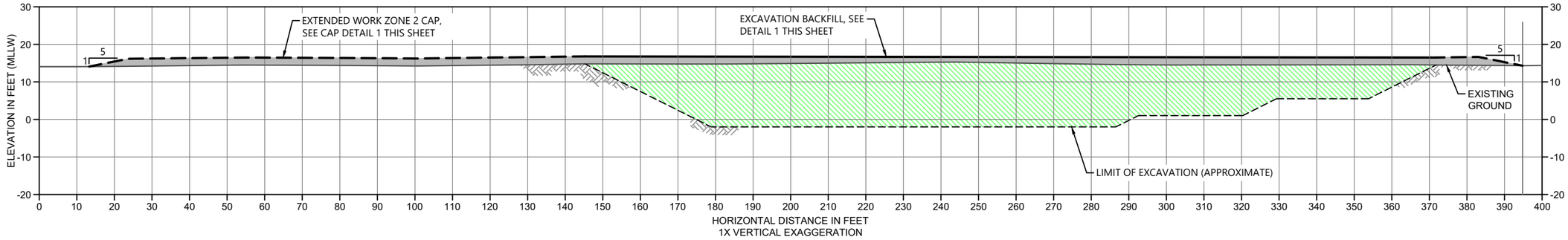
PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

WORK ZONE 1 AND 2 - CAPPING PLAN

C-04

SHEET NO. 17 OF 33

K:\Projects\2381-Rayonier\Port Gamble Mill Site Uplands Remedial Design\Construction Plans\2381-C SERIES CAP & BACKFILL.dwg C-04
Dec 08, 2023 1:37pm rfarnsworth



A C-04 SECTION
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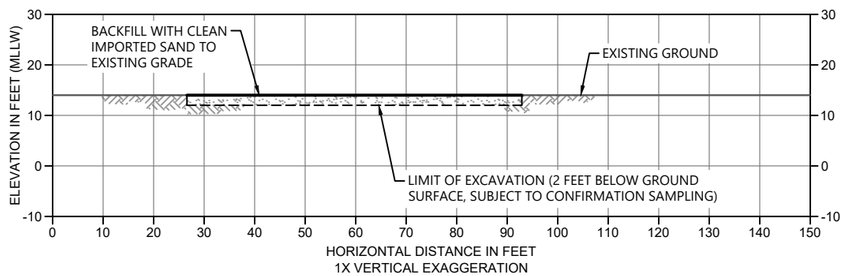
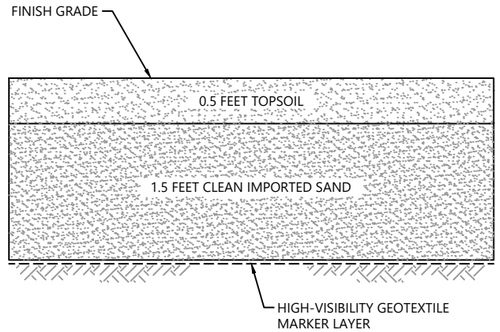


B C-04 SECTION
SCALE: 1" = 15'



1 C-05 UPLAND CAP/BACKFILL DETAIL
SCALE: NTS

LEGEND:
- CAP MATERIAL
- BACKFILL MATERIAL
- STOCKPILE MATERIAL C AND/OR IMPORTED CLEAN BACKFILL

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

ANCHOR QEA

Pope Resources
A Limited Partnership

REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION

DESIGNED BY: G. CASSON
DRAWN BY: D. HOLMER
CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

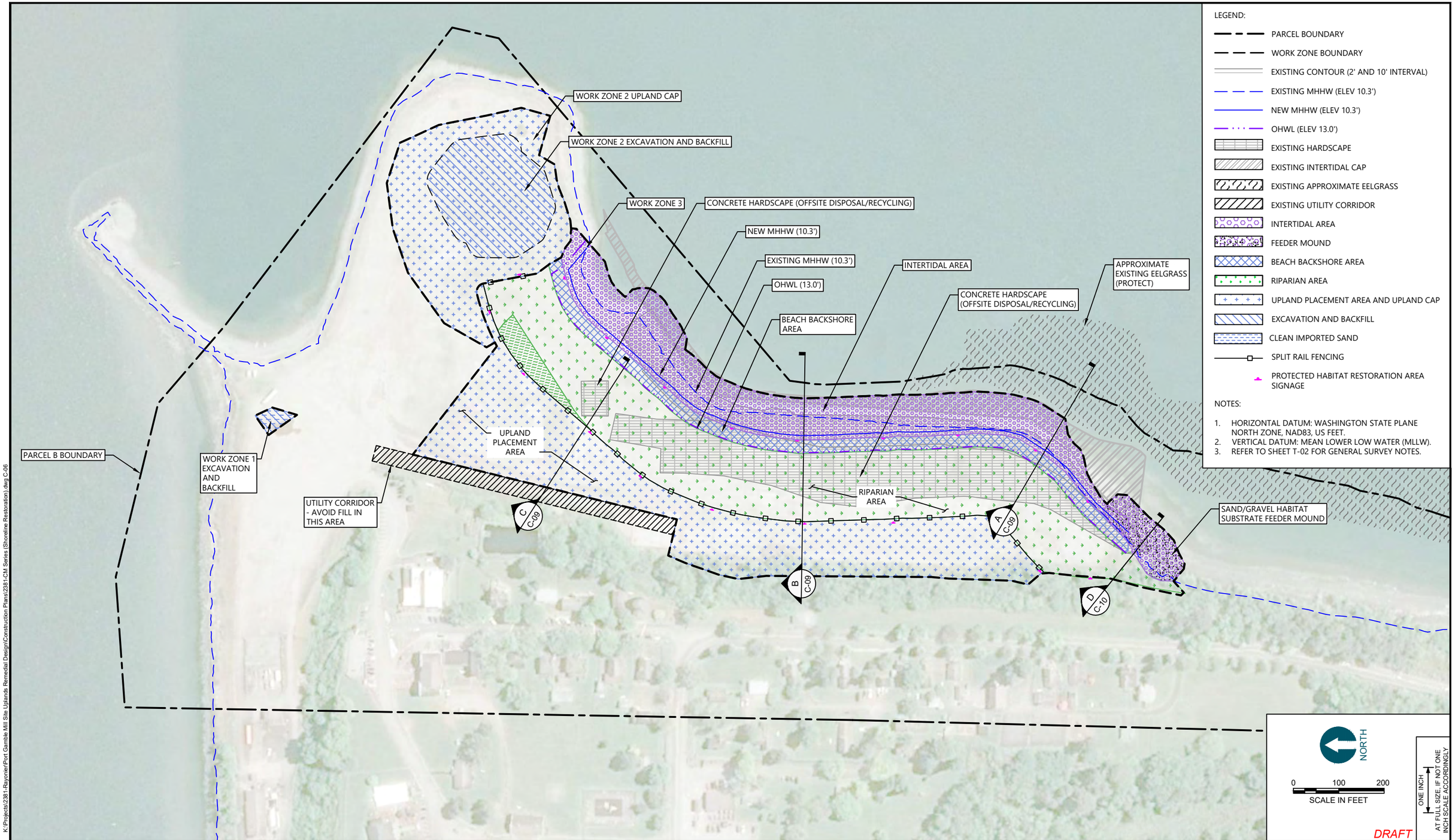
PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

WORK ZONE 1 AND 2 - CAPPING AND BACKFILL CROSS SECTIONS AND DETAIL

C-05

SHEET NO. 18 OF 33

K:\Projects\2381-Rayonier\Port Gamble Mill Site Uplands Remedial Design\Construction Plans\2381-C SERIES CAP & BACKFILL.dwg C-05
Dec 08, 2023 1:37pm rfarnsworth



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Dec 08, 2023 1:39pm rfarnsworth

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REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION

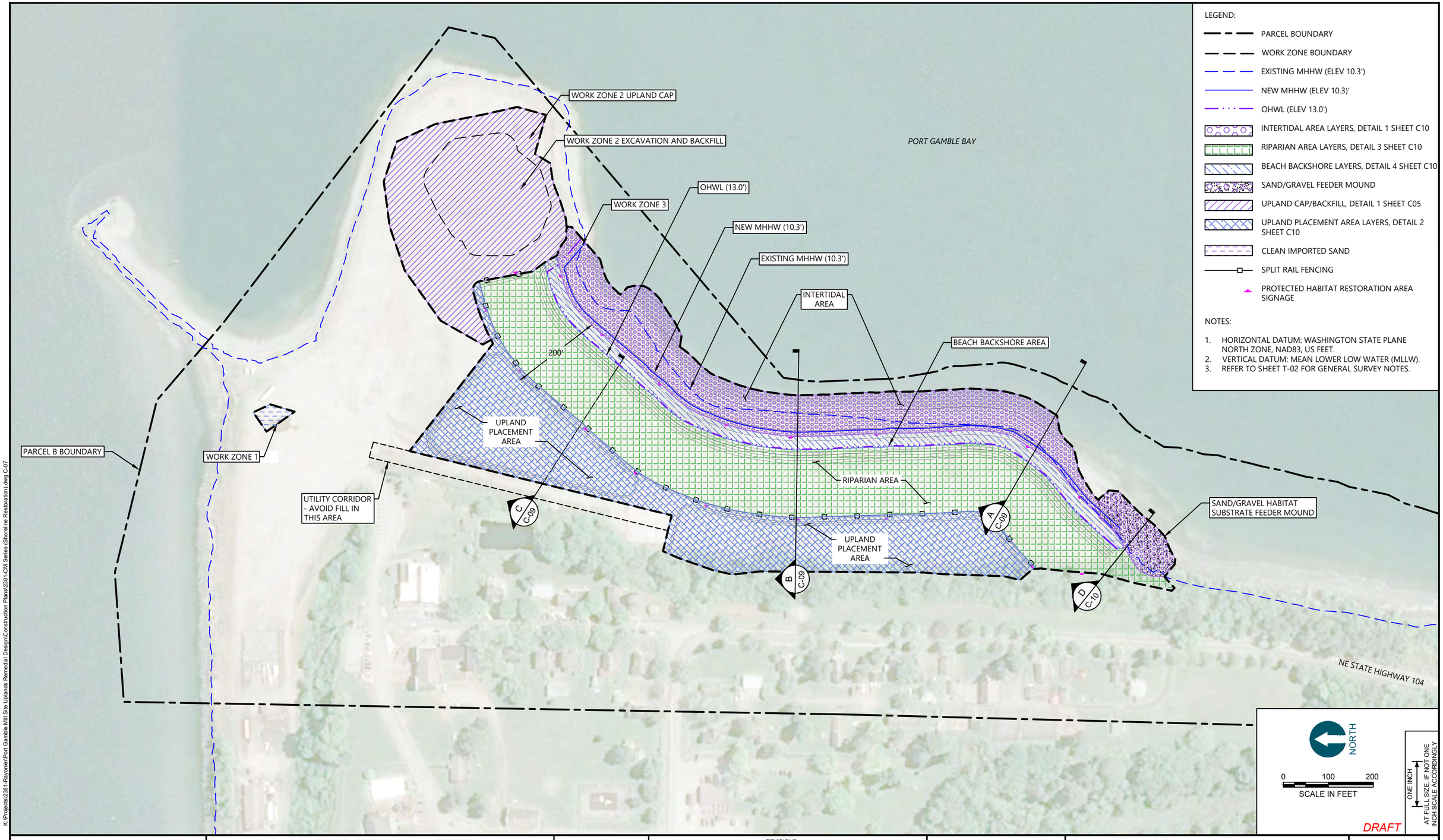
DESIGNED BY: G. CASSON
DRAWN BY: R. FARNSWORTH
CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

MILL SITE SHORELINE COMPOSITE SITE PLAN

C-06

SHEET NO. 19 OF 33



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Dec 08, 2023 1:39pm rfarnsworth

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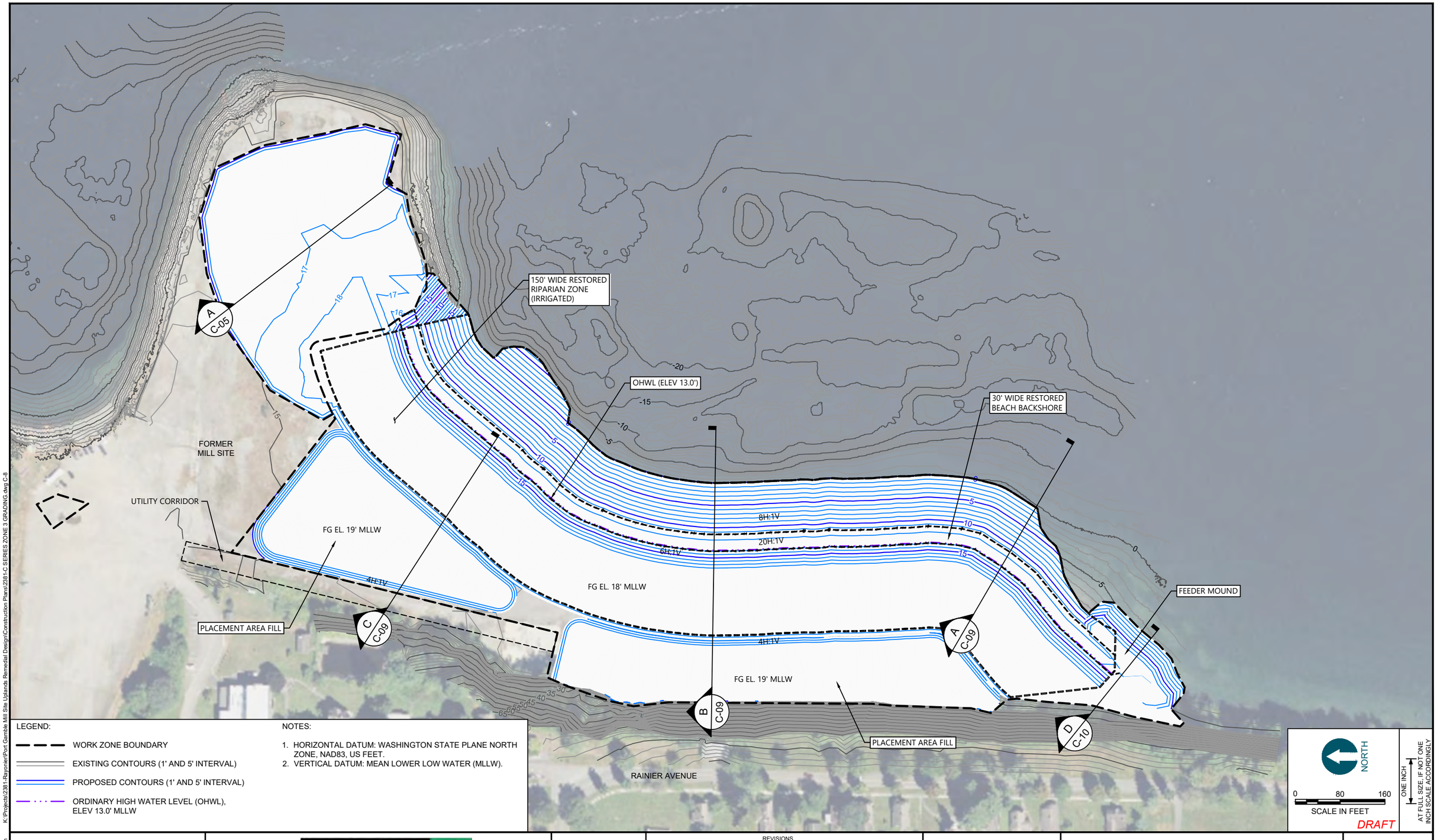
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

MILL SITE RESTORATION CONSTRUCTION MATERIALS PLAN

C-07

SHEET NO. 20 OF 33



LEGEND:

- WORK ZONE BOUNDARY
- EXISTING CONTOURS (1' AND 5' INTERVAL)
- PROPOSED CONTOURS (1' AND 5' INTERVAL)
- ORDINARY HIGH WATER LEVEL (OHWL), ELEV 13.0' MLLW

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD83, US FEET.
2. VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW).

NORTH

0 80 160

SCALE IN FEET

ONE INCH AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

K:\Projects\2381-Rayonier\Port Gamble Mill Site Uplands Remedial Design\Construction Plans\2381-C SERIES ZONE 3 GRADING.dwg C-8

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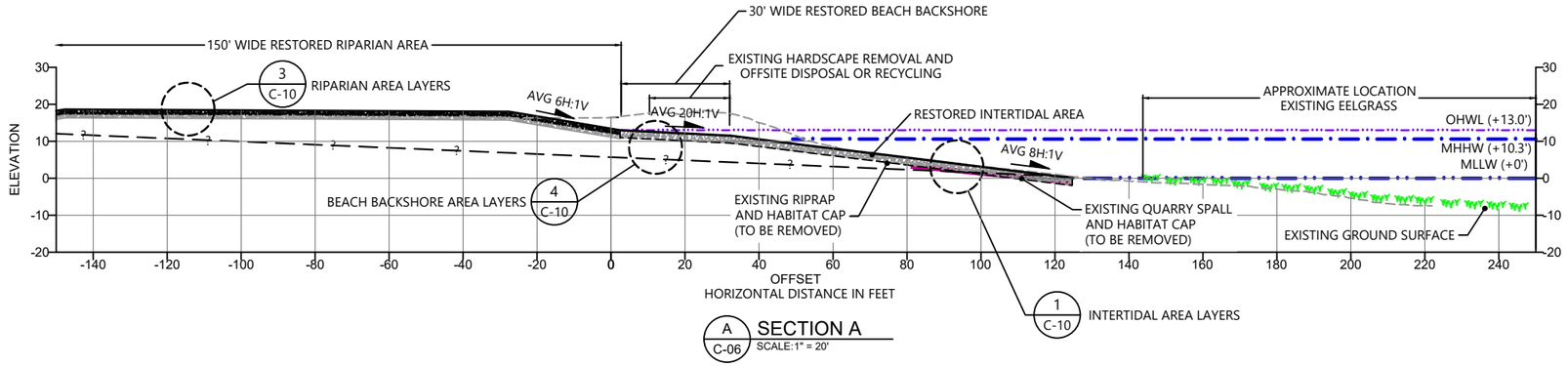
CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

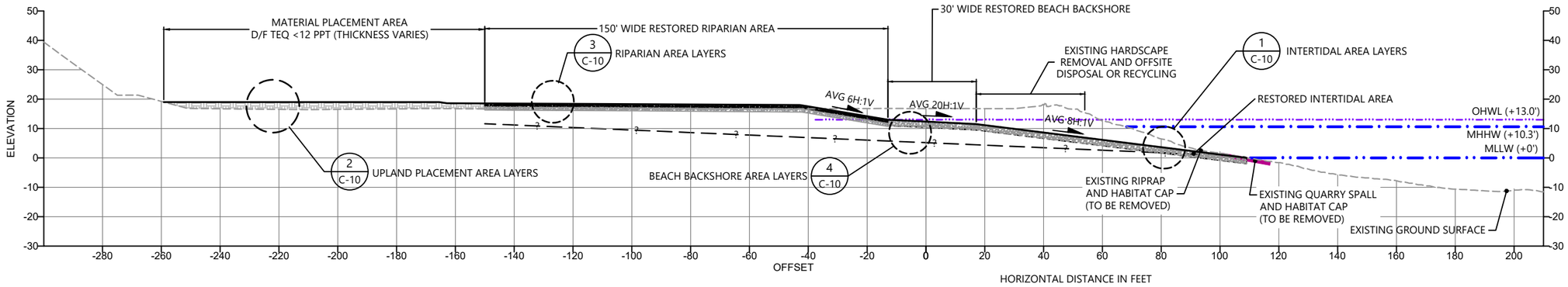
SOUTHERN MILL SITE OVERALL GRADING PLAN

C-08

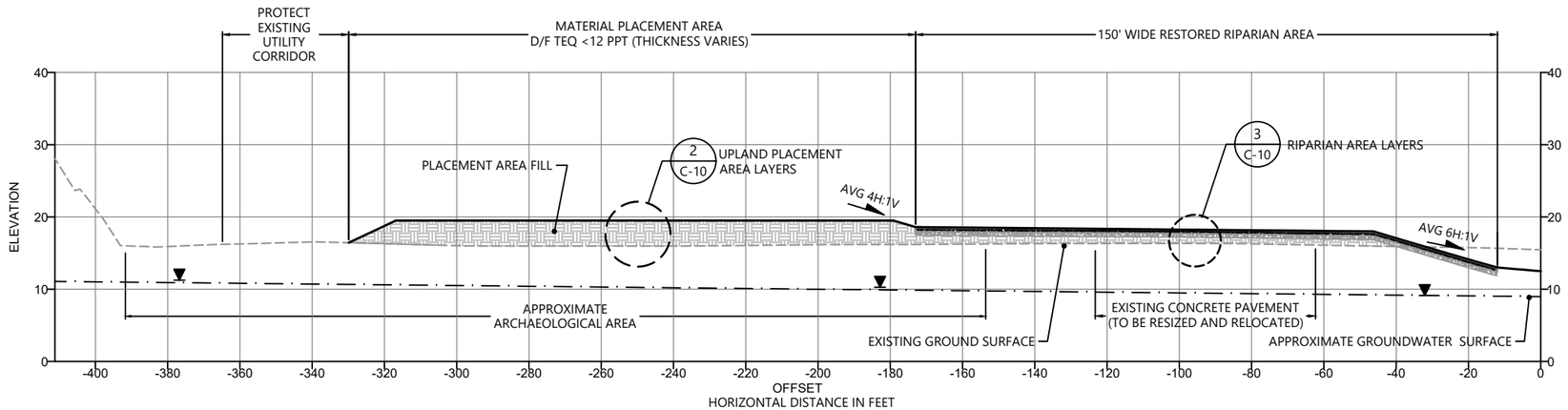
SHEET NO. 21 OF 33



A C-06 SECTION A
SCALE:1" = 20'



B C-06 SECTION B
SCALE:1" = 20'



C C-06 SECTION C
SCALE:1" = 20'

LEGEND:

- QUARRY SPALL AND HABITAT CAP
- APPROXIMATE AREA OF SOILS THAT EXCEED SEDIMENT CLEANUP LEVELS
- SAND AND GRAVEL
- CLEAN SAND
- SANDY SOIL WITH COMPOST

SOURCE: SURVEY BY TRIAD AND ETRAC, DATED AUGUST 27, 2014.
HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH, NORTH AMERICAN DATUM OF 1983 (NAD83) U.S. SURVEY FEET
VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW)

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

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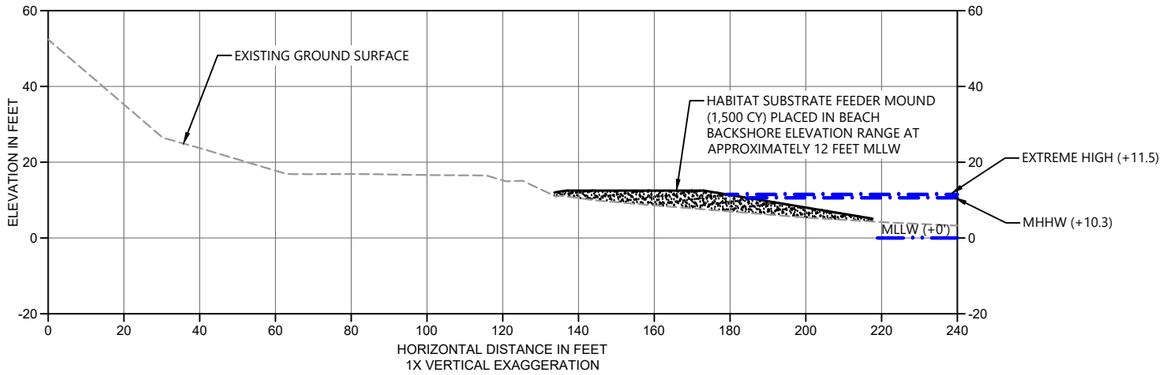
PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

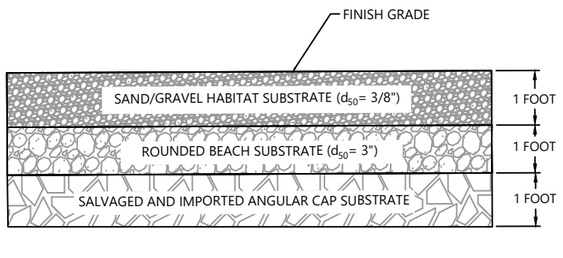
MILL SITE SHORELINE RESTORATION CONSTRUCTION MATERIALS SECTIONS (1 OF 2)

C-09

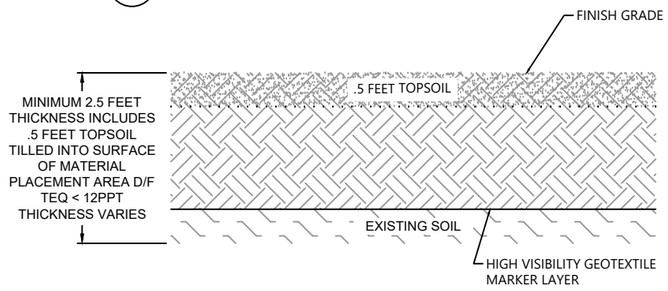
SHEET NO. 22 OF 33



D / C-07 FEEDER MOUND SECTION (TYPICAL)
SCALE:1" = 20'

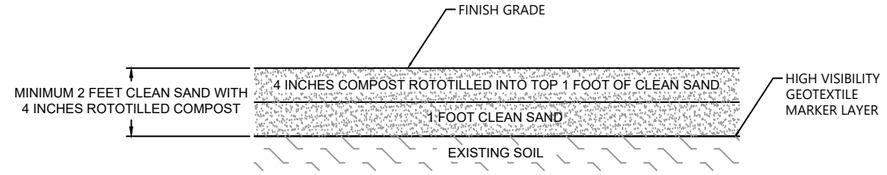


1 / C-07 INTERTIDAL AREA LAYERS (TYPICAL)
SCALE:NTS

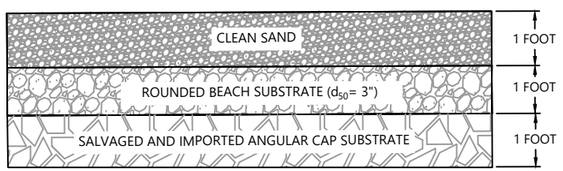


NOTE:
HARDSCAPE TO BE PROCESSED AND SENT OFFSITE FOR DISPOSAL AND RECYCLING.

2 / C-07 UPLAND PLACEMENT AREA LAYERS (TYPICAL)
SCALE:NTS



3 / C-07 RIPARIAN AREA LAYERS (TYPICAL)
SCALE:NTS



4 / C-07 BEACH BACKSHORE AREA LAYERS
SCALE:NTS

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

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Dec 08, 2023 1:42pm rfarnsworth

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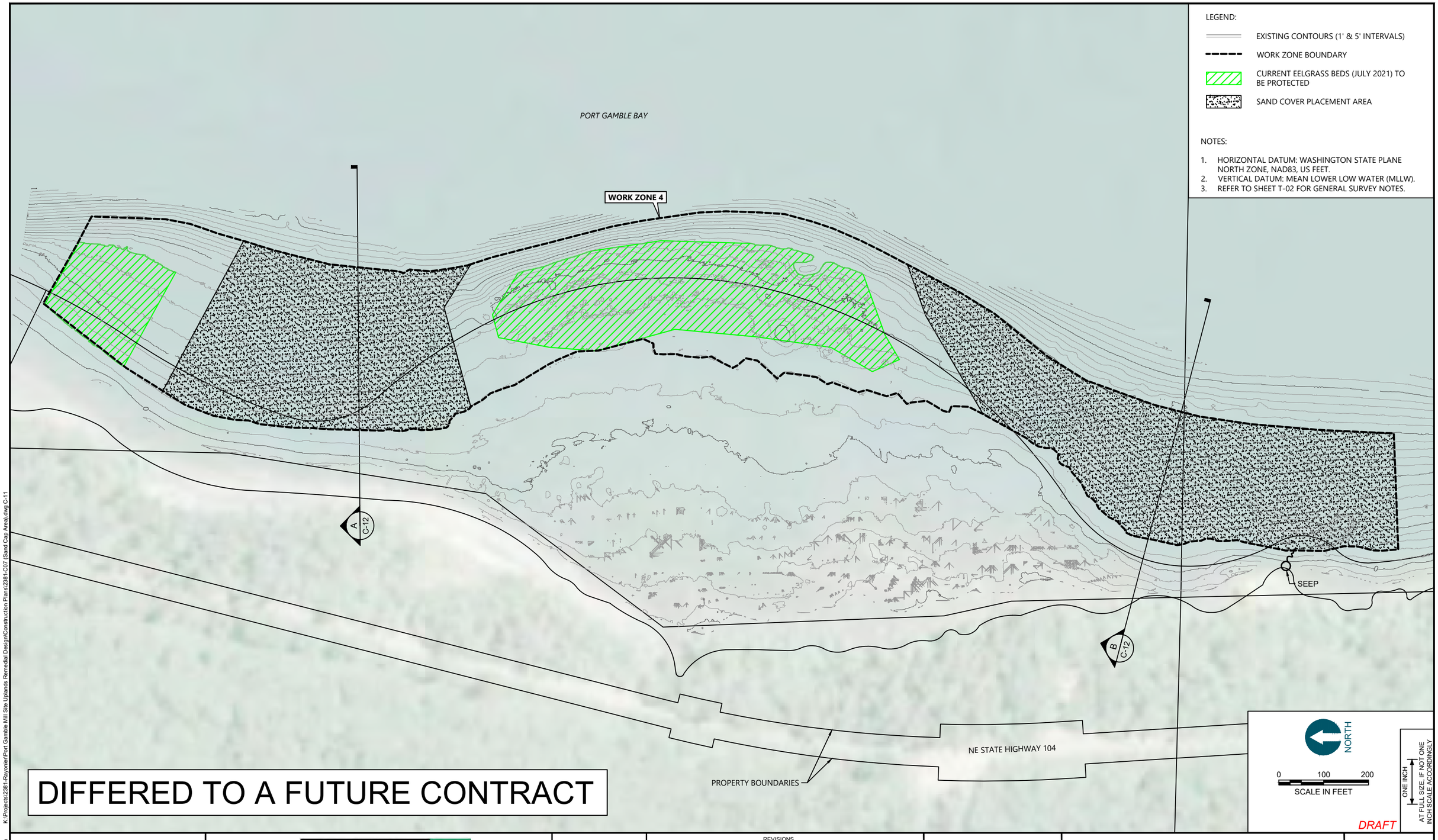
CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

MILL SITE RESTORATION CONSTRUCTION MATERIALS SECTIONS (2 OF 2)

C-10

SHEET NO. **23** OF **33**



DIFFERED TO A FUTURE CONTRACT

K:\Projects\2381-Rayonier\Port Gamble Mill Site Uplands Remedial Design\Construction Plans\2381-C07 (Sand Cap Area).dwg C-11

Dec 08, 2023 1:43pm rfarnsworth

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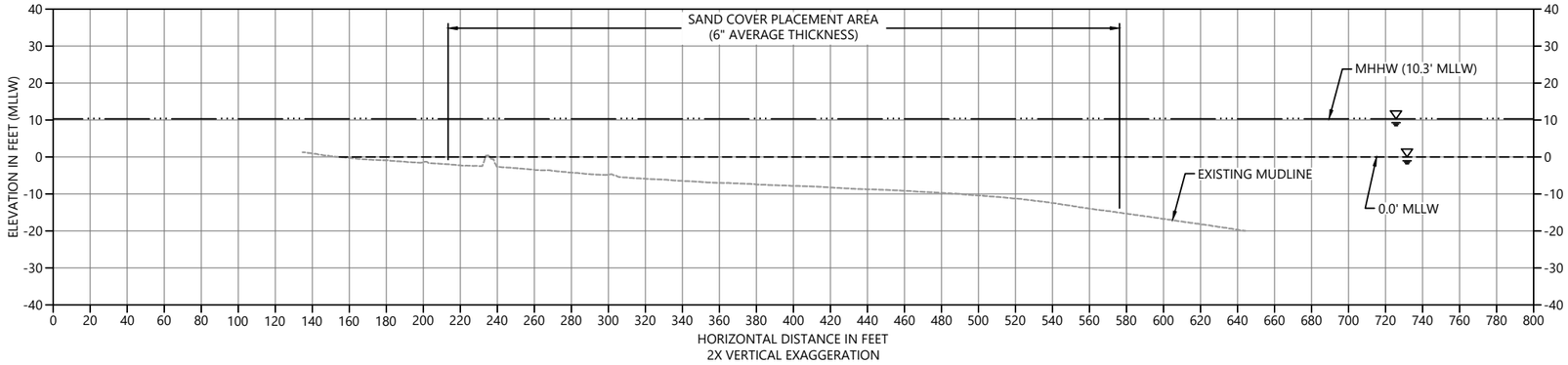
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

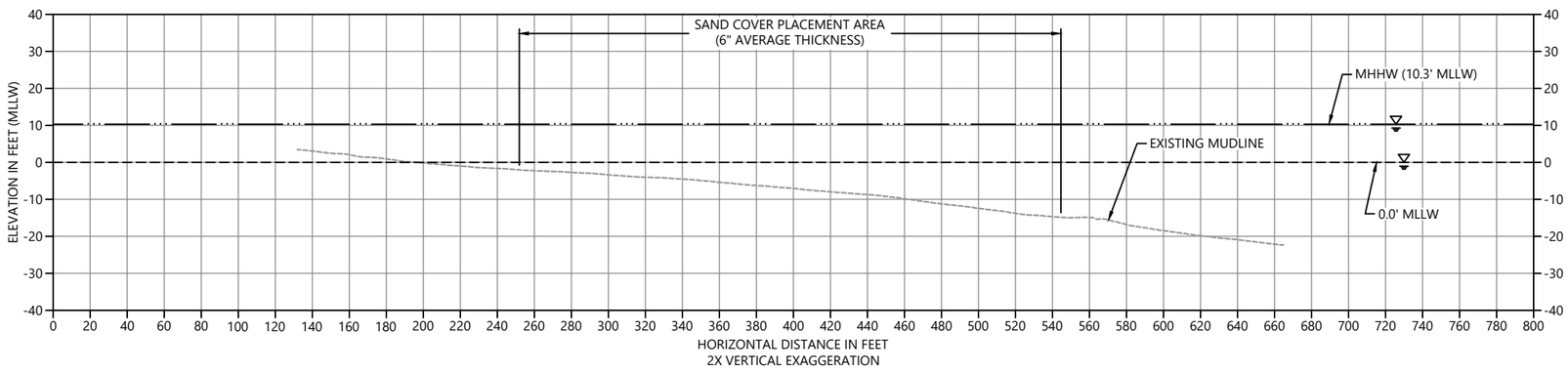
WORK ZONE 4 - WESTERN BAY SAND CAPPING PLAN

C-11

SHEET NO. **24** OF **33**



A C-11 SAND PLACEMENT AREA CROSS SECTION
HORIZ. SCALE: 1" = 40'
VERT. SCALE: 1" = 20'



B C-11 SAND PLACEMENT AREA CROSS SECTION
HORIZ. SCALE: 1" = 40'
VERT. SCALE: 1" = 20'

DIFFERED TO A FUTURE CONTRACT

DRAFT

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

K:\Projects\2381-Rayonier\Port Gamble Mill Site Uplands Remedial Design\Construction Plans\2381-C07 (Sand Cap Area).dwg C-12
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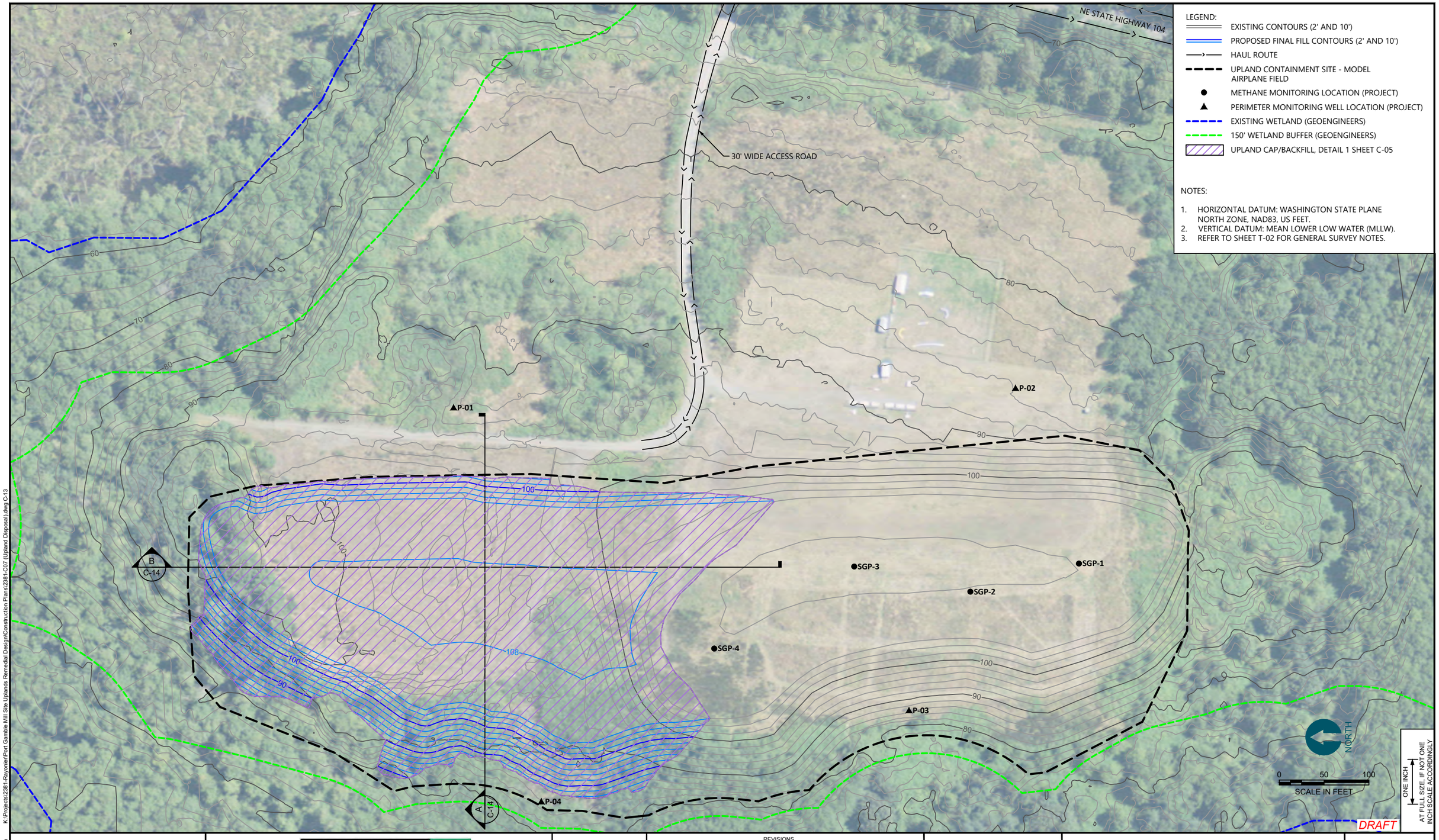
DRAWN BY: D. HOLMER
CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

WORK ZONE 4 - WESTERN BAY SAND CAPPING TYPICAL CROSS SECTIONS

C-12

SHEET NO. 25 OF 33



LEGEND:

- EXISTING CONTOURS (2' AND 10')
- PROPOSED FINAL FILL CONTOURS (2' AND 10')
- HAUL ROUTE
- UPLAND CONTAINMENT SITE - MODEL AIRPLANE FIELD
- METHANE MONITORING LOCATION (PROJECT)
- PERIMETER MONITORING WELL LOCATION (PROJECT)
- EXISTING WETLAND (GEOENGINEERS)
- 150' WETLAND BUFFER (GEOENGINEERS)
- UPLAND CAP/BACKFILL, DETAIL 1 SHEET C-05

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD83, US FEET.
2. VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW).
3. REFER TO SHEET T-02 FOR GENERAL SURVEY NOTES.

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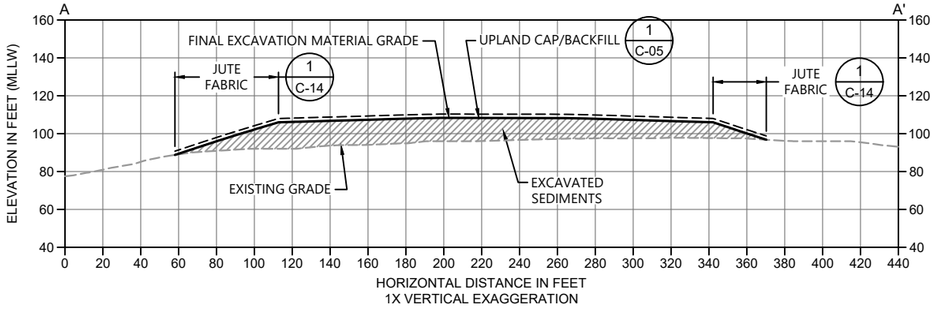
PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

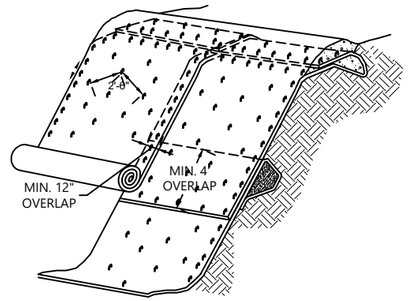
WORK ZONE 5 - MODEL AIRPLANE FIELD UPLAND DISPOSAL PLAN

C-13

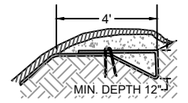
SHEET NO. **26** OF **33**



A C-13 MODEL AIRPLANE FIELD DISPOSAL AREA
SCALE: 1" = 40'



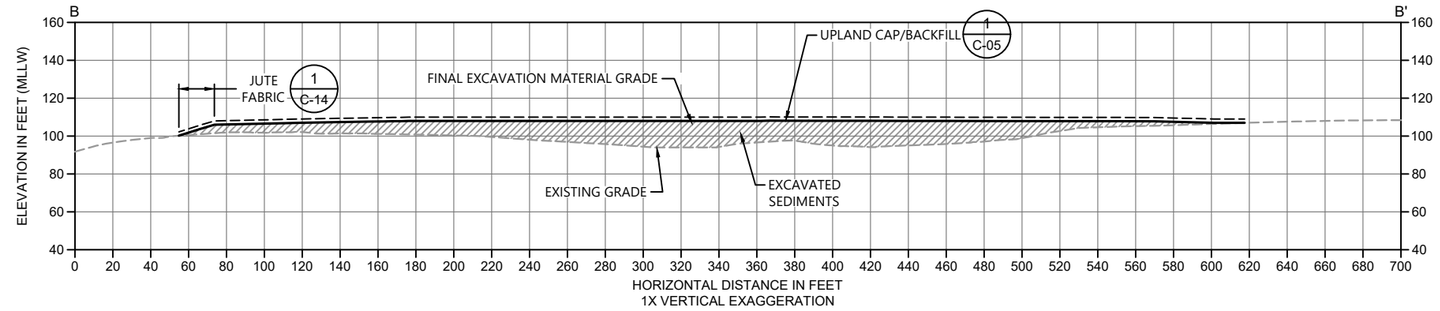
JUTE FABRIC INSTALLATION, TOP OF SLOPE ISOMETRIC VIEW
NOT TO SCALE



TOP OF SLOPE ANCHOR DETAIL

NOTES:

1. SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS AND GRASS. MATS/BLANKETS SHALL HAVE GOOD SOIL CONTACT.
2. LAY BLANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.
3. MATS/BLANKETS SHOULD BE INSTALLED VERTICALLY DOWNSLOPE.
4. INSTALL JUTE MAT OVER ENTIRE PLANTING AREA. AVOID EXISTING TREES AND EXISTING STUMPS.
5. JUTE FABRIC SHALL BE ROLLED IN A CONTROLLED FASHION. INSTALL STAKES AS MAT IS UNROLLED. FABRIC SHALL NOT BE ALLOWED TO ROLL DOWN THE SLOPE ON ITS OWN.



B C-13 MODEL AIRPLANE FIELD DISPOSAL AREA
SCALE: 1" = 40'

1 C-13 JUTE FABRIC SLOPE PROTECTION
SCALE: NTS

LEGEND:

- EXISTING GRADE
- FINAL DREDGE MATERIAL GRADE/GEOTEXTILE
- 2-FT TOPSOIL COVER (FINAL GRADE)

0 40 80
SCALE IN FEET

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

ANCHOR QEA

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PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

WORK ZONE 5 - MODEL AIRPLANE FIELD UPLAND DISPOSAL CROSS SECTION

C-14

SHEET NO. 27 OF 33

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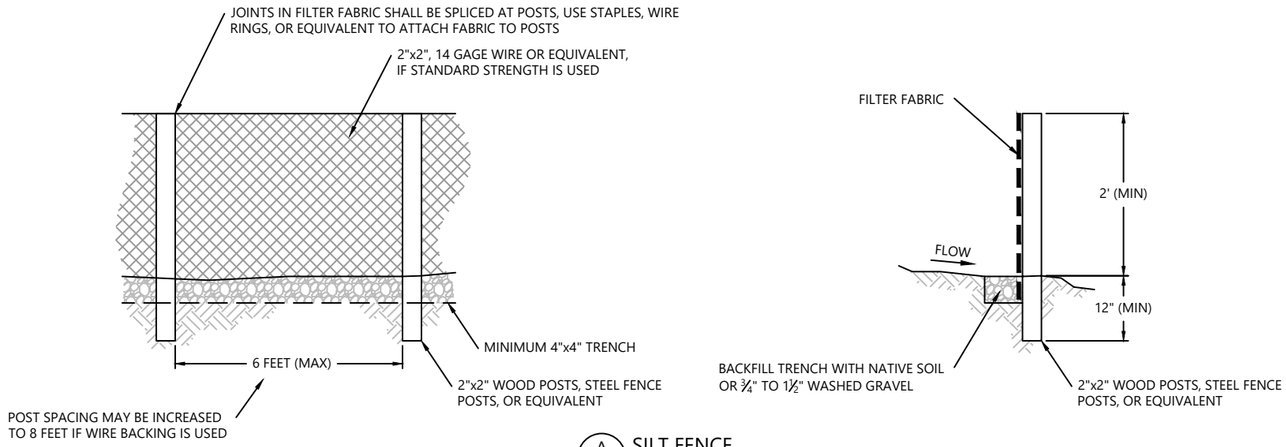
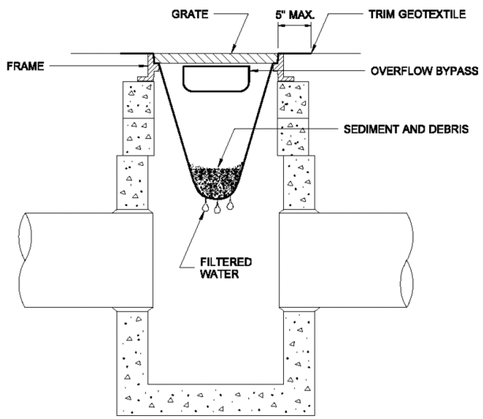


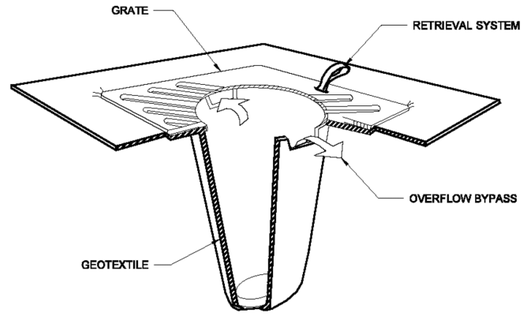
A - SILT FENCE
SCALE:NTS

NOTES:

1. PERFORM MAINTENANCE IN ACCORDANCE WITH SPECIFICATIONS.
2. SIZE THE BELOW GRATE INLET DEVICE (BGID) FOR THE STORM WATER STRUCTURE IT WILL SERVICE.
3. THE BGID SHALL HAVE A BUILT-IN HIGH-FLOW RELIEF SYSTEM (OVERFLOW BYPASS).
4. THE RETRIEVAL SYSTEM MUST ALLOW REMOVAL OF THE BGID WITHOUT SPILLING THE COLLECTED MATERIAL.



CROSS SECTION
NOT TO SCALE



ISOMETRIC VIEW
NOT TO SCALE

B - CATCH BASIN PROTECTION
SCALE:NTS

EROSION CONTROL NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING, INSTALLING, AND MAINTAINING ALL MEASURES NECESSARY TO MEET CONSTRUCTION BEST MANAGEMENT PRACTICES (BMPS) IN ACCORDANCE WITH WASHINGTON STATE DEPARTMENT OF ECOLOGY STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON (2012), WSDOT HIGHWAY RUNOFF MANUAL (2014), AND ALL OTHER STATE AND LOCAL REQUIREMENTS.
2. TEMPORARY EROSION AND SEDIMENT CONTROL (TESC) FEATURES SHALL BE INSTALLED TO PREVENT RUNOFF FROM THE DEWATERED SEDIMENT FROM ENTERING ADJACENT SURFACE WATER BODY. THE NEED FOR THESE FEATURES, AND THEIR LOCATION, SHALL BE DETERMINED DURING CONSTRUCTION BASED ON THE ACTUAL LOCATION OF THE OFFLOADING AND TEMPORARY STORAGE ACTIVITIES.
3. FILTER FABRIC SILT FENCES, WHERE USED, SHALL BE INSTALLED ALONG A CONTOUR OF CONSTANT ELEVATION WHENEVER POSSIBLE.
4. ALTERNATIVES SUCH AS HAY BALES OR BRUSH BARRIERS MAY BE SUBSTITUTED IN LIEU OF SILT FENCES, SUBJECT TO APPROVAL OF THE ENGINEER.
5. TESC FEATURES SHALL BE USED BETWEEN ALL DRAINAGE DITCHES AND ADJACENT SURFACE WATER BODY WHERE THESE DITCHES AREA DOWNSTREAM OF THE OFFLOADING AND TEMPORARY STORAGE AREAS.
6. THE CONTRACTOR SHALL KEEP OFF-SITE STREETS THAT ARE IMPACTED AS A RESULT OF THE CONTRACTOR'S WORK CLEAN AT ALL TIMES. FLUSHING STREETS SHALL NOT BE ALLOWED. ALL STREETS SHOULD BE SWEPT USING HIGH EFFICIENCY VACUUM SWEEPERS.
7. THE TEMPORARY EROSION/SEDIMENT CONTROLS SHALL BE INSTALLED, INSPECTED, AND OPERATING BEFORE ANY EXCAVATION OCCURS. THESE CONTROLS MUST BE SATISFACTORILY MAINTAINED UNTIL CONSTRUCTION ACTIVITIES ARE APPROVED AS COMPLETE BY THE OWNER.

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

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DESIGNED BY: G. CASSON
DRAWN BY: D. HOLMER
CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
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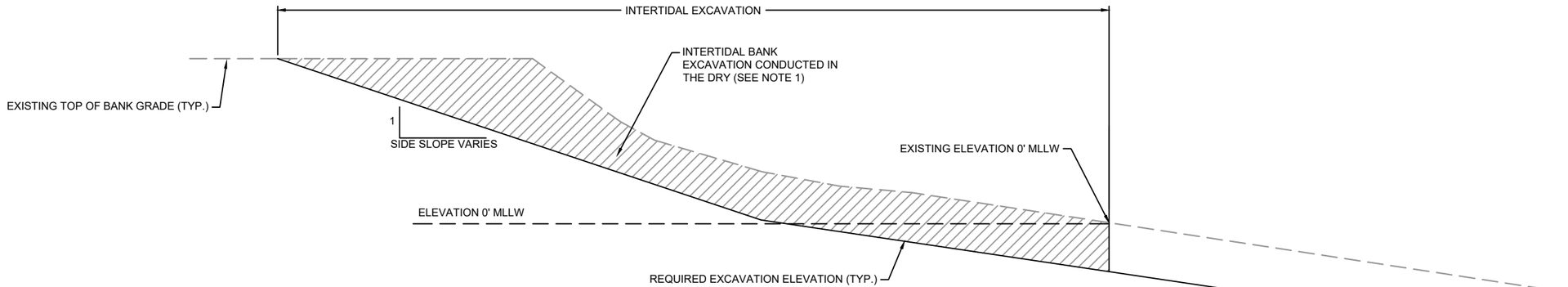
PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

TYPICAL TESC DETAILS (1 OF 2)

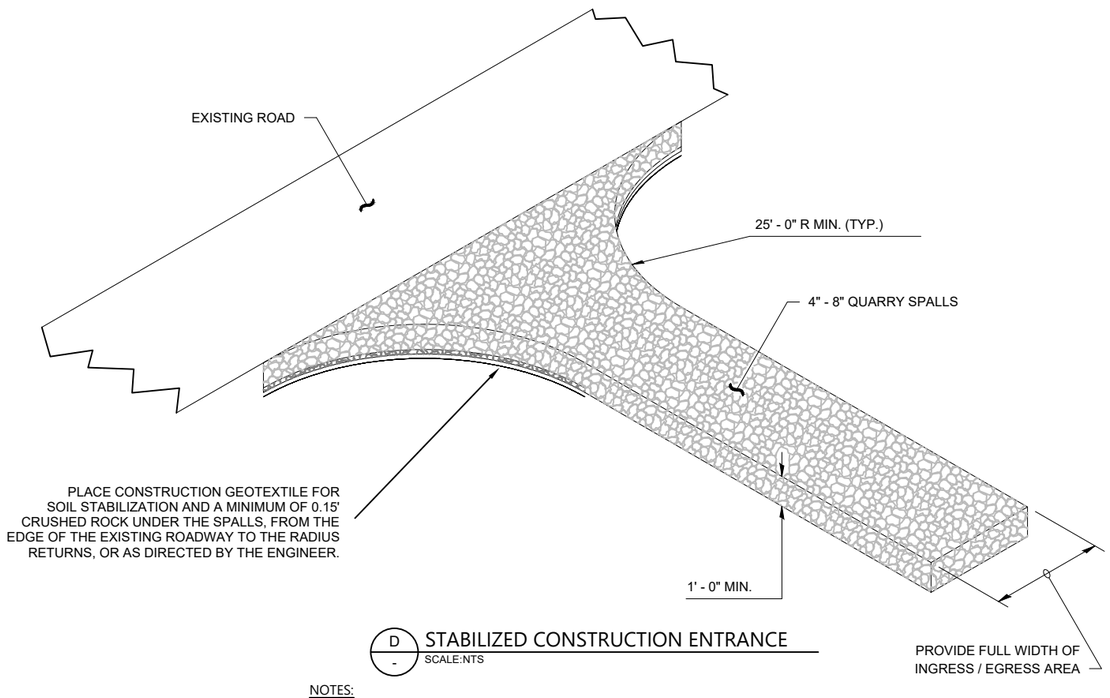
C-15

SHEET NO. 28 OF 33



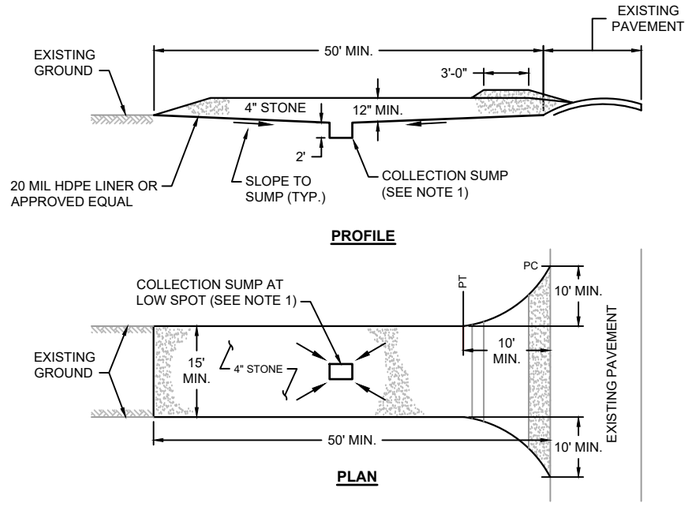
C - EXCAVATION DETAIL
SCALE:NTS

NOTES:
1. FOR EXISTING ELEVATION 0' MLLW AND HIGHER, EXCAVATE IN THE DRY. IF THE REQUIRED DREDGE ELEVATION BENEATH THE EXISTING ELEVATION 0' MLLW CANNOT BE PRACTICABLY ACHIEVED IN THE DRY, DREDGE EQUIPMENT MAY BE CONSIDERED.
2. PLACE A MINIMUM OF 6" OF ANGULAR CAP SUBSTRATE WITHIN THE SAME TIDAL CYCLE OVER THE NEWLY-EXCAVATED SURFACE, FOLLOWING CONFIRMATION THE REQUIRED EXCAVATION ELEVATIONS HAVE BEEN ACHIEVED.
3. IF IN THE DRY EXCAVATION DOWN TO THE REQUIRED EXCAVATION ELEVATIONS IS NOT ACHIEVED PRIOR TO THE INCOMING TIDE, THE CONTRACTOR SHALL PROTECT THE NEWLY-EXCAVATED SURFACE UNTIL THE SUBSEQUENT LOW WATER WORK PERIOD.



D - STABILIZED CONSTRUCTION ENTRANCE
SCALE:NTS

NOTES:
1. A STABILIZED ENTRANCE, SUCH AS THE DETAIL SHOWN, SHALL BE CONSTRUCTED, IF NECESSARY, AT THE ENGINEER'S DIRECTION TO PREVENT TRACKING OF SOIL ONTO PUBLIC ROADWAYS AND TO PREVENT EROSION AND RUNOFF FROM ACCESS ROUTES.



TRUCK WASH STATION NOTES:
1. WASH STATION SHALL BE CONSTRUCTED WITH A 20 MIL HDPE LINER SYSTEM TO DRAIN TO 2' DEEP HDPE LINED COLLECTION SUMP. DECONTAMINATION WATER IN THE COLLECTION SUMP SHALL BE DISPOSED OF AT THE APPROVED AND PERMITTED DISPOSAL FACILITY.
2. THE TRUCK WASH STATION SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SOIL/DEBRIS ONTO ADJACENT PAVED AREAS. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF THE COLLECTION SUMP. ALL SOIL/DEBRIS SPILLED, DROPPED, WASHED OR TRACKED ONTO ADJACENT PAVEMENT MUST BE REMOVED IMMEDIATELY.
3. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.
4. STONE AND ACCUMULATED SEDIMENT SHALL BE REMOVED AND DISPOSED OF AT AN APPROPRIATE DISPOSAL FACILITY AT THE CONCLUSION OF THE PROJECT.

E - TRUCK WASH STATION - TYP.
SCALE:NTS

DRAFT

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

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A Limited Partnership

REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION

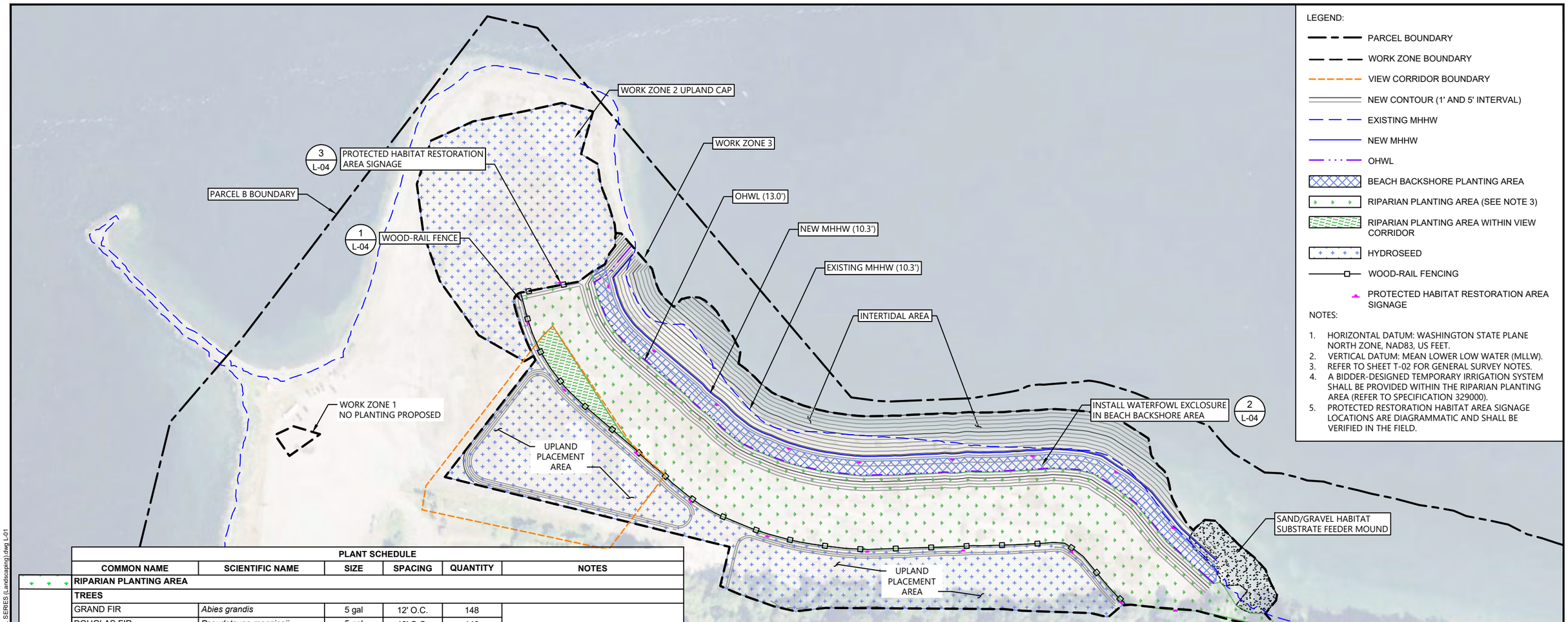
DESIGNED BY: G. CASSON
DRAWN BY: D. HOLMER
CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

TYPICAL TESC DETAILS (2 OF 2)

C-16

SHEET NO. **29** OF **33**



LEGEND:

- PARCEL BOUNDARY
- WORK ZONE BOUNDARY
- VIEW CORRIDOR BOUNDARY
- NEW CONTOUR (1' AND 5' INTERVAL)
- EXISTING MHHW
- NEW MHHW
- OHWL
- BEACH BACKSHORE PLANTING AREA
- RIPARIAN PLANTING AREA (SEE NOTE 3)
- RIPARIAN PLANTING AREA WITHIN VIEW CORRIDOR
- HYDROSEED
- WOOD-RAIL FENCING
- PROTECTED RESTORATION HABITAT AREA SIGNAGE

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD83, US FEET.
2. VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW).
3. REFER TO SHEET T-02 FOR GENERAL SURVEY NOTES.
4. A BIDDER-DESIGNED TEMPORARY IRRIGATION SYSTEM SHALL BE PROVIDED WITHIN THE RIPARIAN PLANTING AREA (REFER TO SPECIFICATION 329000).
5. PROTECTED RESTORATION HABITAT AREA SIGNAGE LOCATIONS ARE DIAGRAMMATIC AND SHALL BE VERIFIED IN THE FIELD.

PLANT SCHEDULE

	COMMON NAME	SCIENTIFIC NAME	SIZE	SPACING	QUANTITY	NOTES
	RIPARIAN PLANTING AREA					
	TREES					
1, 2, 4 / L-03	GRAND FIR	*Abies grandis*	5 gal	12' O.C.	148	PLANT SAME SPECIES IN GROUPS OF 5-7
	DOUGLAS FIR	*Pseudotsuga menziesii*	5 gal	12' O.C.	148	
	SHORE PINE	*Pinus contorta, var. contorta*	5 gal	12' O.C.	148	
	BIG LEAF MAPLE	*Acer macrophyllum*	5 gal	12' O.C.	148	
	RED ALDER	*Alnus rubra*	1 gal	9' O.C.	262	
	PACIFIC MADRONE	*Arbutus menziesii*	1 gal	SEE NOTES	277	CLUSTER (3) 1-GALLON POTS AT 3-FT ON SPACING; SPACE EACH CLUSTER AT 12' O.C. PLANT CLUSTERS IN GROUPS OF 5-7
	SHRUBS					
1, 2, 4 / L-03	BEAKED HAZELNUT	*Corylus cornuta*	1 gal	6' O.C.	553	PLANT EQUAL MIX OF 8 SPECIES; PLANT 1 ROW OF ROSA NUTKANA ALONG WATERWARD SIDE OF WOOD-RAIL FENCE
	NOOTKA ROSE	*Rosa nutkana*	1 gal	6' O.C.	777	
	OCEANSPRAY	*Holodiscus discolor*	1 gal	6' O.C.	553	
1 / L-04	RED ELDERBERRY	*Sambucus racemosa*	1 gal	6' O.C.	553	
	SNOWBERRY	*Symphoricarpos alba*	1 gal	6' O.C.	553	
	INDIAN PLUM	*Oemleria cerasiformis*	1 gal	6' O.C.	553	
	THIMBLEBERRY	*Rubus parviflorus*	1 gal	6' O.C.	553	
	SALAL	*Gaultheria shallon*	1 gal	6' O.C.	553	
	BEACH BACKSHORE PLANTING AREA					
	EMERGENTS					
3 / L-03	AMERICAN DUNE GRASS	*Leymus mollis*	10 cu-in plug	2' O.C.	4419	PLANT EQUAL MIX OF SPECIES
	PUGET SOUND GUMWEED	*Grindelia integrifolia*	10 cu-in plug	2' O.C.	4419	
	YELLOW SAND VERBENA	*Abronia latifolia*	10 cu-in plug	2' O.C.	4419	

PLANT SCHEDULE

	COMMON NAME	SCIENTIFIC NAME	SIZE	SPACING	QUANTITY	NOTES
	RIPARIAN PLANTING AREA WITHIN VIEW CORRIDOR					
	TREES					
1, 2, 4 / L-03	VINE MAPLE	*Acer circinatum*	1 gal	9' O.C.	14	PLANT SAME SPECIES IN GROUPS OF 5-7
	SLIDE ALDER	*Alnus viridus*	1 gal	9' O.C.	14	
	PACIFIC CRABAPPLE	*Malus fusca*	1 gal	9' O.C.	14	
	SHORE PINE	*Pinus contorta, var. contorta*	5 gal	12' O.C.	8	
	SHRUBS					
1, 2, 4 / L-03	NOOTKA ROSE	*Rosa nutkana*	1 gal	6' O.C.	92	PLANT EQUAL MIX OF 4 SPECIES; PLANT 1 ROW OF ROSA NUTKANA ALONG WATERWARD SIDE OF WOOD-RAIL FENCE
	SERVICEBERRY	*Amelanchier alnifolia*	1 gal	6' O.C.	46	
1 / L-04	SNOWBERRY	*Symphoricarpos alba*	1 gal	6' O.C.	46	
	THIMBLEBERRY	*Rubus parviflorus*	1 gal	6' O.C.	46	
	HYDROSEED					
	SEE SPECIFICATION FOR SEED MIX SPECIES		N/A	N/A	WORK ZONE 2 - 137759 SF WORK ZONE 3 - 193227 SF WORK ZONE 5 - 161957 SF (SEE L-02)	SEE SPECIFICATIONS FOR PERCENT BY WEIGHT AND APPLICATION RATES

NORTH

0 100 200

SCALE IN FEET

ONE INCH AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

ANCHOR QEA

Pope Resources
A Limited Partnership

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

DESIGNED BY: G. CASSON
DRAWN BY: R. FARNSWORTH
CHECKED BY: J. LAPLANTE
APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

PLANTING PLAN - MILL SITE SHORELINE

L-01

SHEET NO. 30 OF 33

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NE STATE HIGHWAY 104

30' WIDE ACCESS ROAD AND HAUL ROUTE

WORK ZONE 5 - UPLAND CONTAINMENT SITE - MODEL AIRPLANE FIELD

EXISTING WETLAND BUFFER

EXISTING WETLAND

LEGEND:

- PARCEL BOUNDARY
- WORK ZONE BOUNDARY
- NEW CONTOURS (1' AND 5' INTERVAL)
- HAUL ROUTE
- EXISTING WETLAND (GEOENGINEERS)
- 150' WETLAND BUFFER (GEOENGINEERS)
- HYDROSEED (SEE L-01 FOR PLANT SCHEDULE AND QUANTITIES)

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD83, US FEET.
2. VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW).
3. REFER TO SHEET T-02 FOR GENERAL SURVEY NOTES.

NORTH

0 50 100

SCALE IN FEET

ONE INCH AT FULL SIZE. IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

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APPROVED BY: J. LAPLANTE
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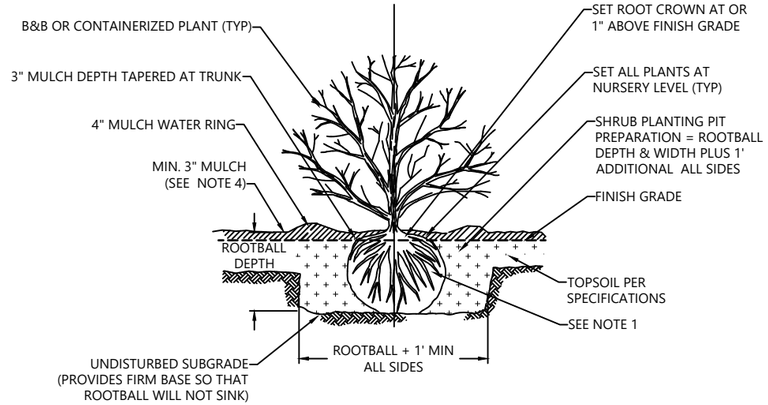
DATE: DECEMBER 2023

PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

PLANTING PLAN - WORK ZONE 5

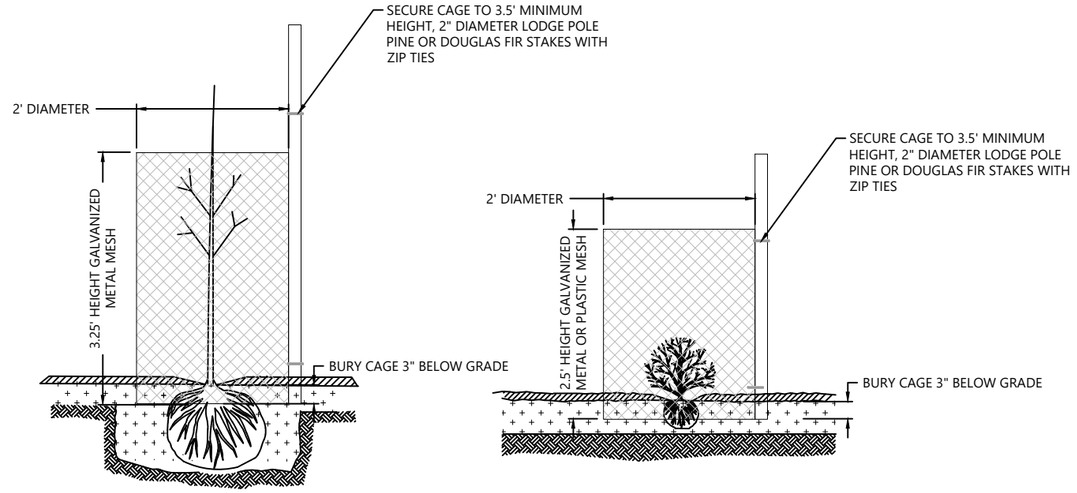
L-02

SHEET NO. 31 OF 33

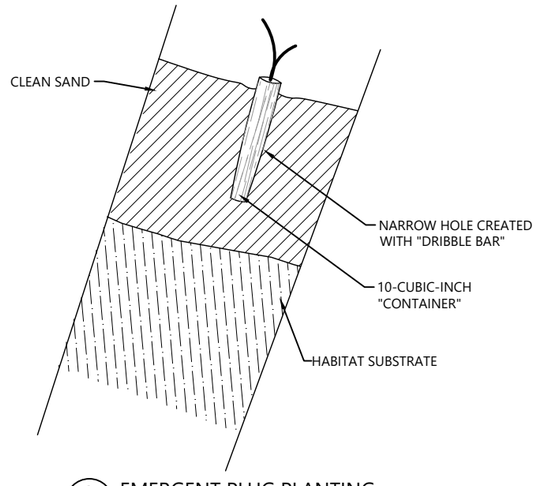


NOTES:
1. REMOVE ALL WIRE, STRING, BURLAP, AND PLASTIC.
2. SHAPE SOIL TO PROVIDE 5-FEET DIAMETER OR TWO TIMES ROOTBALL DIAMETER, WHICHEVER IS GREATER, WATERING RING.
3. ROUGHEN SIDES OF PLANTING HOLE TOMAXIMIZE EXCAVATED AREA WITHOUT UNDERMINING ADJACENT PAVING/CURB.
4. MULCH AREA TO BE CLEAR OF GRASS, WEEDS, ETC. TO REDUCE COMPETITION WITH TREE ROOTS.

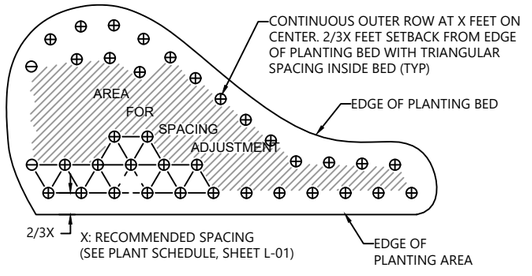
1 / L-01 — 1 GALLON AND 5 GALLON TREE AND SHRUB PLANTING
SCALE: NOT TO SCALE



2 / L-01 — HERBIVORY EXCLOSURE FENCING
SCALE: NOT TO SCALE



3 / L-01 — EMERGENT PLUG PLANTING
SCALE: NOT TO SCALE



NOTES: APPLY PLANTING PATTERN FOR SHRUB AND BEACH BACKSHORE PLANTING

4 / L-01 — PLANTING PATTERN
SCALE: NOT TO SCALE

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

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APPROVED BY: J. LAPLANTE
SCALE: AS NOTED
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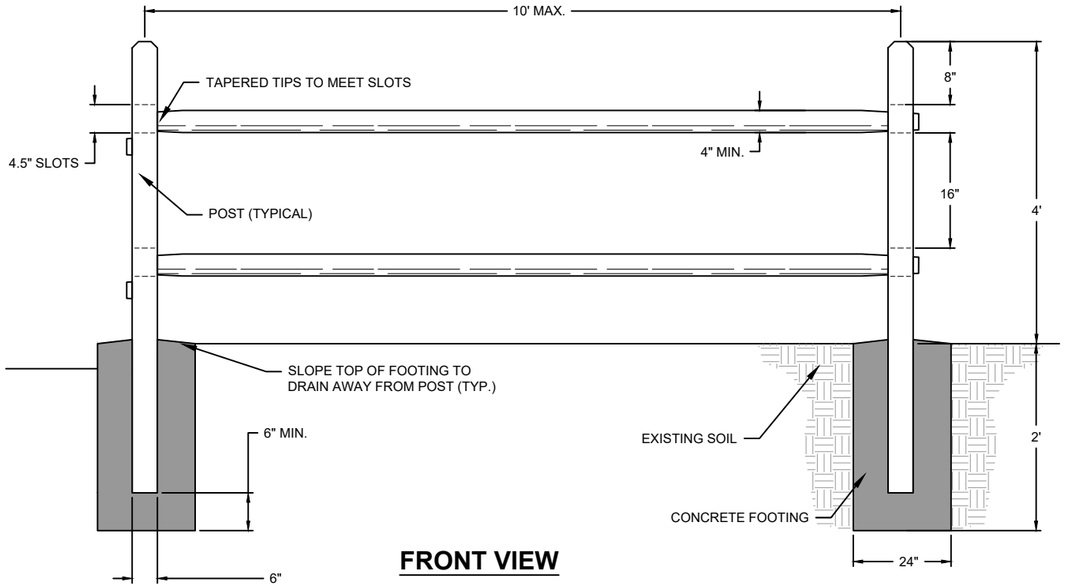
PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

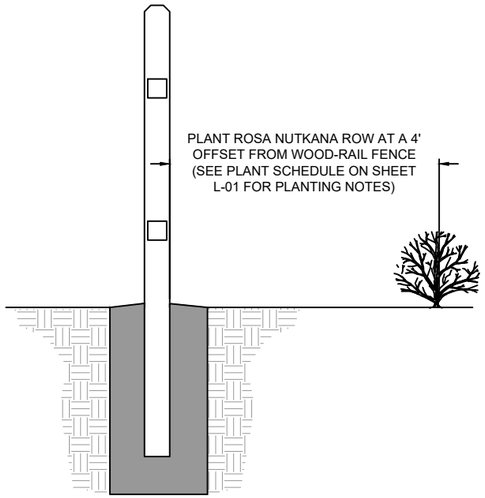
PLANTING DETAILS (1 OF 1)

L-03

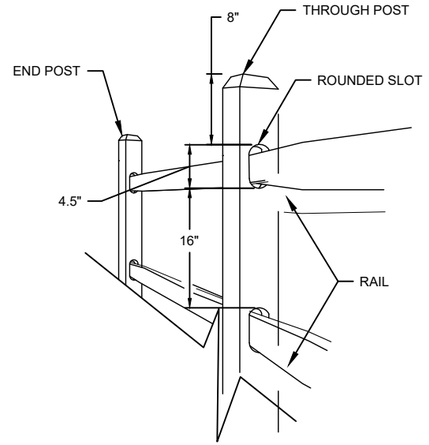
SHEET NO. 32 OF 33



FRONT VIEW



SECTION VIEW

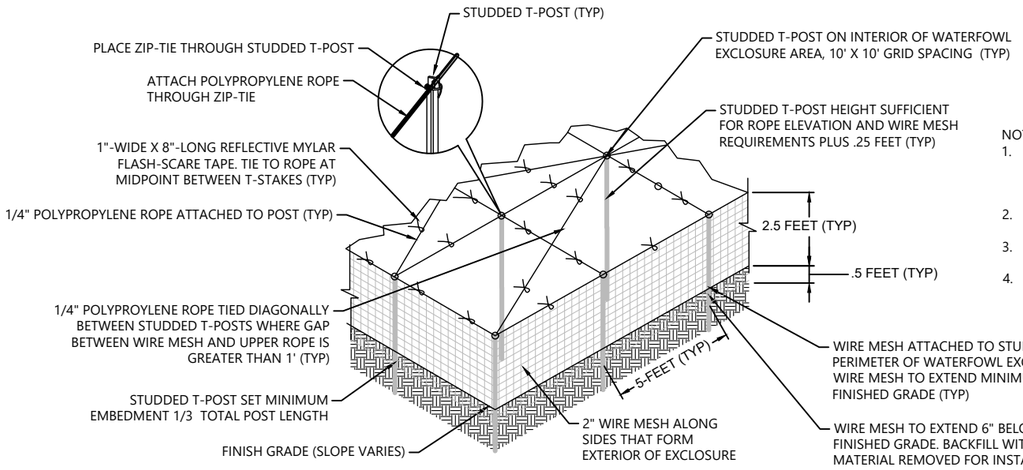


PERSPECTIVE VIEW

1 / L-01 WOOD-RAIL FENCE
SCALE: NTS

NOTE:

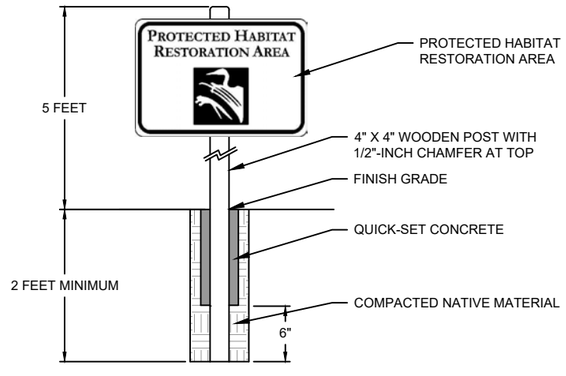
1. RAIL SHALL NOT CONTINUE THROUGH END POST.



NOTES:

1. ATTACH THE WIRE MESH TO THE STUDDED T-POSTS SECURELY USING A MINIMUM OF FIVE FASTENERS. USE ADDITIONAL FASTENERS ON POSTS THAT MARK THE ANGLE POINT OF ANY SUDDEN CHANGES IN TOPOGRAPHY.
2. DRILL 3/8" DIA. HOLE THROUGH T-POST AND THREAD ROPE THROUGH TO BOTTOM OF EXPOSED STAKE.
3. ATTACH POLYPROPYLENE ROPE SECURELY TO FENCE POSTS USING TRIPLE HALF-HITCH KNOT.
4. ATTACH REFLECTIVE MYLAR TAPE SECURELY TO NYLON ROPE USING DOUBLE HALF-HITCH KNOT.

2 / L-01 WATERFOWL EXCLOSURE
SCALE: NOT TO SCALE



NOTE:

1. WHEN SIGN IS LOCATED ADJACENT TO WOOD-RAIL FENCE, OFFSET 3 FEET ON THE UPLAND SIDE OF THE FENCE.
2. WHEN SIGN IS LOCATED ADJACENT TO BEACH BACKSHORE, INSTALL AT APPROXIMATELY ELEVATION +11.5.

3 / L-01 PROTECTED HABITAT RESTORATION AREA
SCALE: NTS

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT

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PORT GAMBLE INTEGRATED CLEANUP AND HABITAT RESTORATION DESIGN

PLANTING DETAILS (2 OF 2)

L-04

SHEET NO. 33 OF 33

Appendix F
Construction Specifications

SECTION 000110

TABLE OF CONTENTS

PROCUREMENT AND CONTRACTING REQUIREMENTS

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (RESERVED)

Section 000110 – Table of Contents

Section 000115 – List of Drawing Sheets (to be included in bid set)

Section 001113 – Advertisement for Bids (to be included in bid set)

Section 002100 – Instructions to Bidders (to be included in bid set)

Section 004143 – Bid Form (to be included in bid set)

Section 004313 – Bid Security Form (to be included in bid set)

Section 005200 – Agreement Form (to be included in bid set)

Section 006113.13 – Performance Bond (to be included in bid set)

Section 006113.16 – Payment Bond (to be included in bid set)

Section 007100 – Contracting Definitions (to be included in bid set)

Section 007200 – General Conditions (to be included in bid set)

TECHNICAL SPECIFICATIONS

DIVISION 01 – GENERAL REQUIREMENTS

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Section 011400 – Work Restrictions

Section 012000 – Price and Payment Procedures (to be included in pre-bid set)

Section 012500 – Substitution Procedures

Section 012973 – Schedule of Values

Section 013100 – Project Management and Coordination

Section 013200 – Construction Progress Documentation

Section 013300 – Submittal Procedures

Section 013529 – Health, Safety, and Emergency Response Procedures

Section 014126 – Permits

Section 014500 – Quality Control

Section 015000 – Temporary Facilities and Controls

Section 015719 – Temporary Environmental Controls

Section 017000 – Execution and Closeout Requirements

Section 017123 – Surveying

Section 017419 – Stockpiling, Waste Management, and Disposal

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Section 323129 – Fences

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Section 329000 – Hydroseeding

Section 329114 – Soil Preparation

Section 329300 – Planting

Section 329310 – Tree and Shrub Protection

DIVISION 35 – WATERWAY AND MARINE CONSTRUCTION

Section 352026 – Capping and Material Placement

APPENDICES

Appendix A – Permits

Appendix B – Geotechnical Information

Appendix C – Consent Decree (pending)

Appendix D – Inadvertent Discovery Plan

Appendix E – Water Quality Monitoring Plan

END OF SECTION

SECTION 011000

SUMMARY

PART 1 – GENERAL

1.01 SCOPE

A. The work under this Contract is to provide all labor and to furnish and/or install all materials and equipment, as may be required, to complete the work as described in these documents.

B. OPG Port Gamble LLC (Owner) requires excavation; management and disposal of soil, sediment, asphalt, concrete pavement, and relic concrete footings; backfill; shoreline capping; and planting to support restoration of shoreline and habitat and riparian uplands. The work will address remediation of contaminated soils/sediment within the Port Gamble Former Mill Site and areas of Port Gamble Bay (Work Zones 1-3 and adjacent areas as shown on the Drawings) as part of the Port Gamble Integrated Cleanup and Habitat Restoration Project located in Port Gamble, Kitsap County, Washington. The work includes disposal of suitable materials the Model Airplane Filed Limited Purpose Landfill (Work Zone 5).

C. The accompanying Drawings and these Specifications show and describe the location and type of work to be performed under this project. Work for this project includes:

1. Development of Contractor work plans.
2. Equipment mobilization and demobilization.
3. Site preparation including material offload area, material processing area, and stockpiling area of the Former Mill Site.
4. Stockpile management of materials for testing and disposal characterization.
5. Excavation shoring, dewatering and water management.
6. The following excavation activities:
    a. Removal, processing (e.g., resizing if necessary), transportation, and off-site disposal of surficial concrete and asphalt pavement and buried structural materials (e.g., wood pilings, foundations, miscellaneous debris) required for demolition or encountered during excavation from the areas shown on the Drawings.
    b. Removal of approximately 20,400 cubic yards (CY) of contaminated soil from Work Zones 1 and 2. Excavation will be sequenced in lifts and segregated in stockpiles as shown on the Drawings.
    c. Removal of approximately 24,000 CY of contaminated soil and shoreline debris, including intertidal excavation below the Ordinary High Water (OHW) Line in Work Zone 3 as shown on the Drawings.
7. Stockpiling of excavated materials for further characterization by the Owner.
8. Separation, blending, and reuse of armor materials that are excavated in Work Zone 3.

9. Transportation and placement of excavated materials suitable for placement in the upland Mill Site, Work Zone 2, or at the Model Airplane Field Limited Purpose Landfill (Work Zone 5) as required based on stockpile characterization .
10. Transportation and disposal of excavated material at approved off-site commercial facilities as required based on stockpile characterization.
11. Purchase, transport, and management of all aggregate materials required for backfill and capping as described in these specifications, with the exception of armor rock to be salvaged from Work Area 3.
12. Intertidal capping and habitat material placement below the OHW line.
13. Placement of approximately 5,330 CY of material for habitat restoration in the beach backshore zone.
14. Placement of approximately 23,000 CY of material for habitat restoration in the riparian zone.
15. Planting and irrigation of native trees, shrubs, and beachgrass in the riparian zone and beach backshore.
16. Placement of upland isolation caps over 15,300 SY of upland area at the Former Mill Site.
17. Placement of an approximately 1,500 CY feeder berm of habitat sand and gravel to the south of the Former Mill Site shoreline.
18. Preconstruction, progress and final surveys to document as built conditions.

D. In-water and intertidal work must be performed during prescribed work windows in accordance with Section 011400 – Work Restrictions.

E. All work must be performed in compliance with project permits. See Section 014126 – Permits.

1.02 ACCESS TO SITE

A. The Contractor will have access to the work area via the uplands through Kitsap Avenue and Walker Street in Port Gamble, Washington, as shown on the Drawings.

1.03 ENGINEERING AND INSPECTION

A. The Owner and/or its designated Representative(s) will perform inspection work except as otherwise specified in the Contract Documents. Refer to Section 014500 – Quality Control for general requirements.

B. Representatives of regulatory agencies and Owner’s Representatives shall be allowed on the work area and on Contractor equipment to inspect the work at any time.

1.04 COORDINATION

A. Coordinate construction activities with the Owner and the Tribes so that interference with Owner and Tribal fishing activities will be minimized to the maximum extent practicable.

B. All costs associated with coordination of the work shall be considered incidental to the prices set forth in the Bid Proposal.

1.05 CURRENT CONDITIONS

A. Current site conditions are summarized in the Port Gamble Integrated Cleanup and Habitat Restoration Engineering Design Report (Anchor QEA 2023).

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

END OF SECTION

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SECTION 011400

WORK RESTRICTIONS

PART 1 – GENERAL

1.01 SUMMARY

A. This section describes the uses and restrictions for the premises, Staging and Stockpile Areas, parking, vehicle and equipment access, work hours, and inadvertent discovery of archaeological materials.

1.02 USE OF PREMISES

A. Use of the Former Mill Site premises is limited to work in areas indicated on the Drawings. Do not disturb portions of Former Mill Site and Port Gamble Bay outside of the Site Boundaries as shown on the Drawings. Disturbance outside the Placement/Excavation Limits (as shown on the Drawings) is only to designated access points and storage areas as shown on the Drawings or specified herein.

1. Limits: Confine construction operations to limits as shown on the Drawings. The Contractor must protect existing eelgrass from damage.

2. Occupancy: Allow for the Owner and Owner's Representatives access to the work area, but the public shall be restricted.

3. Driveways and Entrances: Keep entrances serving premises clear and available to emergency vehicles at all times. Do not use these areas for parking or storage of materials.

4. Move any stored products under Contractor's control that interfere with the other activities and the Former Mill Site.

5. Install and maintain temporary security fencing to secure entrance to the Former Mill Site work areas.

1.03 STAGING AND STOCKPILE AREAS

A. Staging and Stockpile Areas are limited to the areas shown on the Drawings. Contractor's use of the designated Staging and Stockpile Areas shall be limited to purposes directly related to the construction of the project.

B. Contractor may request staging off site at Owner's discretion. If the Contractor opts for requesting off-site staging areas, it shall:

1. Provide Owner with locations for approval.

2. Be prepared to demonstrate, if requested by the Owner, that the off-site area is properly permitted for the Contractor's intended use.

1.04 RESTORATION CLAUSE

A. Unless otherwise designated, protect all existing site features to remain from potential Contractor damage above and below grade. If avoidable damage occurs, notify the Owner

immediately. The Owner will direct the Contractor as to how the Contractor is to replace or repair the damage at the Contractor's expense.

1.05 PARKING

A. Parking for personnel performing the work will be limited to an area within the work area boundaries as shown on the Contract Documents or at other off-site locations arranged by the Contractor. The Contractor will be responsible for ensuring that no nuisance is created through use of the streets for parking or workers' access.

1.06 TRUCK AND EQUIPMENT ACCESS

A. Limit the access of trucks and equipment to the haul routes shown on the Drawings.

1.07 INADVERTENT DISCOVERY OF ARCHAEOLOGICAL MATERIALS

A. An Inadvertent Discovery Plan (IDP) governing actions to be taken if archaeological resources are discovered during construction is included as Appendix F.

B. The IDP shall be available at the work location whenever ground-disturbing activities are underway.

C. If archaeological materials are discovered, stop work in accordance with the IDP and Washington law (Revised Code of Washington 27.50).

1.08 WORK HOURS

A. Work shall be accomplished during the work hours listed below:

1. Regular weekday and weekend hours are between 7:00 a.m. and 10:00 p.m.

2. At the approved request of the Contractor, work may occur up to 24 hours per day to meet the required project schedule; however, the Contractor must abide by all noise requirements of the Kitsap County Code (Chapter 10.28).

B. Intertidal work must be performed during prescribed work windows. The in-water work windows for the project are July 16 to January 14 of any year.

C. Submit a schedule of working hours to the Owner at the Pre-construction Meeting in accordance with Section 013300 – Submittal Procedures.

1.09 PERMIT RESTRICTIONS AND REGULATORY REQUIREMENTS

A. Comply with all conditions in approved permits in Appendix A and subsequently obtained by the Owner and Contractor. See Section 014126 – Permits and Section 014500 – Quality Control. In the event of discrepancy between the Permits and the Contract Documents, the more stringent requirements shall prevail.

1.10 ACCESS TO CONTRACTOR'S EQUIPMENT

A. Grant reasonable access to the Contractor's barge(s), tug(s), and all other equipment mobilized for the work for inspection purposes, to the Owner or to any Owner-designated

representative. Regulatory agency staff may also require access to equipment and will be escorted by Owner-designated representatives at all times. Assess conditions of the site and assess specific elements that are necessary to provide safe access to in-water equipment. Comply with all health and safety regulations pertaining to access to in-water equipment.

1.11 MISPLACED MATERIAL

A. Should the Contractor, during the execution of the work, lose, dump, throw overboard, sink, or misplace any material, barge, machinery, or appliance, promptly recover and remove the same. Give immediate verbal notice, followed by written confirmation, to the Engineer of the description and location of such obstructions and mark and buoy such obstructions until they are removed.

B. Should the Contractor refuse, neglect, or delay compliance with this requirement, such obstructions may be removed by the Owner or its agents, and the cost of such operations may be deducted from any money due to the Contractor, or may be recovered from the Contractor's bond.

C. The liability of the Contractor for the removal of a vessel wrecked or sunk without his fault or negligence shall be limited to that provided in Sections 15, 19, and 20 of the Rivers and Harbors Act of 3 March 1899 (33 U.S.C. 410 et seq.).

D. The Contractor shall be responsible for any fees, fines, penalties, or other costs resulting from misplaced materials.

1.12 SEQUENCING

A. To the extent practicable, sequence the work as follows:

1. Sequence construction activities to avoid placement of contaminated material over remediated areas and to limit double handling.

2. Conduct capping in an excavation area immediately following excavation, ideally in the same in-water work window. Otherwise follow excavation with the placement of temporary containment materials (i.e., geotextiles).

3. Conduct riparian zone seeding/planting after the completion of all earth moving activities.

4. Conduct upland excavation and material placement during the dry season. Additional BMPs are required by the stormwater permit for work conducted during the wet season.

B. Proposed deviations from this sequence shall be subject to the approval of the Engineer.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

END OF SECTION

SECTION 012500
SUBSTITUTION PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

A. This section describes the procedures and timing for requesting a substitution of materials, equipment, and methods that may be required in the Contract Documents.

1.02 QUALITY ASSURANCE

A. The Contract is based upon products and standards established in Contract Documents without consideration of proposed substitutions.

B. Products specified define standard of quality, type, function, dimension, appearance, and performance required.

C. The Owner will consider proposals for substitutions of materials, equipment, and methods only when such proposals are accompanied by full and complete technical data as required by the Owner to evaluate the proposed substitution.

D. Do not substitute materials, equipment, or methods unless such substitution has been specifically approved in writing for this work by the Owner.

E. Do not substitute products unless substitution has been accepted and approved in writing by the Owner.

1.03 TIME OF SUBSTITUTION REQUESTS

A. Requests for substitutions must be made during the bidding period. Written requests by prime bidders for substitutions may be considered if received by the Owner up to 7 days before bids are due. The Owner may, in its sole discretion, defer the consideration of a proposed substitution until after Contract award.

B. Each substitution request shall, in accordance with the applicable provisions of Section 013300 – Submittal Procedures, describe the proposed substitution in its entirety, including the name of the material or equipment, drawings, catalog cuts, performance or test data, and all other information required for an evaluation. The submittal shall also include a statement noting all changes required in adjoining, dependent, or other interrelated work necessitated by the incorporation of the proposed substitution. The bidder shall bear the burden of proof to show that the proposed substitution meets or exceeds the required function and is equal or superior to the Specification.

C. The Owner may require that samples be submitted or demonstration made prior to approval. The Owner's decision of approval or disapproval of a proposed substitution shall be final.

D. Approval of substitutions will be made by addenda. When, in the sole opinion of the Owner, the product is equivalent in all respects to the product specified, it will be approved subject to Contract requirements and the Contractor's assumption of all responsibility therefore.

E. After written approval, this submission shall become a part of the Contract, and may not be deviated from except upon written approval of the Owner.

F. Catalog data for equipment approved by the Owner does not, in any case, supersede the Contract Documents. The approval by the Owner shall not relieve the Contractor from responsibility for deviations from Drawings or Specifications, unless the Contractor has, in writing, called the Owner's attention to such deviations at the time of the submission; nor shall it relieve the Contractor from responsibility for errors of any sort in the items submitted. The Contractor shall check the work described by the catalog data with the Contract Documents for deviations and errors.

G. It shall be the responsibility of the Contractor to ensure that items to be furnished fit the space available. Make necessary field measurements to ascertain space requirements, including those for connections, and order such sizes and shapes of equipment that the final installation shall suit the true intent and meaning of the Drawings and Specifications.

H. Where equipment requiring different arrangement of connections from those shown as approved is used, it shall be the responsibility of the Contractor to install the equipment to operate properly and in harmony with the intent on the Drawings and Specifications, and to make all changes in the work required by the different arrangement of connections together with any cost of redesign necessitated thereby, all at Contractor's expense.

I. Where the phrase "or equal" or the phrase "or equal as approved by the Owner" occurs in the Contract Documents, do not assume that material, equipment, or methods will be approved as equal by the Owner unless the item has specifically been approved as a substitution for this work by the Owner.

J. The decision of the Owner shall be final.

1.04 SUBSTITUTION PROCEDURES

A. Limit each request to one proposed substitution.

B. Submit substitution requests in sufficient detail (with attachments as necessary) to fully document proposed substitution.

C. Document each request with supporting data substantiating compliance of proposed substitution with Contract Documents, including:

1. Manufacturer's name and address, product, trade name, model or catalog number, performance and test data, and reference standards.

2. Itemized point-by-point comparison of proposed substitution with specified product, listing variations in quality, performance, and other pertinent characteristics.

3. Reference to article and paragraph numbers in Specifications section.

4. Cost data comparing proposed substitution with specified product and amount of net change to Bid Price.

5. Changes required in other work.

6. Availability of maintenance service and source of replacement parts, as applicable.

7. Certified test data to show compliance with performance characteristics specified.

8. Samples, when applicable or requested.

9. Other information as necessary to assist Owner's evaluations.

D. A request for substitution constitutes a representation that the Contractor:

1. Has investigated proposed product and determined that it is equal or superior in all respects to specified product.

2. Will provide identical or better warranty as required for specified product.

3. Will coordinate installation and make changes to other work that may be required.

4. Waives claims for additional costs or time extension that may subsequently become apparent.

5. Certifies that proposed product will not affect or delay Construction Progress Schedule.

6. Will pay for changes to engineering design, detailing, and construction costs caused by the requested substitution.

E. Substitutions will not be considered when:

1. Indicated or implied on shop drawings or product data submittals without formal request submitted in accordance with this section.

2. Submittal for substitution request has not been reviewed and approved by Owner.

3. Acceptance will require substantial revision of Contract Documents or other items of the work.

4. Submittal for substitution request does not include point-by-point comparison of proposed substitution with specified product.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

END OF SECTION

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SECTION 012973

SCHEDULE OF VALUES

PART 1 – GENERAL

1.01 SUMMARY

A. This Section defines the process whereby the Schedule of Values for bid items shall be developed.

B. Quantities and unit prices shall be included in the Schedule of Values as described in Part 3 of this section.

1.02 PREPARATION OF SCHEDULE OF VALUES

A. Submit for approval a Schedule of Values for the major components of the work at the Pre-Construction Meeting in accordance with Section 013100—Project Management and Coordination and Section 013300 – Submittal Procedures.

1.03 SUBMITTAL

A. Submit a preliminary Schedule of Values at the Preconstruction Meeting. **DO NOT SUBMIT THE SCHEDULE OF VALUES WITH YOUR BID PACKAGE**.

B. Submit a corrected Schedule of Values within 10 days upon receipt of reviewed Schedule of Values.

C. Upon request, support prices with data that will substantiate their correctness.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

3.01 SAMPLE SCHEDULE OF VALUES

A. The sample Schedule of Values provided as follows is the <u>minimum</u> level of detail expected. Bid items reflected on the bid form but not addressed in the approved Schedule of Values shall be included in the monthly pay request based on the unit of measure indicated on the bid form.

1. The following General Direct Construction Cost Items shall be broken down to include at a minimum Labor and equipment, Materials, Overhead, and Fees

    a. Base Bid Item No. 1 – Mobilization and Site Preparation

        1) Base Bid Item No. 1a – Mobilization and Demobilization, Contractor Work Plans

        2) Base Bid Item No. 1b – Site Preparation for Excavation, Stockpile Area Preparations and Erosion Control, and Temporary Fencing

2. The following Mill Site Upland Specific Direct Construction Cost Items shall be broken down to include at a minimum Labor and equipment, Transportation (per ton), Materials (per ton), Rehandling/Stockpiling (per ton), Overhead, and Fees

    a. Base Bid Item No. 2 – Excavation, Transportation, and Disposal

        1) Base Bid Item No. 2a – Excavation and Decontamination of Equipment

        2) Base Bid Item No. 2b – Concrete/ Asphalt Perforation

        3) Base Bid Item No. 2c – Water Management and Treatment

        4) Base Bid Item No. 2d – Stockpile Management

        5) Base Bid Item No. 2e – Commercial Landfill Disposal of Unsuitable Soils (Load, Transport and Dispose)

    b. Base Bid Item No. 3 – Material Placement

        1) Base Bid Item No. 3a – Sand for Backfill (purchase, deliver, place and compact)

        2) Base Bid Item No. 3b – Excavated Material (place and compact)

        3) Base Bid Item No. 3c – Upland Cap Layer

            a) Base Bid Item No. 3c.1 – Sand (purchase, deliver, and place)

            b) Base Bid Item No. 3c.2 – Topsoil (purchase, deliver, and place)

            c) Base Bid Item No. 3c.3 – Geotextile Marker Layer

            d) Base Bid Item No. 3c.4 –Hydroseed (purchase, deliver, and place)

    c. Base Bid Item No. 4 – Environmental Controls

        1) Base Bid Item No. 4a – Stormwater Management, Haul Road Maintenance, and General Housekeeping

    d. Base Bid Item No. 5 – Survey

        1) Base Bid Item No. 5a – Post-Excavation Survey

        2) Base Bid Item No. 5b – Post-Placement Survey

3. The following Mill Site Shoreline Restoration Specific Direct Construction Cost Items shall be broken down to include at a minimum Labor and equipment, Transportation (per ton), Materials (per ton), Rehandling/Stockpiling (per ton), Overhead, and Fees

    a. Base Bid Item No. 6 – Demolition and Clearing

        1) Base Bid Item No. 6a – Remove Utility Vault

        2) Base Bid Item No. 6b – Asphalt Pavement Demolition

        3) Base Bid Item No. 6c – Concrete Pavement Demolition

4) Base Bid Item No. 6d – Miscellaneous Demolition

b. Base Bid Item No. 7 – Excavation, Transportation, and Disposal

1) Base Bid Item No. 7a – Excavate Intertidal Area to Subgrade

2) Base Bid Item No. 7b – Excavate Beach Backshore Subgrade

3) Base Bid Item No. 7c – Stockpile Excavated Remedial Cap Materials

4) Base Bid Item No. 7d –Resize Debris for off-Site Disposal

5) Base Bid Item No. 7e – Commercial Landfill Disposal of Hardscape (asphalt and concrete)

c. Base Bid Item No. 8 – Material Placement

1) Base Bid Item No. 8a – Intertidal Areas

a) Base Bid Item No. 8a.1 –Armor Rock (purchase, deliver, and place)

b) Base Bid Item No. 8a.2 – Rounded Habitat Substrate (purchase, deliver, and place)

c) Base Bid Item No. 8a.3– Sand/Gravel Substrate (purchase, deliver, and place)

d) Base Bid Item No. 8a.4– Place Stockpiled Remedial Cap Material (Salvaged Armor Rock)

2) Base Bid Item No. 8b – Beach Backshore Areas

a) Base Bid Item No. 8b.1 –Armor Rock (purchase, deliver, and place)

b) Base Bid Item No. 8b.2 – Sand/Gravel Substrate (purchase, deliver, and place)

c) Base Bid Item No. 8b.3– Sand/Gravel Substrate (purchase, deliver, and place)

d) Base Bid Item No. 8b.4– Place Stockpiled Remedial Cap Material (Salvaged Armor Rock)

3) Base Bid Item No. 8c – Riparian Areas

a) Base Bid Item No. 8c.1 –Sand (purchase, deliver, and place)

b) Base Bid Item No. 8c.2 – Compost (purchase, deliver, and place)

c) Base Bid Item No. 8c.3– Mulch (purchase, deliver, and place)

d) Base Bid Item No. 8c.4– Geotextile Marker Layer

4) Base Bid Item No. 8d – Upland Placement Areas

a) Base Bid Item No. 8d.1 –Excavated Shoreline Materials (place and compact)

b) Base Bid Item No. 8d.2 – Sand (purchase, deliver, and place)

c) Base Bid Item No. 8d.3– Topsoil (purchase, deliver, and place)

d) Base Bid Item No. 8d.4– Geotextile (purchase, deliver and, place)

e) Base Bid Item No. 8d.5 –Hydroseed (purchase, deliver and, place)

5) Base Bid Item No. 9 – Shoreline Nourishment and Bank Protection

a) Base Bid Item No. 9a – Hydroseed (purchase, deliver and, place)

6) Base Bid Item No. 10 – Planting and Irrigation

a) Base Bid Item No. 10a – Native Deciduous or Coniferous Tree (1 gallon—Deliver and Install)

b) Base Bid Item No. 10b – Native Deciduous Tree (5 gallon—Deliver and Install)

c) Base Bid Item No. 10c – Native Coniferous Tree (5 gallon—Deliver and Install)

d) Base Bid Item No. 10d – Native Shrub (1 gallon—deliver and install)

e) Base Bid Item No. 10e – Native Beach Backshore Planting (10-cubic-inch tubes—deliver and install)

f) Base Bid Item No. 10f - Wood-rail fencing

g) Base Bid Item No. 10g – Herbivore exclosure fencing (tree and shrub protection)

h) Base Bid Item No. 10h – Waterfowl exclosure (beach backshore planting area)

i) Base Bid Item No. 10i - Protected habitat restoration signage

j) Base Bid Item No. 10j – Temporary Irrigation (150-foot-wide riparian area only)

7) Base Bid Item No. 11 – Environmental Controls

a) Base Bid Item No. 11a – Stormwater Management, Haul Road Maintenance, and General Housekeeping

8) Base Bid Item No. 12 – Survey

a) Base Bid Item No. 12a – Post- Excavation Survey

b) Base Bid Item No. 12b – Post-Placement Survey (As-Built Survey)

4. The following Model Airplane Field Specific Direct Construction Cost Items shall be broken down to include at a minimum Labor and equipment, Transportation (per ton), Materials (per ton), Rehandling/Stockpiling (per ton), Overhead, and Fees

a. Base Bid Item No. 15 – Mobilization, Demobilization and Site Preparation

1) Base Bid Item No. 15a – Mobilization/Demobilization and Site Preparation

b. Base Bid Item No. 16 – Material Management

1) Base Bid Item No. 16a – Load, Transport, and Place Landfill Material (12–45 ppt)

2) Base Bid Item No. 16b – Sand (purchase, deliver, and place)

3) Base Bid Item No. 16c – Jute Matting (purchase, deliver, and place)

4) Base Bid Item No. 16d – Topsoil (purchase, deliver, and place)

5) Base Bid Item No. 16e – Hydroseed (purchase, deliver, and place)

6) Base Bid Item No. 16f – Geotextile Marker Layer

c. Base Bid Item No. 17 – Environmental Controls

1) Base Bid Item No. 17a – Temporary Traffic Control

2) Base Bid Item No. 17b – TESC Maintenance—Wheel Wash

d. Base Bid Item No. 18 – Survey

1) Base Bid Item No. 18a – Pre-Placement Survey

2) Base Bid Item No. 18b – Post-Placement Survey

B. A Schedule of Values shall be prepared for Alternate Bid Items within 2 weeks following the request of the Engineer. The Schedule of Values for Alternate Bid Items shall have a similar level of detail, and provide the same type of information as described for the Base Bid Items.

C. A Schedule of Values shall be prepared for Optional Bid Items within 2 weeks following the request of the Engineer. The Schedule of Values for Optional Bid Items shall have a similar level of detail, and provide the same type of information as described for the Base Bid Items.

END OF SECTION

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SECTION 013100

PROJECT MANAGEMENT AND COORDINATION

PART 1 – GENERAL

1.01 SUMMARY

A. This section includes the required attendees, suggested agendas, and locations for the Pre-Construction Meeting and progress meetings.

1.02 PRE-CONSTRUCTION MEETING

A. Notification

1. Following Notice of Award, the Owner will notify the selected bidder of the location, time, and date of a Pre-Construction Meeting.

B. Attendance

1. The following parties are requested to attend:

a. Owner's Representatives:

1) Engineer.

2) Contract Administrator.

3) Consultants.

4) Inspectors.

5) Other Owner personnel.

b. Contractor's Representatives:

1) Project Manager (Superintendent).

2) Contract Administrator.

3) Major Subcontractors.

4) Major Suppliers.

c. Third Party Representatives:

1) Washington State Department of Ecology (Ecology) representatives.

2) Other third-party representatives to be determined by the Owner.

2. Suggested Agenda

a. The Engineer or Contract Administrator will summarize the Contract Document requirements such as:

1) The work: sequence, phasing, and occupancy.

2) Job communications.

3) Contractor's use of the premises.

4) Special procedures.

5) Procedures and processing:

   a) Field decisions.

   b) Submittals.

   c) Change orders.

   d) Application for payment.

6) Record Documents.

7) Construction facilities, controls, and construction aids.

8) Temporary utilities.

9) Security procedures.

10) Safety and first-aid procedures.

11) Housekeeping procedures.

12) Other.

b. The Contractor will present and distribute information indicating:

   1) List of major subcontractors and suppliers.

   2) Preliminary construction schedule.

   3) Schedule of Working Hours.

   4) Draft Schedule of Values.

   5) Staging and Stockpiling Area proposal.

1.03 PROGRESS MEETINGS

A. The Engineer will schedule and administer weekly progress meetings throughout progress of the work.

B. The Engineer will arrange meetings, prepare standard agenda with copies for participants, preside at meetings, record minutes, and distribute copies within 10 working days to the Contractor, meeting participants, and others affected by decisions that are made.

C. Attendance is required for the Contractor's job superintendent, major subcontractors and suppliers, the Engineer, Designer, and other Owner's Representatives, and Ecology or other regulatory agencies or their representatives, as appropriate to the agenda topics for each meeting.

D. Standard Agenda

1. Review of minutes from previous meeting.
2. Review of work progress.
3. Review of field observations, problems, and decisions.
4. Identification of problems that impede planned progress.
5. Progress schedule (3 weeks ahead; 1 week back).
6. Effect of proposed changes on progress schedule and coordination.
7. Corrective measures to regain projected schedules.
8. Planned progress during succeeding work period.
9. Safety issues.
10. Maintenance of quality and work standards.
11. Demonstration that the site record drawings are up-to-date.
12. Pay request (as required).
13. Other business relating to the work.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

END OF SECTION

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SECTION 013200
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 – GENERAL

1.01 SUMMARY

A. This section includes construction scheduling procedures.

1.02 CONSTRUCTION SCHEDULE

A. Prepare a construction schedule as part of the Construction Work Plan in accordance with Section 013300 – Submittal Procedures, which will show specific tasks, dates, and the critical path necessary for completion of the project within the contract time limits. Submit the preliminary schedule at the Pre-construction Meeting in accordance with Section 013300 – Submittal Procedures.

1.03 ON-SITE DOCUMENTS

A. Maintain at the site, in good order for ready reference by the Owner, one complete record copy of the Contract Documents, including the Addenda, Change Orders, and Permits; all working drawings; Progress Schedule; and other approved submittals. Generate and keep on site all documents and reports required by applicable permit conditions.

B. Mark the Contract Record Drawings to record all changes made during construction. The location of all existing or new underground piping, valves and utilities, and obstructions, as located during the work, shall be appropriately marked on the ground until the Contractor incorporates the actual field location dimensions and coordinates into the Record Drawings for the site. Update the project's Record Drawings on a weekly basis and before elements of the work are covered or hidden from view. After the completion of the work or portions of the work and before requesting final inspection, give the Record Drawings to the Owner. The Owner reserves the right to withhold progress payments until such time as the Record Drawings are brought current.

1.04 DOCUMENTATION OF PROGRESS AND DAILY QUANTITIES

A. Provide Daily and Weekly Construction Reports in accordance with Section 013300 – Submittal Procedures.

B. Meet with the Engineer daily to agree upon the quantities of materials or work completed during the day. Both parties shall initial the Project Daily Quantities Report that shows there is agreement (or a lack of agreement) over the amount of work performed that day.

C. Prepare a Daily Construction Report, which will include the following items:

1. Date.

2. Weather conditions.

3. Period covered by the report and hours worked.

4. Equipment used.

5. Staff on site.
6. Description of activity as identified by stationing and offset.
7. Area, quantity, and type of demolished material that day and cumulatively.
8. Area and quantity of material excavated that day and cumulatively.
9. Quantity of material offloaded that day and cumulatively.
10. Quantity of material disposed of off site that day and cumulatively.
11. Area, quantity, and type of material placed that day and cumulatively.
12. Progress survey data.
13. Downtime and delays to the operation.
14. Health and safety status.
15. Other relevant comments concerning conduct of the operation.

D. The Contractor's Superintendent or Quality Control Supervisor shall sign the Daily Construction Report.

E. Submit the Daily Construction Report to the Engineer on the morning following completion of the work for that day.

F. Submit to the Engineer copies of all Certificates of Disposal no later than 3 calendar days after the material has been delivered to the off-site disposal facility(ies).

1. Records shall include copies of all manifests, weight tickets, and other documentation.
2. Documentation shall track the material from the point of leaving the site to final disposal at the disposal facility(ies).

G. Weekly Construction Report: Summarize the week's work in a Weekly Construction Report to be submitted to the Engineer on the following Monday morning. The Weekly Construction Report shall identify work completed to date, anticipated work to be completed in the present week, and the latest progress survey information. The Weekly Report shall include a written Environmental Protection Inspection Report summarizing the daily inspections, condition of the environmental protection equipment and materials, Temporary Erosion and Sedimentation Control facilities, and repairs or modifications to environmental protection means and methods.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

END OF SECTION

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SECTION 013300
SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

A. This section includes the content, procedures, and format for preparing and transmitting submittals.

1.02 SUBMITTALS LIST

A. Individual submittals are required in accordance with the pertinent sections of these Specifications. Other submittals may be required during the course of the project and are considered part of the normal work to be completed under the Contract.

B. This summary list is presented for the Contractor's convenience only, but no warranty is given to its accuracy or completeness. In the event of any discrepancies with the requirements of the individual Specification sections, those individual Specification sections apply.

SECTION NUMBER	DESCRIPTION
012973	• Schedule of Values
013200	• Construction Schedule • Project Daily Quantities
013300	• Construction Work Plan
013529	• Health and Safety Plan (HASP)
014500	• Construction Quality Control (CQC) Plan • Daily Construction Reports • Test Reports • Field Superintendent Qualifications
015000	• Temporary Facilities and Control Plan • Traffic Control Plan
015719	• Environmental Protection Plan (EPP) • Temporary Erosion and Sedimentation Control (TESC) Plan • Weekly Environmental Protection Inspection Reports • Spill Prevention, Control, and Countermeasures (SPCC) Plan • Construction Stormwater Pollution Prevention Plan (SWPPP) • Temporary Erosion and Sediment Control Plan
017000	• Project As-Built Drawings • Warranty

SECTION NUMBER	DESCRIPTION
017123	• Survey Plan • Excavation, backfill, and Material Placement Progress Surveys • Pre-construction Baseline Survey • Acceptance Surveys • Record Document Survey
017419	• Stockpiling Waste Management, Transportation, and Disposal Plan
312300	• Excavation, Haul Truck, and Water Management Plan • Daily Reports • Weekly Reports
312319	• Water Management Plan
319300	• Planting Plan
352026	• Capping and Material Placement Plan • Borrow Source Characterization Reports

1.03 PRE-CONSTRUCTION MEETING SUBMITTALS

A. Prepare a preliminary construction schedule showing specific tasks, dates, and the critical path necessary for completion of the project within the contract time limits. Submit the preliminary schedule at the Pre-Construction Meeting; the Owner shall approve or return for correction within 5 working days of the Pre-Construction Meeting. Within 5 working days, revise the preliminary schedule in accordance with the Owner's corrections and submit the revised schedule for acceptance.

B. Prior to mobilization, submit a proposal at the Pre-Construction Meeting for review by the Owner of Staging and Stockpiling Areas indicating specific use, access, restoration, and anticipated duration of use. No use of the designated Staging and Stockpiling Areas is permitted until the Owner provides written approval of Contractor's proposal.

C. Submit a schedule of working hours to the Owner at the Pre-Construction Meeting for acceptance prior to the start of any work. Do not perform any activities outside of these hours without prior approval of the Engineer. Said approval shall be requested at least 48 hours prior to the proposed work outside of these hours.

D. Submit for approval a Schedule of Values for the major components of the work at the Pre-Construction Meeting in accordance with Section 012973 – Schedule of Values, and Section 013100 – Project Management and Coordination. The listing shall include, at a minimum, the proposed value for the major work components as described in Article 3.01 of Section 012973 – Schedule of Values. The summary of detail provided in the Schedule of Values shall separately include materials costs (as appropriate by unit), installation costs (labor and equipment components), and other incremental breakouts. The detail summary total shall match the Contractor's bid amount for each bid item.

E. Submit for approval a list of major subcontractors and suppliers at the Pre-Construction Meeting in accordance with Section 013100 – Project Management and Coordination.

1.04 CONSTRUCTION WORK PLAN

A. Submit a Construction Work Plan that describes the Contractor's means and methods for completing the various parts of the work.

B. Submit the following individual elements of the Construction Work Plan within 7 calendar days following the Contractor's receipt of the signed contract for early review to allow for a Limited Notice to Proceed:

1. Construction Work Schedule as specified in paragraph 1.04.C.1.

2. Demolition Plan as specified in paragraph 1.04.C.4.

3. CQC Plan as specified in paragraph 1.04.C.8.

4. HASP as specified in paragraph 1.05.C.9.

5. Temporary Facilities and Controls Plan as specified in paragraph 1.04.C.11.

6. EPP as specified in paragraph 1.04.C.12.

C. Submit all elements of the Construction Work Plan for Engineer review and approval within 28 calendar days after Notice of Award. The plans listed under this article shall comprise the Contractor's Construction Work Plan.

1. Construction Work Schedule in a Gantt chart format, which shows the critical path of work and which will:

a. Identify the work clearly, showing the detailed items of work, specific tasks, dates, and the critical path necessary for completion of the project within the contract time limits.

b. Show all significant design, manufacturing, construction, and installation activities.

c. Include sufficient time for cleaning, punch list review, and completion of punch list items prior to the Substantial Completion Date.

d. Clearly show the relationship between the work items and the starting and completion dates, as well as include all details of the work within the timeframe shown.

2. Traffic Control Plan:

a. Accommodate traffic to complete all elements of the work.

b. Specifically highlight the impact of the work, including anticipated road closures and partial road closures.

c. Flagging, signs, and all other traffic control devices including personnel for flagging, escorting, and setup and removal of all traffic control devises and signs.

3. Survey Plan, including:

a. The name, address, telephone number, and qualifications of the surveyor, crew chief, superintendent, and all other persons who are proposed to perform survey or survey-related duties.

b. Procedures and equipment for performing topographic surveys.

c. Methods for establishing survey control, benchmarks, tide gage(s) and layout of the work.

4. Demolition and Clearing Plan, including:

a. Work sequence.

b. Number, types, and capacity of equipment to be used.

c. Hours of operation.

d. Methods of operation, estimated production rates, and the time required to complete each activity.

e. Areas for the protection of existing trees, shrubs, and plant material not designated for removal.

5. Excavation, Haul Truck, and Water Management Plan, including:

a. Work sequence.

b. Number, types, and capacity of equipment to be used.

c. Hours of operation.

d. Methods of operation, estimated production rates, and the time required to complete each activity.

e. Means and methods for Excavation and haul truck transport.

f. Means and methods for horizontal and vertical control of the work, including methods for confirming that the Contractor’s excavation in Work Zone 2 is conducted in the specific layering sequence shown on the drawings.

g. Methods for maintaining a stable side slope during excavation in Work Zone 2, including proposed shoring methods, if proposed.

h. Methods for salvaging Angular Substrate materials in Work Zone 3, and location proposed for storing salvaged materials so that comingling does not occur.

i. Methods for protection of the environment and existing facilities, including:

1) Procedures for preventing unfiltered release of water from excavation equipment and haul trucks.

2) Methods, procedures, and controls to protect existing facilities against damage.

3) Methods, procedures, and equipment to be used to dewater excavations.

4) Best management practices (BMPs) proposed by the Contractor to minimize the potential for water quality exceedance.

j. Method for dewatering excavations, including:

1) Locations for infiltration

2) Methods, equipment, procedures, and controls for conveying water generated during construction to infiltration areas.

3) Anticipated volume of water including dewatering and pumping rates.

4) Anticipated infiltration rates.

5) Anticipated number of storage tanks, if necessary.

k. Methods, procedures, and controls to be used to segregate, handle, and transport debris to the approved transloading facility in accordance with applicable regulations.

6. Stockpiling, Waste Management, Transportation, and Disposal Plan, including:

a. A list of wastes that will be generated and the proposed recycling facility or disposal site for each waste stream.

b. Means and methods for operating the Staging and Stockpiling Area, including:

1) Description of stockpiling operations, including measures to prevent loss of soil or sediment or associated water during stockpiling and rehandling within the Staging and Stockpiling Area.

2) Proposed locations and sizes of stockpiles for each layer of material excavated in Work Zones 1 and 2, and for sediments excavated in Work Zone 3 that are not to be salvaged.

3) Detailed sequencing for stockpiling contaminated material generated during excavation, testing, and backfilling and material placement.

4) Detailed methods of transporting clean capping and backfill materials to the site in conjunction with transporting stockpiled contaminated materials for disposal.

5) Methods and locations for staging clean stockpiled material on site separate from contaminated stockpiled soils. Methods for sparging materials excavated from Work Zone 3, as necessary.

6) Methods, procedures, and equipment for preventing untreated sediment and effluent release from the site Staging and Stockpiling Area into receiving waters.

7) Methods for maintaining separation between stockpiles while they are being characterized by the Owner.

c. Documentation that facilities proposed for off-site disposal or recycling of waste materials are in compliance with applicable regulations. Include copies of permits for waste sites and recycling operations.

d. A list of all subcontractors to be employed in transportation, types of trucks, containers, and liners to be used, inspection procedures prior to transport, and BMPs to prevent any leakage or spillage.

e. A description of all haul routes, transfer facilities, estimated hours and days of operation, estimated number of trucks per day, and on-site traffic control measures.

f. Means and methods for operations within the MAF (Work Zone 5), including:

1) A description of all estimated hours and days of operation and estimated number of trucks per day.

2) Traffic control measures for entering and exiting.

3) Means for clearing grubbing and stockpiling any soils generated during the opening of the MAF prior to material placement.

4) Means for closing the MAF following material placement.

7. Capping and Material Placement Plan, including:

a. Work sequence.

b. Number, types, and capacity of equipment to be used, including names of all marine vessels to be used.

c. Hours of operation.

d. Methods of operation, estimated production rates, and the time required to complete each activity.

e. Means and methods for horizontal and vertical control of the work.

f. List of the sources (quarries) of all capping materials, including name, location, ownership, material supplied, and contact information.

g. List of the laboratory(ies) that will be conducting the testing of all engineered sediment capping materials, including name, location, ownership, laboratory certifications, list of tests to be performed, list of analysis methods and standards, and contact information.

h. Methods for protection of the environment and existing facilities, including:

1) Methods, procedures, and controls to protect existing facilities against damage.

2) Methods, procedures, and controls to protect existing and constructed eelgrass beds.

3) BMPs proposed by the Contractor to minimize the potential for water quality exceedance.

i. Methods for estimating average thickness of cap material placed.

8. CQC Plan, including:

a. Organization chart showing the various Quality Control (QC) team members, along with their designated responsibilities and lines of authority.

b. The name, qualifications, duties, responsibilities, and authorities of each person assigned a primary QC function.

c. Acknowledgement that the QC staff will conduct inspections for all aspects of the work specified, and shall report to the QC Supervisor, or someone of higher authority in the Contractor's organization.

d. Procedures for scheduling and managing submittals, including those of subcontractors, off-site fabricators, and material suppliers.

e. Testing methods, schedules, and procedures used to report QC information to the Owner, including samples of the various reporting forms.

9. HASP, including:

a. Anticipated chemical and/or physical hazards associated with the work.

b. Hazardous material inventory and Safety Data Sheets for all chemicals that will be brought into the site.

c. Engineering controls/equipment to be used to protect against anticipated hazards.

d. Personal protective equipment and clothing including head, foot, skin, eye, and respiratory protection.

e. Work area housekeeping procedures and personal hygiene practices.

f. Personnel and equipment decontamination plan.

g. Administrative controls.

h. Emergency plan, including locations of and route to nearest hospital and key phone numbers.

10. Record keeping, including:

a. Documentation of appropriate employee training.

b. Name and qualification of person preparing the HASP and person designated to implement and enforce the HASP.

c. Signatory page for work area personnel to acknowledge receipt, understanding, and agreement to comply with the HASP.

11. Temporary Facilities and Controls Plan, including:

    a. Layout of all proposed temporary facilities, including but not limited to, on-site Contractor's office, employee parking, materials delivery area(s), equipment/material lay-down and storage areas, fueling facility, fencing, entry and exit locations, and on-site and off-site transload facility(ies).

    b. Utility connections.

    c. Methods for temporary facilities maintenance and security.

    d. Methods for traffic control, where and when needed.

12. EPP, including:

    a. Organization chart and names of persons responsible for EPP compliance.

    b. A list of key personnel, including phone numbers (home and office), qualified to act as the emergency coordinator.

    c. Location of equipment and personnel decontamination areas.

    d. Exclusion zones, contaminant reduction zones, and other zones specified in the Contractor's site-specific HASP.

    e. Wastewater collection and storage areas or treatment facilities as necessary.

    f. Identify the procedures that the Contractor shall implement if the Contractor encounters suspected hazardous waste during construction.

13. SPCC Plan including:

    a. Name of the individual who will be responsible for implementing and supervising spill containment and cleanup.

    b. The name and phone number of the Contractor's 24-hour/on-call spill response subcontractor.

    c. Identification of potentially hazardous substances to be used on the job site. Identify intended actions to prevent introduction of such materials into air, water, or ground, and identify provisions for complying with federal, state, and local laws, ordinances, and regulations for storage and handling of these materials.

    d. Controls and supplies for preventing environmental spill.

    e. Controls and supplies for containing and cleanup of a spill should such occur.

    f. Methods to protect groundwater from contamination, and methods to protect monitoring wells, as applicable.

g. On-site upland and in-water fueling procedures.

h. Oil spill prevention and response procedures, including the Contactor's notification procedures, to be used in the event of a spill of a regulated substance.

14. SWPPP, including:

a. Potential sources of pollution that may reasonably be expected to affect the quality of stormwater discharge from the work site.

b. Methods to manage stormwater at the site and Contractor's on- and off-site transload facility(ies), and on-site Staging and Stockpiling Area(s) to comply with all applicable laws, regulations, and permit requirements.

c. Methods that will be used for erosion control and to reduce the pollutants in the stormwater discharge associated with excavation, and in placing clean soil at the site.

d. Methods to direct surface waters that have not contacted potentially contaminated materials to existing surface drainage systems.

e. Methods to contain and collect water from sediment dewatering and/or stockpile areas and decontamination facilities and properly dispose of collected water.

f. Identification of appropriate BMPs to manage stormwater and maps depicting where and when they will be installed at each work zone.

15. Air Pollution and Odor Control Plan, including:

a. Describe air pollution control procedures and air permit application for on-site crushing operations, as applicable.

b. Describe dust minimization practices.

c. Describe contingency actions to address odor from sediment stockpiles if necessary. Describe methods and materials that may be used should odor control be required.

1.05 ADMINISTRATIVE

A. Submit to the Engineer all submittals required for review as described in these Specifications. Submit promptly and in an orderly sequence so as to not cause a delay in work. Failure to submit in ample time is not considered sufficient reason for extension of Contract duration and no claim for extension by reason of such default will be allowed.

B. Allow necessary time for the following:

1. Review of product and sample data.

2. Review of re-submissions as necessary.

3. Ordering of accepted materials and/or products.

C. Allow a minimum of 7 calendar days for Engineer review of each submittal and an additional 7 calendar days for Engineer review of re-submittals. Unless stated otherwise in the Specifications, the Contractor shall be allowed 7 calendar days for revising initial submittals and providing re-submittals to the Engineer. The Contract time shall not be extended on the basis that the Contractor experienced delays due to rejection of submittals.

D. Do not proceed with work affected by a submittal until Engineer review and approval, if appropriate, is complete.

E. Review submittals prior to submission to the Engineer. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of work and Contract Documents. Submittals with content that does not meet the requirements of the Specifications, or not signed, dated, and identified as to the specific project, will be returned without being examined and considered rejected. Engineer review time starts only when a complete submittal is received.

F. Notify the Engineer, in writing at the time of submission, identifying deviations from requirements of Contract Documents and stating reasons for deviations.

G. The Contractor's responsibility for errors and omissions in its submissions is not relieved or diminished by the Engineer's review and acceptance of the Contractor's submissions. The Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Engineer's review and acceptance of submittals.

H. Revise all submittals that are determined by the Engineer to be inadequate or non-compliant with the Contract Documents or permit conditions.

I. Re-submittals are the responsibility of the Contractor and shall be compensated at no additional costs to the Owner. Submittals shall be completed to the satisfaction of the Engineer.

J. Keep one reviewed, and approved, if appropriate, copy of each submission at the work site.

PART 2 – PRODUCTS

2.01 SAMPLES

A. The sample submitted shall be the exact or precise article proposed to be furnished.

2.02 SUBSTITUTIONS

A. Refer to Section 012500 – Substitution Procedures.

B. Catalog data for equipment approved by the Owner does not in any case supersede the Contract Documents. The approval by the Owner shall not relieve the Contractor from responsibility for deviations from Drawings or Specifications, unless the Contractor has in writing called to the Owner's attention such deviations at the time of the submission; nor shall approval relieve the Contractor from responsibility for errors of any sort in the items submitted. The Contractor shall check the work described by the catalog data with the Contract Documents for deviations and errors.

PART 3 – EXECUTION

3.01 TRANSMITTALS

A. Submittals typically provided on paper may be submitted electronically as PDFs. This is the preferred method for the Owner.

B. Preparation: A separate submittal form shall be prepared for each product or procedure and shall be further identified by referencing the Specification section and paragraph number; each submittal shall be numbered consecutively.

C. Whenever materials or equipment are described by using the name of a proprietary item or the name of a particular supplier, the naming of the item is intended to establish the type, function, and quality required. If the name is followed by the words “or equivalent,” indicating that a substitution is permitted, materials or equipment of other suppliers may be accepted by the Owner. Sufficient information shall be submitted by the Contractor to allow the Owner to determine that the material or equipment proposed is equivalent to that named, subject to the following requirements:

1. The burden of proof as to the type, function, and quality of any such substitute material or equipment shall be upon the Contractor.

2. The Owner will be the sole judge as to the type, function, and quality of any such substitute material or equipment and the Owner’s decision shall be final.

3. The Owner may require the Contractor to furnish, at the Contractor’s expense, additional data about the proposed substitution.

4. Acceptance by the Owner of a substitute item proposed by the Contractor shall not relieve the Contractor of the responsibility for full compliance with the Contract Documents and for adequacy of the substitute item.

3.02 COORDINATION

A. Submit shop and detail drawings in related packages. All equipment or material details that are interdependent or are related in any way must be submitted indicating the complete installation. Submittals shall not be altered once approved for Construction. Revisions shall be clearly marked and dated. Major revisions must be submitted for approval.

B. Thoroughly review all shop and detail drawings, prior to submittal, to ensure coordination with other parts of the work. The Contractor’s failure to do this will be the cause for rejection. Submittals shall bear approval stamp and initials.

C. Components or materials that require shop drawings and which arrive at the job site prior to approval of shop drawings shall be considered as not being made for this project and shall be subject to rejection and removal from the premises.

END OF SECTION

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SECTION 013529

HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

A. This section includes the requirements for health and safety provisions necessary for all work at the site.

B. The work also includes compliance with all laws, regulations, and ordinances with respect to safety, noise, dust, fire and police action, civil disobedience, security, and traffic.

1.02 SUBMITTALS

A. Prior to the start of any work, provide a site-specific Health and Safety Plan (HASP) as part of the Construction Work Plan in accordance with Section 013300 – Submittal Procedures. The HASP shall meet all the requirements of local, state, and federal laws, rules, and regulations and the pertinent regulations listed in the Contract Documents, and shall address all requirements for general health and safety.

1.03 POTENTIAL PHYSICAL AND OTHER HAZARDS

A. The work of the Contractor is described elsewhere in these Specifications. Precautions to prevent all anticipated physical and other hazards, and including heavy equipment, shall be addressed in the HASP.

B. Specific aspects of construction resulting in physical hazards anticipated for this project include, but are not limited to, the following:

1. Work near water, presenting hazards of falling in the water, hypothermia from exposure to the elements, and drowning.

2. Operation of land-based equipment, including excavators, winches, derricks, and related equipment that present hazards of entrapment, ensnarement, and being struck by moving parts.

C. Other anticipated physical hazards include, but are not limited to, the following:

1. Heat stress, such as that potentially caused by impermeable clothing (may reduce the cooling ability of the body due to evaporation reduction).

2. Cold stress, such as that potentially caused during times of low temperatures and high winds, especially when precipitation occurs during these conditions.

3. Biological hazards, such as insect stings or bites.

4. Trips and falls.

PART 2 – PRODUCTS

2.01 PRODUCTS SPECIFIED FOR HEALTH AND SAFETY

A. Provide the equipment and supplies necessary to support the work as described in the site-specific HASP. Equipment and supplies may include, but are not limited to, the following:

1. Chemicals to be used on site including dust suppressants or wetting agents, cleaning or degreasing agents, or welding and cutting supplies.

2. Hazardous materials inventory and Safety Data Sheets for the chemicals brought on site.

3. Fencing and barriers.

4. Warning signs and labels.

5. Fire extinguishers.

6. Equipment to support “hot” work.

7. Equipment to support “lock out”/”tag out” procedures.

8. Scaffolding and fall protection equipment.

9. Personal protective equipment (e.g., hard hats, foot gear, and skin, eye, and respiratory protection).

10. Area and personnel exposure monitoring equipment.

11. Demolition equipment and supplies.

12. Decontamination equipment and supplies.

13. First aid equipment.

14. Release prevention equipment.

15. Field documentation logs and supplies.

PART 3 – EXECUTION

3.01 GENERAL

A. Comply with health and safety rules; regulations and ordinances promulgated by the local, state, and federal government; the various construction permits; and other sections of the Contract Documents. Such compliance shall include, but not be specifically limited to, the following:

1. Any and all protective devices, equipment, and clothing.

2. Guards.

3. Restraints.

4. Locks.

5. Latches.

6. Switches.

7. Other safety provisions that may be required or necessitated by state and federal safety regulations.

B. Determine the specific requirements for safety provisions and provide inspections and reports by the appropriate safety authorities to be conducted to ensure compliance with the intent of the regulations.

C. Inform employees and subcontractors and their employees of the potential danger in working with any potentially contaminated materials, equipment, soils, and groundwater at the site.

D. Perform whatever work is necessary for safety and be solely and completely responsible for conditions of the work area, including the safety of all persons and property during the Contract period. This requirement applies continuously and is not limited to normal working hours.

E. The Owner's review of the Contractor's performance does not include an opinion regarding the adequacy of, or approval of, the Contractor's safety supervisor, site-specific HASP, safety program, or any safety measures taken in, on, or near the site.

F. Accidents causing death, injuries, or damage must be reported immediately to the Owner in person or by telephone or messenger. In addition, promptly report in writing to the Owner all accidents whatsoever arising out of, or in connection with, the performance of the work whether on, or adjacent to, the site, giving full details and statements of witnesses.

G. If a claim is made by anyone against the Contractor or any subcontractor because of any accident, the Contractor shall promptly report the facts to the Owner in writing within 24 hours after occurrence, giving full details of the claim.

3.02 SITE SAFETY AND HEALTH OFFICER

A. Provide a person designated as the Site Safety and Health Officer, who is thoroughly trained in construction safety, marine construction safety, rescue procedures, and the use of all necessary safety equipment that the work requires. The person must be present at all times while work is being performed.

B. The Site Safety and Health Officer shall be empowered with the delegated authority to order any person or worker at the site to follow the safety rules. Failure to observe these rules is sufficient cause for removal of the person or worker(s) from this project.

C. The Site Safety and Health Officer is responsible for determining the extent to which any safety equipment must be utilized, depending on conditions encountered at the site.

END OF SECTION

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SECTION 014126

PERMITS

PART 1 – GENERAL

1.01 SUMMARY

A. This section describes the Contract-applicable permits.

1.02 PERMITS

A. Keep fully informed of all local ordinances, as well as state and federal laws that in any manner affect the work specified herein. Comply with said ordinances, laws, and regulations at all times, and protect and indemnify the Owner and its officers and agents against any claim or liability arising from, or based on, the violation of such laws, ordinances, or regulations. Secure and pay for any permits, licenses, and inspection fees necessary for prosecution and completion of the work that have not otherwise been obtained by the Owner.

B. Comply with all conditions required and response actions attached to applicable county, federal, state, and local permits and project requirements in Appendix A. The permits obtained by the Owner include the following:

1. Nationwide Permit 27 issued by the U.S. Army Corps of Engineers (in process), which includes compliance with the following:

    a. Endangered Species Act: The project is being processed under the Salish Sea Nearshore Programmatic per the Biological Opinions issued by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service.

    b. Section 106 of the National Historic Preservation Act: BMPs are outlined in the Inadvertent Discovery Plan.

2. Clean Water Act Section 401 Water Quality Certification issued by the Washington State Department of Ecology (in process).

3. Coastal Zone Management Program Certification of Consistency issued by Ecology (in process).

4. National Pollutant Discharge Elimination System Construction Stormwater General Permit issued by Ecology.

5. Right-of-Entry or Easement issued by the Washington State Department of Natural Resources (in process).

6. Hydraulic Project Approval issued by the Washington Department of Fish and Wildlife (in process).

7. State Environmental Policy Act Determination of Nonsignificance issued by Kitsap County.

8. Shoreline Substantial Development Permit issued by Kitsap County.

9. Site Development Activity Permit issued by Kitsap County (in process).

1.03 POSTING PERMITS

A. Retain permits at the site of the work.

1.04 INSPECTIONS

A. Make arrangements for all inspections and testing required by the permits and conditions of the permits.

B. Retain inspection reports at the site.

1.05 RESTORATION OF PROPERTY

A. Comply with all property restoration requirements contained in permits and agreements to complete the work.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

END OF SECTION

SECTION 014500
QUALITY CONTROL

PART 1 – GENERAL

1.01 SUMMARY

A. This section describes the Contractor's Construction Quality Control (CQC) requirements, duties, and responsibilities during execution of the work. The intent of this section is to require the Contractor to establish a necessary level of control that will provide sufficient information to assure both the Contractor and the Engineer that the Specification requirements are and have been met.

B. Establish, provide, and maintain the CQC Plan as specified herein, detailing the methods and procedures that will be taken to ensure that all materials and completed construction elements conform to the Drawings, these Specifications, and other requirements. Although guidelines are established and certain minimum requirements are specified herein and elsewhere in the Specifications, it is the responsibility of the Contractor to ensure that construction and CQC are accomplished in accordance with the stated purpose and these Specifications as described herein.

C. Be prepared to discuss and present the Contractor's understanding of the CQC requirements at the Pre-Construction Meeting. No construction shall begin until the CQC Plan has been reviewed and approved by the Engineer.

1.02 SUBMITTALS

A. Submit the qualifications of the personnel identified in Article 2.01 of this section.

B. Submit the CQC Plan in accordance with Section 013300 – Submittal Procedures.

C. Submit Daily Construction Reports in accordance with Section 013200 – Construction Progress Documentation and Section 013300 – Submittal Procedures.

D. Submit Test Reports in accordance with Section 013200 – Construction Progress Documentation and Section 013300 – Submittal Procedures.

1.03 QUALITY ASSURANCE – CONTROL OF INSTALLATION

A. Monitor QC over suppliers, manufacturers, products, services, site conditions, and workmanship to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in a sequence.

C. Should manufacturers' instructions conflict with the Contract Documents, request clarification from the Engineer before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Ensure that work is performed by persons qualified to produce the required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

H. Familiarity with Pertinent Codes and Standards: In procuring all items used in this work, it is the Contractor's responsibility to verify the detailed requirements of the specifically named codes and standards and to verify that the items procured for use in this work meet or exceed the specified requirements.

I. Rejection of Non-Complying Items: The Owner reserves the right to reject items incorporated into the work that fail to meet the specified minimum requirements. The Owner further reserves the right, and without prejudice to other recourse, to accept non-complying items subject to an adjustment in the Bid Price as approved by the Owner.

1.04 REFERENCES AND STANDARDS

A. Products or workmanship specified by association, trade, or other consensus standards shall comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes or the Contract Documents.

B. Conform to reference standard by date of issue current on date of Contract Documents, except where a specific date is established by code.

C. Obtain copies of standards where required by product Specification sections.

D. Neither the contractual relationships, duties, nor responsibilities of the parties in the Contract, nor those of the Owner, shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

E. All pertinent laws, ordinances, rules, regulations, and codes shall govern construction activities at the site.

F. Construction that is not governed by governmental regulations or the Contract Documents will be governed by the more stringent provisions of the latest published edition or statute adopted edition, at the time of Contract signing, following these applicable codes and standards:

1. Uniform Building Code.

2. National Electrical Code.

3. Uniform Plumbing Code.

4. Uniform Fire Code.

1.05 TESTING SERVICES

A. Necessary materials testing shall be performed by an independent testing laboratory during the execution of the work. Provide access to the area necessary to perform the testing and/or to secure the material for testing.

B. Testing does not relieve the Contractor's obligation to perform work to Contract requirements.

C. Re-testing required because of non-conformance to specified requirements shall be performed by the same independent firm. Payment for re-testing will be charged to the Contractor by deducting testing charges from payments due to the Contractor.

D. Material testing for initial material approval will be performed by an independent, certified laboratory and paid for by the Contractor. These tests must be dated within 6 months of the submittal date.

E. Subsequent sampling and testing required as the work progresses, to ensure continual control of materials and compliance with all requirements of the Contract Documents, will be the responsibility of the Owner, except as required by other sections of these Specifications.

PART 2 – PRODUCTS

2.01 CONTRACTOR PERSONNEL REQUIREMENTS

A. All Contractor personnel shall be trained, experienced, and qualified to perform the tasks assigned to them.

B. Submit the qualifications of the proposed Field Superintendent to the Owner for review and approval. The proposed Field Superintendent shall have a minimum of 5 years of experience as a Field Superintendent, in addition to having been the Field Superintendent on three projects of similar type and size, described using the form below.

Contractor Personnel

Field Superintendent: The Field Superintendent must have successfully completed three projects of similar type and size (describe below).

Name: _____
Address: _____
Phone: _____
Name of Contractor Employed By: _____

1. Project Name: _____
   Owner: _____ Contact Person: _____
   Name of Contractor Employed By: _____
   Completion Date: _____

2. Project Name: _____
   Owner: _____ Contact Person: _____
   Name of Contractor Employed By: _____
   Completion Date: _____

3. Project Name: _____
   Owner: _____ Contact Person: _____
   Name of Contractor Employed By: _____
   Completion Date: _____

PART 3 – EXECUTION

3.01 CQC PLAN

A. Submit a CQC Plan to the Owner as part of the Construction Work Plan in accordance with Section 013300 – Submittal Procedures. The CQC Plan will be reviewed by the Owner and must be approved before any work can start. The CQC Plan will be used to document inspections, monitoring, surveys, and other actions to be taken by the Contractor to ensure that the work complies with all Contract requirements.

B. Organization

   1. CQC Supervisor: Identify an individual within the Contractor's organization, located at the site, who shall be responsible for overall QC management and have the authority to act in all QC matters for the Contractor.

   2. Personnel: Maintain a staff member under the direction of the CQC Supervisor to perform all QC activities. The personnel of this staff shall be fully qualified by experience and technical training to perform their assigned responsibilities and shall be directly hired for the work by the Contractor.

C. The Contractor is encouraged to add any additional elements to the CQC Plan that are deemed necessary to adequately control all production and/or construction processes required by this Contract.

3.02 DOCUMENTATION

A. Specific Contractor QC Records required for the Contract shall include, but are not necessarily limited to, the following records:

1. QC Records are those documents that have been reviewed and accepted by the Contractor as complete, correct, and legible. QC Records shall include documents such as:

   a. Drawings, Specifications, procedures used for construction, procurement documents, inspections, and test records.

   b. Submittals.

   c. Personnel and procedure qualification records.

   d. Material, chemical, and physical property test results.

   e. Certificates of Compliance and shipment releases.

   f. Non-compliance reports and corrective action.

2. Identify all QC Records in the CQC Plan and maintain them in the Contractor's site files. Provide the Engineer access to these files when requested. Upon completion of the Contractor's contractual activities, turn these files over to the Engineer.

3. Daily CQC Report: Prepare and maintain a Daily CQC Report of operations. The Daily CQC Report shall be attached to the Contractor's Daily Construction Report, submitted in accordance with Section 013200 – Construction Progress Documentation and Section 013300 – Submittal Procedures.

4. The Daily CQC Report shall include the results of all inspections, surveys, and monitoring activities and shall be signed by the Contractor's Field Superintendent or CQC Supervisor.

B. Document Control: The Contractor's CQC Plan must require that Contractor-generated documents pertaining to quality-related items be controlled. The following types of documents shall be on controlled distribution to ensure that changes to them are transmitted and received when applicable:

1. Manuals.

2. Instructions.

3. Procedures.

4. Specifications.

5. Drawings.

6. Inspection and test plans.

7. Field change requests.

3.03 CORRECTIVE ACTION REQUIREMENTS

A. The CQC Plan shall indicate the appropriate action to be taken when a process is deemed, or believed, to be out of control (out of tolerance) and detail what action will be taken to bring the process into control.

3.04 OVERSIGHT BY THE ENGINEER

A. All items of material and equipment shall be subject to oversight by the Engineer at the point of production, manufacture, or shipment to evaluate whether the Contractor, producer, manufacturer, or shipper maintains an adequate QC system in conformance with the requirements detailed herein and the applicable technical Specifications and Drawings. In addition, all items of materials, equipment, and work in place shall be subject to surveillance by the Engineer at the site for the same purpose.

B. To facilitate oversight by the Engineer, allow the Engineer access to the dredge derrick, barge, or other floating equipment at the request of the Engineer while the work is being performed.

C. Oversight by the Engineer does not relieve the Contractor of performing QC inspections of either on-site or off-site Contractor’s or subcontractors’ work.

3.05 NON-COMPLIANCE

A. The Engineer will notify the Contractor of any non-compliance with any of the foregoing requirements. Immediately take corrective action after receipt of such notice. Any notice, when delivered by the Engineer or his/her authorized representative to the Contractor or his/her authorized representative at the site of the work, shall be considered sufficient notice.

END OF SECTION

SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.01 SUMMARY

A. This section presents requirements for establishment of temporary facilities as part of the work, including but not limited to, Contractor access to the work site, Contractor parking, Contractor offices, locations for materials delivery, security fencing, storage, and utility connections that will be made available during the work.

B. Locations for temporary facilities, Staging and Stockpiling Area(s) and storage, utility connections, and where temporary facilities will be made available to the Contractor at the work site during completion of the work are shown on the Drawings.

C. The work includes compliance with all controls or ordinances with respect to safety, noise, dust, security, and traffic.

D. Install, maintain, and operate all temporary facilities and controls as long as needed for the safe and proper completion of the work.

E. Details regarding environmental protection measures associated with temporary facilities are presented in Section 015719 – Temporary Environmental Controls.

F. Work under this Specification section is paid under Bid Item No. 2 – Site Preparation as shown on the Bid Form and described in Section 012000 – Price and Payment Procedures.

1.02 SUBMITTALS

A. Submit a Temporary Facilities and Controls Plan as part of the Construction Work Plan in accordance with Section 013300 – Submittal Procedures, which provides the site layouts in accordance with requirements of these Specifications.

1.03 ACCESS AND DELIVERY

A. The designated entry and exit of Contractor's vehicles to the site are shown on the Drawings.

B. Locate all offices, employee parking, and staging and stockpiling operations at the Staging and Stockpiling Area. Use of the Staging and Stockpiling Area(s) shall be only for Contractor access to complete the work and for equipment and materials laydown.

C. The Contractor is required to use only the designated entrance(s) to access the work site, as shown on the Drawings, for deliveries and access to the site:

   1. Maintain designated entrances for the duration of the Contract.

   2. Repair damage resulting from the Contractor's use.

D. Provide and maintain access roads, sidewalk crossing ramps, and construction runways as may be required for access to the work. All roadways and walkways outside of the Contractor's work site must be kept clear of materials and equipment at all times.

E. Provide and maintain competent flag operators, traffic signals, barricades and flares, lights, or lanterns as may be required to perform work and to protect other users at the work site.

1.04 REMOVAL OF TEMPORARY FACILITIES

A. Remove temporary facilities from the work site when advised by the Engineer.

B. Clean and repair damage caused by installation or use of temporary work.

1.05 CLEANUP

A. Conduct all project cleanup activities in accordance with these Specifications.

B. Remove construction debris, waste materials, and packaging material from the work site daily.

C. Clean dirt or mud tracked onto paved or surfaced roadways.

PART 2 – PRODUCTS

2.01 TEMPORARY SIGNAGE

A. Project and Safety Signs

1. Erect signs within 15 days after receipt of the Notice to Proceed.

2. Maintain signs and notices in good condition for duration of the work, and dispose of off site on completion of the project or when advised by the Engineer. Signs and notices that are damaged, destroyed, or deemed unacceptable shall be replaced by the Contractor at the Contractor's expense.

2.02 TEMPORARY TRAFFIC CONTROL

A. Haul Roads

1. At Contractor's expense, construct on-site access and haul roads necessary for proper implementation of the work under this Contract.

2. Construct on-site access and haul roads with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic are to be avoided.

3. Provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic.

4. The method of dust control must be adequate to ensure safe operation at all times.

5. Location, grade, width, and alignment of construction and hauling roads are subject to approval by the Engineer.

6. Lighting must be adequate to ensure full and clear visibility for full width of haul road and work areas during any night work operations.

B. Barricades

1. Erect and maintain temporary barricades to limit public access to hazardous areas.

2. Whenever safe public access to paved areas—such as roads, parking areas, or sidewalks—is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic, barricades will be required.

3. Securely place barricades clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

2.03 UTILITIES

A. Non-potable water for construction purposes is provided to the Contractor at the water hook up as shown on the Drawings. There is no potable water source available on site.

B. Provide adequate facilities for the Contractor's operation at the Contractor's expense, including:

1. Potable Water

    a. Provide fresh drinking water for employees near sanitary containers. Make arrangements to supply construction water for the duration of this Contract.

    b. Install backflow preventers between the water utility source and the Contractor's connection to that source.

    c. Furnish, install, and remove upon completion of the work all such connections and fittings to the satisfaction of the Owner.

2. Construction Electricity

    a. Make all arrangements for the furnishing of electric power for construction purposes. The power meter shall be registered in the name of the Contractor.

3. Toilet Room Facilities

    a. Install and maintain necessary temporary sanitary toilet facilities with hand washing facilities during the term of this Contract. Regularly maintain all toilet facilities in a sanitary condition. Toilets shall be of a chemical type; they shall be removed at completion of work and the premises disinfected.

4. Communications

    a. Install and maintain the appropriate equipment to allow for the efficient communication with the Owner and with outside parties at all times during the term of this Contract. Remove at completion of work. All accounts shall be registered in the name of the Contractor.

5. Contractor Field Office

    a. Install and maintain necessary field office space during the work. Remove at the completion of work.

6. Engineer's Field Office

a. Provide a secure field office suitable for use by the Engineer and his/her resident inspection staff. The Engineer's field office shall be plumb and level, a minimum of 200 square feet in size, and shall be separate from the Contractor's field office. It shall be for the exclusive use of the Engineer and his/her staff. The final location of the Engineer's field office shall be approved by the Engineer.

   The field office shall be complete with two 5-foot office desks with three drawers each, two office-type chairs, one layout table of 2.5 by 5 feet, one drafting table of 3 by 6 feet with stool, one four-drawer lockable metal filing cabinet, shelves, one bulletin board, three additional chairs, power, light, ventilation, air conditioning, security barred windows, fire extinguisher, first aid kit, and heat. Provide three sets of keys providing access to the vandal-proof field office door lock.

2.04 USE AND OCCUPANCY

A. The Contractor will be allowed space for the storage of materials, equipment, and employee parking, as shown on the Drawings.

   1. Employee parking will be confined to the Staging and Stockpiling Area shown on the Drawings. Employee and equipment parking in the town of Port Gamble is not allowed.

B. Make arrangements with private property owners as desired to secure additional space for material storage, employee parking, or other needs.

   1. All space must be within local land use and permitting requirements at the Contractor's expense.

   2. Provide the Owner with a copy of the release from the private property owner that all obligations of the property use arrangement have been met before final payment to the Contractor is issued.

C. The work site shall be closed to the public at all times. Abide by any special requests of security personnel and local police and fire departments.

2.05 DUST CONTROL

1. Where Work includes clearing, grubbing, excavating, grading, hauling, placing, stockpiling, sawing, coring, drilling, sandblasting, general demolition, or other activities that will create dust of blowing soil, the Contractor must present their methods to control dust with the Owner prior to starting the Work. The dust control methods must include all methods required to retain or control dust and soil so that they do not leave the immediate Work Site, present health hazards, or enter any public areas.

2. Dust control must be effective in preventing visible fugitive dust from leaving the excavation area during construction and maintaining a safe environment for workers.

3. Non-potable water for dust control must be obtained from the Owner.

4. If conditions exist that cause dust or soil to become windblown or otherwise entrained in the air by vehicular traffic or equipment activities, that Contractor must employ methods to control and abate nuisance dust conditions including, but not limited to:

a. Covering excavated, graded, and disturbed areas or stockpiles with tarps or sheeting until removed from the Site or finished in accordance with the Contract Documents

b. Cleaning, sweeping, or vacuuming areas to remove the dust source

c. Removing or relocating dust-creating materials or activities to other areas that will eliminate the dust problem

5. Applying dust-control agents, such as water, or water misting, to the dust source; application of any other wetting agents other than water is not permitted by the Owner:

a. Runoff from wetted material is strictly prohibited.

b. The Contractor must achieve a balance between effective dust control and overwatering.

END OF SECTION

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SECTION 015719

TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

A. This section covers preventing environmental pollution during, and as a result of, construction operations. Other Specification sections may also contain specific requirements for environmental protection. Those specific requirements are in addition to the requirements in this section; the more stringent requirements shall control. The control of environmental pollution requires consideration of noise levels, air, water, and land.

B. The Contractor is responsible for environmental protection during all construction activities at all locations it performs work. Work locations include, but are not limited to: the site, on- and off-site transload facility(ies), on- and off-site Staging and Stockpiling Area(s), and during land-based transportation of all contaminated materials. This section primarily addresses work conducted at the site, but the Contractor is responsible for complying with environmental protection regulations at all locations that are used for the work of this project.

C. Environmental degradation arising from construction activities shall be prevented, abated, controlled, and minimized by complying with all applicable federal, state, and local laws and regulations concerning environmental pollution control and abatement, as well as the specific requirements in the project permits. The Contractor shall comply with all permit conditions.

D. The work includes compliance with all controls or local, state, and federal ordinances with respect to safety, noise, odor, dust, fire and police action, civil disobedience, security, or traffic.

E. The work also includes implementing Temporary Erosion and Sedimentation Control (TESC) measures, including stormwater pollution prevention measures to prevent debris, dredged sediment, excavated soils, and contaminated stormwater from entering Port Gamble Bay.

F. The work also includes providing control measures to prevent or limit, to the extent practicable, recontamination of cleaned-up areas or adjacent non-contaminated areas during construction activities.

G. No separate payment will be made for effort associated with work described in this Specification section. Work required to comply with this Specification section is considered to be incidental to all other activities described in the Contract Documents.

1.02 REFERENCES

A. Comply with all federal, state, and local environmental statutes, ordinances, and regulations that deal with the prevention of environmental pollution and the preservation of public natural resources that affect or may affect this project for the duration of the project.

1.03 SUBMITTALS

A. Prepare and submit an Environmental Protection Plan (EPP), TESC Plan, Spill Prevention, Control, and Countermeasures (SPCC) Plan, and Stormwater Pollution Prevention Plan (SWPPP) as part of the Construction Work Plan in accordance with Section 013300 –

Submittal Procedures that presents the procedures by which the Contractor shall establish and maintain quality control for environmental protection during all construction activities.

1.04 ENVIRONMENTAL RESPONSIBILITY

A. Demonstrate in the performance of the work that the Contractor is environmentally responsible by complying with environmental laws, ordinances, and regulations; being observant for, and immediately notifying the Engineer of, any environmental problems that develop at the site or Contractor Facilities; and taking all reasonable and necessary measures in the performance of the work to avoid causing negative impacts to the environment. Where negative impacts occur, the Contractor must immediately advise the Engineer and shall be solely liable to undertake all reasonable and necessary measures to address such negative impacts.

B. Sequence the Contractor's work to prevent or minimize, to the extent practicable, the potential for recontamination of the site or adjacent non-contaminated areas.

C. Maintain key pollution control systems in working condition throughout the project and undertake all works such that there are no unauthorized discharges of liquids or solids to the marine environment, or of gas to the atmosphere.

D. Maintain a neat work area free of unnecessary debris, tools, equipment, or materials; dispose of sewage, refuse, and chemical wastes in compliance with the applicable regulations and permit requirements for this work; and remove all tools, equipment, supplies, and wastes from the site upon completion of the work.

E. Maintain all equipment and machinery in good working order and free of leaks or excess oil, grease, and debris. Ensure that appropriately equipped spill kits are available on all equipment at the site and Contractor Facilities, and that workers and supervisory staff are knowledgeable with the provisions of the EPP and are adequately trained to implement the measures contained therein.

1.05 FIRES

A. Fires and burning of rubbish at the site are not permitted.

1.06 WASTEWATER MANAGEMENT AND DISPOSAL

A. Handle water in accordance with Section 312319 – Dewatering and Water Management.

1.07 DISPOSAL OF NON-SEDIMENT WASTES

A. Do not bury rubbish or waste materials on the site.

B. Do not dispose of waste or volatile materials, such as mineral spirits, oil, or paint thinner into waterways, storm sewers, or sanitary sewers.

C. Do not discharge wastes into streams or waterways.

D. The Contractor is responsible for storing, separating, handling, transporting, and disposing of all waste materials in accordance with applicable regulations and requirements, and at appropriate disposal facilities or transfer stations.

E. Disposal or recycling of other waste generated during the project shall be done in compliance with applicable regulations, and the facilities used will need to be reviewed by the Engineer.

1.08 NOTIFICATION

A. The Engineer will notify the Contractor, in writing, of observed noncompliance with federal, state, or local environmental statutes, ordinances or regulations, permits, and other elements of the Contractor's EPP. Notwithstanding this notification process, the Contractor shall be responsible for conducting all construction activities in a manner compliant with these regulations.

B. Inform the Engineer of proposed corrective action after receipt of such notice, and take such action for approval by the Engineer.

C. The Engineer may issue a stop work order until satisfactory corrective action has been taken.

D. No time extensions shall be granted or equitable adjustments allowed to the Contractor for such suspensions.

PART 2 – PRODUCTS

2.01 TEMPORARY EROSION AND SEDIMENT CONTROLS

A. Components for Silt Fences shall meet the requirements provided on the Drawings.

B. Components for Straw Bales

1. The straw in the bales shall be stalks from oats, wheat, rye, barley, rice, or from grasses such as byhalia, bermuda, etc., furnished in air dry condition. Provide bales with a standard cross section of 14 by 18 inches. Wire-bound or string-tie all bales.

2. Use either wooden stakes or steel posts to secure the straw bales to the ground.

PART 3 – EXECUTION

3.01 GENERAL

A. Maintain a copy of the EPP at the site and at the Contractor's on- and off-site transload facility(ies).

B. In the event of a conflict between these requirements and environmental and pollution control laws, rules, or regulations of other federal, state, or local agencies, the more restrictive laws, rules, or regulations shall apply as determined by the Engineer.

C. No discharge of water to Port Gamble Bay shall be allowed that exceeds the regulated pollutant levels in the National Pollutant Discharge Elimination System (NPDES) General Permit. All water discharged to Port Gamble Bay shall be in compliance with Washington State Surface Water Quality Standards (173-201A Washington Administrative Code [WAC]).

D. The Contractor shall be solely responsible for any damages and fines incurred because of Contractor, subcontractor, or supplier actions in implementing the requirements of this section.

E. The Contractor shall be solely responsible for schedule impacts incurred because of Contractor, subcontractor, or supplier actions in implementing the requirements of this section.

F. Supervision

1. During the work, supervise all activities, including those of subcontractors, to ensure compliance with the intent and details of the EPP. Conduct weekly environmental compliance meetings for the Contractor and its subcontractors to ensure that all personnel working at the site are familiar with the environmental protection provisions. Inspect all equipment and materials for environmental protection regularly to ensure that they are in proper order, are being applied correctly, and have not deteriorated.

G. Daily Inspection and Weekly Reporting

1. Conduct daily inspection of the Contractor's environmental protection measures to ensure that all are working properly and are adequately maintained during the duration of construction.

2. Submit written Weekly Environmental Protection Inspection Reports to the Engineer as part of the Contractor's Weekly Construction Report in accordance with Section 013300 – Submittal Procedures.

3.02 NOTIFICATION OF NON-COMPLIANCE

A. The Owner will notify the Contractor of non-compliance with the provisions of this section. Immediate corrective action shall be taken in the event of non-compliance. Such notice, delivered at the site, shall be sufficient for the Contractor to take action. The Owner may issue an order stopping all or part of the work for failure to comply until corrective action has been taken. No time lost resulting from such stop orders shall be the subject of a claim for extension of time or for costs or damages. The Contractor is required to comply with all environmental requirements whether or not notified by the Owner of non-compliance.

3.03 SUBCONTRACTORS

A. Compliance with this section by subcontractors will be the responsibility of the Contractor.

3.04 SITE MAINTENANCE

A. Keep the site, on- and off-site transload facility(ies), on-site Staging and Stockpiling Area(s), and Contractor's temporary facilities clean and free from rubbish and debris. Remove materials and equipment from the site when they are no longer necessary. Upon completion of the work, and before final acceptance, clear the site of equipment, unused materials, and rubbish to present a clean and neat appearance in conformance with the present condition of the site.

B. Cleanup

1. Maintain work in tidy condition, free from accumulation of waste products and debris.

2. Dispose of waste materials and debris in accordance with these Specifications.

3. Waste material of any kind shall not be permitted to remain on the site of the work or on adjacent streets. Immediately upon such materials becoming unfit for use in the work, they shall be collected, carried off the site, and properly disposed of by the Contractor.

4. Keep all buildings occupied by the Contractor clear of all refuse, rubbish, and debris that may accumulate from any source, and keep them in a neat condition to the satisfaction of the Engineer.

5. Handle paints, solvents, petroleum products, hazardous substances, bulk cement, concrete cure washings, crushed concrete, waste streams generated during construction, and other construction materials with care to prevent entry of contaminants into storm drains, surface waters, or soils. Dispose of excess materials off-site in accordance with applicable local, state, and federal regulations.

6. In the event that waste material, refuse, debris, and/or rubbish are not removed from the work by the Contractor, the Owner reserves the right to have the waste material, refuse, debris, and/or rubbish removed, and the expense of the removal and disposal deducted from payment owed to the Contractor.

C. Street Cleaning

1. Prevent dirt and dust from escaping from trucks departing the site by covering all loads, scrubbing and/or washing truck tires and undercarriages before leaving the site, installing inserts at catch basins, and other reasonable methods. Take all measures necessary to prevent the tracking of mud and other debris from the site to the surrounding streets.

2. When working dump trucks or other equipment are on paved streets and roadways, clean said streets and roadways at the conclusion of each day's operations at a minimum, and as required by the Engineer to prevent tracking of soil or other transported materials on paved roads at no additional cost to the Owner. Properly dispose of all collected material. This shall be the case, whether the vehicles or equipment are owned and/or operated by the Contractor or its subcontractors, or not.

3. In the event that the above requirements are violated and no action is taken by the Contractor after notification of non-compliance by the Engineer, the Owner reserves the right to have the streets and roadways in question cleaned by others and the expense of the operation deducted from payment owed to the Contractor.

3.05 PROTECTION OF FISH AND WILDLIFE

A. Perform all work and take all steps to prevent interference or disturbance to fish and wildlife. Do not alter or disturb water flows or habitat outside the project boundaries. Do not remove or alter native trees or shrubs during construction. Protect existing native vegetation on or adjacent to the site prior to and for the duration of construction.

B. Immediately cease excavation or material placement if fish kill or distressed fish are observed, and immediately notify the Owner, Engineer, and Washington State Department of Ecology (Ecology).

3.06 AIR POLLUTION AND ODOR CONTROL

A. Do not discharge smoke, dust, odor, or other contaminants into the atmosphere that violate the regulations of any legally constituted authority. Do not allow internal combustion engines to idle for prolonged periods of time. Maintain construction vehicles and equipment in good repair. Repair or replace exhaust emissions that are determined to be excessive by the Engineer.

B. Minimize dust nuisance by cleaning, sweeping, vacuum sweeping, sprinkling with water, or other means. The use of water, in amounts that result in mud on public streets, is not acceptable as a substitute for sweeping or other methods. Keep equipment for this operation on the jobsite or available at all times.

1. Execute work by methods that minimize raising dust from construction operations.

2. Apply water as required for dust control, and when advised by Engineer. Choose dust control methods such that a minimal amount of water is required.

3. Apply water with distributors equipped with a spray system to ensure uniform application and with means of shut off.

4. Do not allow runoff from water used for dust control to enter storm drains.

C. Conduct all operations and maintain the site so as to minimize and suppress objectionable odors and the potential for organic vapors associated with the work consistent with all local, state, and federal regulations.

1. Monitor odor as necessary to comply with any applicable health and safety regulations and implement procedures to reduce or eliminate odor from sediment stockpiles if necessary.

2. Implement measures to suppress organic vapor concentrations and/or odors at no additional cost to the Owner. Acceptable measures include backfilling open excavations, and/or application of an odor or organic vapor suppression foam.

3. The Owner reserves the right to suspend work at any time in the event that the Contractor’s operations result in organic vapors or objectionable odors that are deemed to cause a potential safety and/or air quality issue.

3.07 NOISE AND LIGHTING CONTROL

A. Ensure that construction involving noisy operations, including starting and warming up of equipment, is in compliance with local noise ordinances. Schedule noisy operations so as to minimize their duration.

B. Comply with all local controls and noise level rules, regulations, and ordinances that apply to the work.

C. Enclose each internal combustion engine used for any purpose on the job or related to the job and equip with a muffler and spark arrester of a type recommended by the manufacturer. Do not operate any internal combustion engine on the project without said muffler and enclosure. Ensure that noise control devices on construction equipment are properly

maintained. Operate all construction equipment with exhaust systems in good repair to minimize noise.

D. Implement the use of lighting shrouds for work to be completed during night-time hours to minimize lighting disruptions to local residents.

3.08 SPILL PREVENTION AND CONTROL

A. Be responsible for prevention, containment, and cleanup of spilling of oil, fuel, and other petroleum products used in the Contractor's operations. All such prevention, containment, and cleanup costs shall be borne by the Contractor.

B. The Contractor is advised that discharge of oil from equipment or facilities into State waters or onto adjacent land is not permitted.

C. Take the following measures, at a minimum, regarding oil spill prevention, containment, and cleanup:

1. Inspect fuel hoses, lubrication equipment, hydraulically operated equipment, oil drums, and other equipment and facilities regularly for drips, leaks, or signs of damage, and maintain and store properly to prevent spills. Maintain proper security to discourage vandalism.

2. Dike or locate all land-based oil and products storage tanks so as to prevent spills from escaping to the water. Line diking and sub-soils with impervious material to prevent oil from seeping through the ground and dikes.

3. Immediately contain all visible floating oils with booms, dikes, oil-absorbent pads, or other appropriate means and remove from the water prior to discharge into State waters. Immediately contain all visible oils on land using dikes, straw bales, or other appropriate means and remove using sand, ground clay, sawdust, or other absorbent material, and properly dispose. Temporarily store waste materials in drums or other leak-proof containers after cleanup and during transport to disposal. Dispose waste materials off-property at an approved and permitted disposal facility.

4. Use environmentally sensitive hydraulic fluids that are non-toxic to aquatic life and that are readily or inherently biodegradable.

5. In the event of any oil or product discharges into public waters, or onto land with a potential for entry into public waters, immediately notify the Engineer and other required reporting agencies at their listed 24-hour response numbers, including but not limited to:

    a. National Response Center: (800) 424-8802

    b. Washington Emergency Management Division: (800) 258-5990 or (800) OILS-911

    c. Ecology, Northwest Regional Office: (425) 649-7000

    d. U.S. Coast Guard: (206) 217-6002

6. Maintain the following equipment and materials on the jobsite in sufficient quantities to address potential spills from the Contractor's floating and land-based equipment:

    a. Oil-absorbent booms.

b. Oil-absorbent pads or bulk material.

c. Oil-skimming system.

d. Straw bales.

e. Oil dry-all, gloves, and plastic bags.

f. Contractor employee personal protective equipment (PPE) for emergency spill response.

g. Concentrated odor neutralizer.

D. Perform construction activities by methods that will prevent entrance or accidental spillage of solid matter, contaminants, debris, or other pollutants or wastes into saltwater bodies, streams, flowing or dry watercourses, lakes, wetlands, reservoirs, or underground water sources. Such pollutants and wastes include, but are not restricted to: refuse, garbage, cement, sanitary waste, industrial waste, hazardous materials, radioactive substances, oil and other petroleum products, aggregate processing tailings, mineral salts, and thermal pollution.

3.09 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Develop and implement the construction SWPPP as described in Section 013300 – Submittal Procedures, including TESC best management practices (BMPs) and the locations within each Work Zone where and when they will be installed prior to construction. Address the following issues as part of developing and implementing the TESC BMPs:

1. The TESC notes and details shown in the Drawings and the information in this section of these Specifications are minimum requirements for the anticipated site conditions during the construction period. During the construction period, upgrade the TESC facilities as needed for unexpected storm events and modify these facilities for changing site conditions (such as relocation of ditches and silt fences, etc.) at no additional cost to the Owner.

2. Inspect the TESC facilities daily and maintain these facilities to ensure continued proper functioning during the construction period. Submit written records of these inspections to the Engineer as part of the Contractor's Weekly Construction Report on a weekly basis in accordance with Section 013300 – Submittal Procedures.

3. Immediately stabilize any areas of exposed soils, including embankments, which will not be disturbed for 2 days during the wet season (October 1 through April 30) or 7 days during the dry season (May 1 through September 30) with the approved TESC measure (e.g., plastic covering, etc.).

4. Employ appropriate erosion control measures, including silt fences, filter fabric, plastic sheeting, sedimentation ponds, and placement of straw bales along the peripheries of construction sites, temporary detention ponds, and terraced slopes, and ensure that measures are in place prior to any clearing or grading activity.

B. Silt Fences

1. Provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Properly install silt fences to effectively retain sediment immediately after

completing each phase of work where erosion would occur in the form of sheet and rill erosion (e.g., clearing and grubbing, excavation, embankment, and grading).

C. Straw Bales

1. Provide bales of straw as a temporary structural practice to minimize erosion and sediment runoff. If bales are used, properly place the bales to effectively retain sediment immediately after completing each phase of work (e.g., clearing and grubbing, excavation, embankment, and grading) and remove, replace, or relocate the bales as needed for work to progress in the drainage area.

D. If monitoring or inspection shows that the erosion controls are ineffective, immediately mobilize work crews to make repairs, install replacements, or install additional controls as necessary.

3.10 WASTEWATER MANAGEMENT CONTROLS

A. Stockpile Wastewater Control Measures

1. Fully contain all Staging and Stockpiling Area(s) located within the on-site Staging and Stockpiling Area(s) to prevent release of unfiltered effluent and suspended sediments, or other potentially contaminated materials from the stockpile area.

2. Suspend work in the rain if such work cannot be performed without causing turbid runoff.

3. Discharge of hazardous substances will not be permitted under any circumstances.

3.11 STORMWATER MANAGEMENT CONTROLS

A. Drainage and Surface Water Management

1. Divert stormwater runoff from upslope areas away from stockpile and/or excavation areas. Implement practices to divert flows from exposed soils, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site.

2. Use methods of dewatering, excavating, or stockpiling sediment, soil, and debris materials that include prevention measures to control silting and erosion, and that will intercept and settle any runoff of soil- or sediment-laden wastewaters.

3. Before construction begins, establish appropriate perimeter barriers to prevent excess surface water flows from causing erosion. Keep work areas free of surface water run-on from adjacent upland areas, and as free from immersion as possible. Unless otherwise specified, remove all temporary facilities, equipment, and structures for care and diversion of water upon completion of the work, except the permanent drainage features of the project.

4. To avoid solids or turbid runoff from entering surface waters, secure, and/or berm excavated areas and stockpiles and employ other methods as necessary such as straw bale around storm drains or around excavated areas; or use sedimentation basins.

5. Prevent construction site runoff from directly entering any storm drain or the waterway; use straw bales or other filtration method suitable to the Engineer.

6. During intertidal excavation in Work Zone 3, ensure that appropriate BMPs are installed, along the upland limit of excavation, at the end of each work shift. Appropriate BMPs must be approved by the Engineer and prevent surface water run-on from adjacent upland areas to excavated and capped intertidal or beach backshore areas.

3.12 FUEL STORAGE TANKS MANAGEMENT

A. Storage tank placement: Place fuel or other petroleum product (hereinafter referred to collectively as fuel) storage tanks or containers at least 20 feet from saltwater bodies, streams, flowing or dry watercourses, wetlands, reservoirs, and any other water source in a discharge area.

B. Storage area dikes: Construct storage area dikes at least 12 inches high or graded and sloped to permit safe containment of leaks and spills equal to the capacity located in each area plus a sufficient amount of freeboard to contain the 25-year rainstorm.

C. Diked area barriers: Provide diked areas with an impermeable barrier at least 50 mils thick. Provide areas used for refueling operations with an impermeable liner at least 50 mils thick buried under 2 to 4 inches of soil.

D. Underground tank prohibitions: Do not use underground storage tanks.

3.13 PROTECTION OF WATER RESOURCES

A. General

1. Compliance with state water quality standards and conditions of any permits and clearances obtained for the work is the Contractor’s responsibility. No uncontrolled effluent will be permitted that results from the Contractor’s activities.

B. Disposal

1. Except as provided in the Contract, disposal of any wastes, effluents, trash, grease, chemicals, or other contaminants in waterbodies shall not be allowed. If any waste material is dumped in unauthorized areas, the material shall be removed and the area restored to a condition approximating the adjacent undisturbed area, at no additional expense to the Owner.

3.14 MARINE WATER QUALITY CRITERIA COMPLIANCE

A. The Contractor is responsible for meeting marine water quality criteria for in-water construction activities as defined in the Water Quality Monitoring Plan (WQMP; Appendix G) and applicable local, state, and federal standards. The Owner will conduct its own marine water quality monitoring during the project to assess the Contractor’s compliance, but this does not alleviate the responsibility of the Contractor to comply with the water quality criteria. In the event of a water quality exceedance, the Contractor will be required to modify its procedures, methods, or equipment appropriately so as to remedy the exceedances, at no additional expense to the Owner. The purpose of the specified water quality monitoring is to provide ongoing assessment of water quality impacts during excavation, capping, or other in-water construction activities as specified in the WQMP. The Contractor shall have in place BMPs to respond to water quality exceedances from in-water construction activities.

B. Review and comply with conditions in the Ecology-approved WQMP. The WQMP is available as a reference document to the Contract Documents as an Appendix to these Specifications.

C. In the event that water quality criteria are exceeded during the work:

1. Modification of Operations: If water quality criteria are exceeded, take immediate steps to correct the exceedance and improve water quality conditions. Such steps may include modified operational practices, engineering controls, and other measures as appropriate. Communicate all modifications proposed by the Contractor to the Engineer prior to implementing them. If corrective actions do not result in water quality criteria being met, be prepared to temporarily suspend operations until water quality comes back into compliance with the criteria.

2. Cessation of Operations: Cease construction activities at the first indication of a regulated substance spill (e.g., oil) within the work area, or at the first indication of distressed or dying fish in the vicinity of construction. When such conditions occur, cease all operations and take all necessary steps to correct the problem. Immediately notify the Engineer of the problem. Operations may resume upon approval of the Engineer after the problem has been corrected.

D. Marine Water Quality and Sediment Recontamination Controls

1. Procure, design, install, operate, inspect, and maintain BMPs and control measures as necessary to comply with water quality criteria and prevent or minimize to the extent practicable sediment recontamination within the site.

3.15 CONTAMINATED/HAZARDOUS SOILS AND GROUNDWATER

A. Contractor’s Responsibility

1. Visually monitor soils, groundwater (seeps), and waste materials by instructing workers to observe and report questionable materials and odors, such as oily sheen or color on soils or water, and oily or chemical odors. If suspected hazardous or contaminated materials (other than debris) are encountered, stop all work in that area and immediately notify the Engineer.

2. Be responsible for all matters related to work safety and for detection of contaminated soils and groundwater encountered during the construction as they relate to worker safety. Ensure the protection of the safety and health of construction workers and other authorized persons at the site from exposure to potentially toxic materials.

3. As part of the Contractor’s safety program, workers shall be instructed by a Contractor-provided and qualified specialist on methods or techniques to assist workers in detecting hazardous soils or groundwater during construction of this project.

B. Notification and Suspension

1. In the event that the Contractor suspects the presence of suspicious materials, the Contractor’s Site Safety and Health Officer shall immediately notify the Engineer. Following such notification by the Contractor, the Engineer will, in turn, notify the various regulatory agencies concerned with the presence of potentially dangerous materials. Depending on the type of problem identified, the Engineer may suspend the work in the vicinity of the material discovery under the provisions of the General Conditions.

2. Following completion of any further testing necessary to determine the nature of the materials involved, the Engineer will determine how the material shall be handled and disposed. Although the actual procedures used in resuming the work shall depend upon the nature and extent of the questionable material, the following alternate methods of operation are foreseen as possible:

    a. Contractor to resume work as before the suspension.

    b. Contractor to move its operations to another portion of the site until measures to eliminate any hazardous conditions can be developed and approved by the appropriate regulatory agencies.

    c. For dangerous or hazardous waste, or other non-municipal refuse waste, the Engineer will direct the Contractor to dispose of the excavated material in accordance with regulatory requirements. Such work shall be paid by force account.

3.16 EQUIPMENT DECONTAMINATION

A. Decontaminate equipment after working in potentially contaminated work areas and prior to subsequent work or travel on clean areas.

B. Perform equipment decontamination on a Contractor-constructed equipment decontamination pad to prevent cross-contaminating un-impacted areas.

C. Each piece of equipment may be inspected by the Engineer after decontamination and prior to removal from the site or travel on clean areas. The Engineer will have the right to require that additional decontamination be completed if deemed necessary, at no additional cost to the Owner.

D. Collect decontamination wastewaters and sediments that accumulate on the equipment decontamination pad and properly dispose.

E. Furnish and equip personnel engaged in equipment decontamination with PPE including suitable disposable clothing, respiratory protection, and face shields.

END OF SECTION

SECTION 017000

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 – GENERAL

1.01 TIMING

A. Prior to requesting final inspection, ensure that the work is complete in all aspects.

1.02 DESCRIPTION OF WORK

A. Ensure that all procedures and actions identified in this section and elsewhere in the Contract Documents necessary to fully complete the work are accomplished in a timely and effective manner. Lack of compliance with the closeout requirements will result in delays to any or all of the milestones identified herein.

1.03 PRE-FINAL INSPECTION

A. Prepare a Punchlist prior to requesting a Pre-Final Inspection by the Engineer. Limit Punchlist items to administrative requirements of the Contract and minor deficiencies in the work requiring correction. A Pre-Final Inspection will not be requested or granted if the work is incomplete.

B. Make the request for Pre-Final Inspection to the Engineer in writing and with the Punchlist attached, at least 3 working days prior to the requested date of inspection.

1.04 SUBSTANTIAL COMPLETION

A. Substantial Completion is the stage in the progress of the work when the work is complete and in accordance with the Contract Documents; the date of Substantial Completion is the end of Contract Time and the start of the warranty period.

B. The date of Substantial Completion is established in a Certificate of Substantial Completion issued by the Engineer.

C. In order to achieve Substantial Completion, the Contractor must:

1. Satisfactorily complete the Engineer’s Punchlist resulting from the Pre-Final Inspection.

2. Submit for approval to the Engineer any Special Warrantees, Bonds, or Follow-on Contracts required by the Contract Documents.

3. Perform Final Cleaning of the project site as required by the Contract Documents.

4. Upon completion of the above items, request a Final Inspection from the Engineer, in writing, at least 3 days prior to the requested date.

5. Satisfactorily pass the Final Inspection and receive the Certificate of Substantial Completion from the Engineer.

1.05 NOTICE OF COMPLETION

A. Notice of Completion will be issued in writing when all the work is complete, with the exception of claims previously made in writing and identified by the Contractor, a subcontractor, or material supplier as unsettled at the time of application for Final Payment.

B. Notice of Completion will be issued in writing by the Owner if:

1. Contractor demobilization is satisfactorily completed.

2. Project Record Documents have been submitted and approved by the Engineer.

3. Final Payment has been requested.

1.06 CONTRACTOR'S CHECKLIST

A. Attached to this section is a Contractor's Project Closeout Checklist for use in tracking completion of the items required herein.

PART 2 – PRODUCTS

2.01 WARRANTY

A. The Contractor warrants the labor, materials, and equipment delivered under the Contract to be free from defects in design, material, or workmanship, and against damage caused prior to final inspection. Unless otherwise specified, this warranty extends for a period of 1 year from the date of Substantial Completion.

B. Promptly (within 48 hours) repair or replace all defective or damaged items delivered under the Contract. Haul away all defective or damaged items prior to Substantial Completion.

C. In the event of equipment failure, during such time or in such a location that immediate repairs are mandatory, respond promptly, irrespective of time. If the Contractor is not available, the Owner will affect repairs. Reimburse the Owner for parts and labor necessary to correct deficiencies as defined within the warranty clause and time.

PART 3 – EXECUTION

3.01 FINAL DOCUMENTS

A. Project As-Built Drawings

1. Compile Project As-Built Drawings and submit to the Owner for translation to the Record Drawings on a monthly basis.

2. Submit the Project As-Built Drawings on full-sized (ANSI D) paper copy.

3. Keep Project As-Built Drawings current, and update at the time materials and equipment are installed. Make annotations to the record documents with an erasable colored pencil conforming to the following color code:

a. Additions – red.

b. Deletions – green.

c. Comments – blue.

d. Dimensions – graphite.

4. Project As-Built Drawings must be complete and accepted by the Owner before Final Completion is issued.

5. As-Built Drawings shall be in accordance with horizontal and vertical control as shown on the Drawings.

B. Record Document Survey

1. See Section 017123 – Surveying, for Final As-Built Survey (post-material placement) requirements. Complete the Final As-Built Survey and submit to the Owner within 30 days of Substantial Completion. The Final As-Built Survey must be complete and accepted by the Owner before Final Completion is issued.

C. The following certificates of conformance shall be submitted by the Contractor prior to Final Completion:

1. Notice of Termination Construction Stormwater General Permit: confirmation of termination request acceptance by Ecology.

3.02 CLEANUP

A. Provide final cleaning of the work and project site prior to final inspection. Employ experienced workers or professional cleaners for the final cleaning. Clean each surface or unit of work to the condition expected from normal commercial building cleaning and maintenance programs. Complete the following cleaning operations prior to closeout:

1. General: Prior to completion of the work, remove from the site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described above.

2. Site: Unless otherwise specifically directed by the Owner, hose down all paved areas affected by the work, including any public sidewalks and catch basins on adjoining streets. Completely remove all resultant debris.

3. In addition to performing debris removal and the cleaning specified in these Specifications, clean exterior exposed-to-view surfaces.

4. Regrade unpaved staging areas as necessary to restore original grades and a level area.

5. Remove waste, debris, and surplus materials from site. Clean grounds; remove stains, spills, and foreign substances from paved areas and sweep clean. Rake other exterior surfaces clean.

6. Maintain clean condition until final completion.

7. Re-clean areas or equipment after final inspection if such were dirtied as result of Contractor’s preparations for final inspection or completion of the Punchlist.

B. Timing: Schedule final cleaning as approved by the Owner.

END OF SECTION

CONTRACTOR'S PROJECT CLOSEOUT CHECKLIST

ITEM		BY	DATE
1.	Request Pre-Final Inspection – Provide Contractor's Punchlist to Engineer		
2.	Final operations and maintenance data and warranties		
3.	Pre-Final Inspection		
4.	Certificates of Compliance		
5.	Submit special warranties, bonds, or follow-on contracts as required by Contract		
6.	Perform Final Cleaning of project site per Contract		
7.	Complete Engineer's Punchlist		
8.	Request Final Inspection		
9.	Final Inspection		
10.	Certificate of Substantial Completion		
11.	Demobilization complete		
12.	Project Record Documents submitted and approved by Engineer		
13.	Final progress payment requested 100% (all items complete)		
14.	Notice of Completion		
15.	Contractor's Release of Claims Form Executed		
16.	Subcontractor and Supplier Claims Settled		
17.	Submit Final Payment Request		

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SECTION 017123

SURVEYING

PART 1 – GENERAL

1.01 SUMMARY

A. Provide all materials, labor, equipment, and incidentals necessary to conduct the proper surveys required to determine shore elevations within the area of the work.

B. Perform topographic surveys for layout of the work, to verify material placement and excavation depths and obtain final quantity for backfill, and to verify the grades of final as-built construction for acceptance of completed work as stipulated in this section.

C. Vertical Datum: All elevations indicated on drawings refer to National Ocean Survey mean lower low water (MLLW) Datum unless otherwise noted.

1.02 Reference Standards

A. The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only. The most recent version of the reference applies.

1. U.S. Army Corps of Engineers (USACE) – EM 1110-1-1005 (January 2007). USACE Engineering and Design – Control and Topographic Surveying.

1.03 LICENSED SURVEYOR QUALIFICATIONS AND RESPONSIBILITIES

A. Retain a licensed surveyor that will be responsible for conducting the Pre-Construction and Final As-Built Surveys. The Contractor's licensed surveyor shall satisfy the following minimum qualification requirements:

1. Professional Land Surveyor with current registration in the State of Washington.

B. The Contractor's proposed licensed surveyor will be subject to review and approval by the Engineer.

C. The responsibilities of the Contractor's licensed surveyor shall include, but not be limited to, the following:

1. Establishment of survey control points as required to complete the work.

2. Establishment of supplemental benchmarks, control points, staff gauges, etc., as needed to conduct the work.

3. Installation of automatic recording tide gauge.

4. Initial layout of all work elements.

5. Initial calibration and verification of survey system accuracy.

6. Pre-Construction and Final As-Built Surveys of all soil excavation, sediment excavation, and material placement activities.

7. Calculation of final quantities for the Contractor's final payment request.

8. Preparation of as-built construction Record Drawings.

D. Assume full responsibility for the coordination, scheduling, accuracy, and quality of the licensed surveyor's work. The licensed surveyor shall coordinate with the Contractor's quality control (QC) manager as necessary to fulfill project QC requirements, in accordance with Section 013100 – Project Management and Coordination, and Section 014500 – Quality Control.

E. In addition to the submittals specified in this section, the Owner reserves the right to request, at any time, copies of all other survey data, calculations, and supporting documentation generated by the licensed surveyor in support of the work.

1.04 SUBMITTALS

A. Submit a Survey Plan to the Engineer for review and acceptance as part of the Construction Work Plan in accordance with Section 013300 – Submittal Procedures.

B. Pre-Construction and Final As-Built Surveys: Provide a submittal to the Engineer within 48 hours of completion. The submittal must include: an AutoCAD electronic file, plan view drawings with 1-foot contour intervals, and spot elevations depicting high and low points plotted at 1 foot equal to 50 feet. The AutoCAD electronic file shall include a triangulated irregular network (TIN)-based digital terrain model (DTM). American Standard Code for Information Interchange (ASCII)-format processed survey data shall be provided in x, y, z (easting, northing, elevation) format. Each data file shall include a descriptive header including, but not limited to: software and equipment information, client, project, horizontal and vertical datum, units, tidal correction, survey type, alignment, and stations surveyed.

C. Prior to submitting a request for progress payment, furnish to the Engineer copies of all field notes, computations, any records relating to the quantity survey or to the layout of the work, and personal computer (PC)-compatible versions of any computer software required to interpret the finished data and records. The Contractor is responsible for converting data and drawing files to a standard software version approved by the Engineer. Standard ASCII format is pre-approved for data files.

D. Maintain on site a complete, accurate log of control of survey work as it progresses.

E. Keep updated survey field notes in a standard field book. These field notes shall include all upland survey work performed by the Contractor's surveyor in establishing line, grade, and slopes for the construction work. Keep separate updated field notes for in-water survey work performed by the Contractor. Copies of these field notes shall be provided to the Engineer upon request.

F. Excavation Backfill, and Material Placement Progress Surveys: Submit to the Engineer, within 12 hours of completing excavation, backfill, or cover placement, the results of ongoing progress surveys and records required to document compliance with the Material Placement limits shown on the Drawings.

1.05 PRESERVATION OF STAKES AND MARKS

A. Carefully preserve all primary controls. The Contractor will be charged for the replacement costs of stakes and marks damaged or destroyed by the Contractor's operation. Such charges will be deducted from amounts otherwise due or to become due to the Contractor at the current time and material rates.

B. Do not remove major survey control points without the approval of the Engineer.

1.06 CONTRACTOR SURVEYS

A. Establish such additional lines, grades, and controls as are needed for construction.

B. Perform all work in conformance with the lines, grades, and dimensions indicated on the Drawings. If a discrepancy is noted between the Drawings, immediately bring this to the Engineer's attention. Where tolerances are stated, perform the work within those tolerances. The Engineer will determine if the work conforms to such lines, grades, and dimensions; his/her determination shall be final.

C. The Contractor assumes full responsibility for detailed dimensions and elevations measured from primary control points.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

3.01 GENERAL

A. Exercise care during the execution of the survey work to minimize any disturbance to existing property and to the landscape and waters in the areas surrounding the work site. Survey crews shall comply with all provisions of the site-specific construction Health and Safety Plan when traversing into controlled areas.

1. If the survey work provided by the Contractor does not meet the Contract requirements, the Contractor shall, upon the Engineer's Written Notice, remove and replace the individual or individuals doing the survey work. The Owner may subcontract control of surveying at the Contractor's expense, which will be deducted from moneys due or to become due to the Contractor.

2. The Engineer reserves the right to check all work laid out by the Contractor during the progress of the work, as deemed necessary to verify conformance with the Drawings and Specifications. Allow a reasonable time to permit such checks (24 hours, excluding Sundays and holidays) before completing the work. These checks will be made during the regular working hours.

3.02 SURVEY CONTROL AND REFERENCE POINTS

A. Existing survey control points are noted on the Drawings and may be used by the Contractor to establish project baseline, stationing, offsets, and work limits. The existing survey control points may also be used to establish supplemental temporary survey control points. For all surveys, use the horizontal datum Washington State Plane Coordinate System North

American Datum of 1983 (NAD83) (1991), North zone, in U.S. feet. Show all surveys in MLLW, in US feet.

B. Protect all survey control points prior to starting site work and preserve permanent reference points during construction. Do not relocate site reference points without prior written approval from the Engineer.

C. Promptly report to the Engineer the loss, damage, or destruction of any reference point or relocation required because of changes in grades or other reasons. Replace dislocated survey control points based on original survey control at no additional cost to the Engineer. Replacement of dislocated survey control points shall be done by a land surveyor licensed in the State of Washington.

3.03 INSPECTION

A. Verify locations of site reference and survey control points prior to starting work. Promptly notify the Engineer of any discrepancies discovered. Also verify layouts periodically during Construction.

3.04 SURVEY REQUIREMENTS

A. Reference survey and site reference points to the provided control monuments and record locations of survey control points, with horizontal and vertical data, on Project Record Documents.

B. Topographic Surveys

1. Conduct topographic surveys for areas above -3 feet MLLW before and after all excavation and capping activities and in accordance with USACE Engineering and Design – Control and Topographic Surveying (USACE EM 1110-1-1005 [January 2007]). Conduct surveys on a minimum 5-foot by 5-foot grid, including grade breaks from which a 1-foot contour map will be required in an electronic format. The topographic surveys shall cover all work areas with sufficient overlap beyond the work area to allow for tying the survey into existing grades.

2. All control surveys for elevation shall be +/-0.01 foot and, for horizontal, control angles shall be to the nearest 20 seconds +/-10 seconds, and measured distances shall be to +/-0.01 foot. All upland measurement surveys shall be within the following accuracies: horizontal: +/- 0.033 feet +1 parts per million (ppm) at 1 root-mean-square (RMS) (67% confidence level); and vertical: +/- 0.066 feet +1 ppm at 1 RMS (67% confidence level). Real-time kinematic-global positioning system (RTK-GPS) methods are acceptable during positional dilution of precision values of 7.0 feet or less and the utilization of a Geoid model or site calibration. Verify the RTK-GPS system on at least three survey control points near the limits of the site, as established by differential leveling methods from a project benchmark or survey control point. Avoid multi-path environments. Equip range pole tips with a “topo shoe” or device to prevent the tip of the range pole from penetrating the ground surface, or make a conscious effort to capture the ground surface and prevent the tip of the range pole from sinking into the ground.

3. Provide all materials as required to properly perform surveys, including but not limited to: instruments, tapes, rods, measures, mounts and tripods, stakes and hubs, nails, ribbons, other reference markers, and all else required. All material shall be of good professional quality and in first-class condition.

4. All lasers, transits, and other instruments shall be calibrated and maintained in accurate calibration throughout the execution of the work. Submit calibration certificates to the Engineer prior to the use of any instrument.

5. Furnish all materials and accessories (i.e., grade markers, stakes, pins, spikes, etc.) required for proper location of grade points and line. All marks given shall be carefully preserved and, if destroyed or removed without the Engineer's approval, they shall be reset, if necessary, at the Contractor's expense.

6. Soundings

    a. Sounding lines shall extend a minimum of 50 feet beyond the project survey boundaries or as otherwise approved by the Engineer. Intervals between soundings on each line shall not exceed 1 foot during raw data collection and the data shall not be decimated more than 5 feet for the DTM. In areas in which there are breaks in the slope, the 5-foot decimated data may need to be augmented at a denser interval to accurately depict the slope break.

    b. Complete all post-fill completion surveys, as well as the post-dredging and excavation surveys, within the same survey area with the same survey coverage as the Pre-construction Survey.

    c. All sonar collection procedures, methods, and equipment specifications shall be in accordance with the USACE Hydrographic Surveying Engineering Manual, for Navigation and Dredging Support Surveys (USACE EM 1110-2-1003 [January 2002]).

C. Conduct survey events requiring a licensed surveyor as follows:

1. Pre-construction Survey: The data derived from the Pre-construction Survey shall be used in establishing initial conditions, for computing the quantities, and for verifying required backfill thicknesses. No dredging, excavation, or backfilling shall be permitted before the Engineer has approved the Pre-construction Survey.

    a. The Owner and Engineer shall be notified at least 5 working days in advance of the Pre-construction Survey, and the Owner and Engineer shall be permitted to accompany the survey party and to inspect the data and methods used in preparing the baseline map. This survey will serve as the basis for computing payment quantities.

2. Acceptance Surveys: These surveys shall document post-excavation and post-placement of material conditions for verifying required elevations and grades have been achieved during construction.

3. Final As-built Survey: This survey shall document the post-construction elevations and contours at the site. The data derived from this survey shall be used in preparing the Record Drawings in accordance with Section 017000 – Execution and Closeout Requirements.

4. All surveys requiring a licensed surveyor shall be accomplished with the same licensed surveyor and equipment, and use the same data processing and interpolation methods.

3.05 PREPARATION

A. Establish and protect survey control points from traffic and construction equipment.

B. Establish a method of horizontal positioning and vertical control before excavation or material placement begins. The proposed method and maintenance of the horizontal positioning and vertical control system shall be subject to the approval of the Engineer and if, at any time, the method fails to provide accurate location for the excavation or material placement operation, the Contractor will be required to suspend operations. Lay out all work using horizontal and vertical measurements from physical structures, as indicated on the Drawings. The accuracy of all measurements taken from these points is the Contractor's responsibility. Furnish and maintain all stakes, templates, platforms, equipment, range markers, transponder stations, and labor as may be required to lay out the work from the control points or features shown on the Drawings. Maintain all points established for the work until authorized to remove them. If such points are destroyed by the Contractor or disturbed through its negligence prior to an authorized removal, they shall be replaced by the Contractor at its own expense.

3.06 PRECONSTRUCTION SURVEY

A. A survey of the existing site conditions that covers the limits of the work in Work Zones 1, Work Zone 2, and Work Zone 3 shall be completed prior to the start of construction. Construction shall not commence until pre-construction survey documentation has been submitted to and approved by the Owner or Engineer.

B. Conduct the preconstruction survey using existing and temporary survey control points and soundings in accordance with Article 3.02.

C. Existing contours shown on the Drawings may not reflect contours as the time of construction. Contractor shall verify all grades, lines, levels, and dimensions shown on the Drawings and shall report any errors or inconsistencies to the Construction Manager before commencing work. Failure to do so shall make the Contractor responsible for any changes which may be required thereafter in connection therewith.

D. The pre-construction survey data will serve as the baseline for progress surveys, acceptance surveys, and as-built surveys.

3.07 ACCEPTANCE SURVEYS

A. Acceptance Survey(s): The data derived from the Acceptance Surveys will be used in verifying depths, grades, and thicknesses, and for computing the quantities for payment. For intertidal excavation and capping and beach backshore excavation, acceptance surveys will need to be conducted concurrently with construction because excavation and capping need to occur during the same tide cycle. If the Acceptance Survey does not demonstrate that the required grades, elevations, or thicknesses have been achieved, additional work will be required and additional surveying will be necessary following that work. Additional work and surveys will be completed at no cost to the Owner.

B. Should the work be determined to be incomplete, immediately perform such additional work as may be necessary to complete the work to the satisfaction of the Owner. Final estimates will be subject to deductions and adjustments to deductions previously made because of excessive excavation, excavation outside the indicated or authorized areas, or disposal of material in an unauthorized manner.

3.08 PROGRESS SURVEYS

A. Conduct progress surveys for excavation and material placement on a daily basis during intertidal work using the equipment and methods specified in Article 3.04, and elsewhere in this section.

1. The areal coverage of daily progress surveys for intertidal work areas shall encompass the entire area of that day's work, plus an additional area of at least 20 feet beyond the outside perimeter of the day's work (including areas that have been previously excavated and backfilled). Survey and record the toe, crest, and corners of all cut and fill slopes.

B. Submit the results of progress surveys to the Engineer within 24 hours of completing the survey. The Engineer will utilize the progress survey submittals to assess the Contractor's compliance with the Contract documents. The Owner reserves the right to direct the Contractor to cease work, at no expense to the Owner, in the event that the Contractor fails to submit the results of progress surveys within the specified time frame.

C. The progress surveys shall be submitted in the form of a grid plan and cross-section drawings, as prepared by the Contractor. The grid plan shall indicate the location of each cross section. The cross sections shall be computer generated, and shall conform to the following format and informational requirements:

1. Plot cross sections at a horizontal scale of 1 inch equals 10 feet (maximum) and vertical scale of 1 inch equals 5 feet (maximum), with axes shown on margins.

2. Note grid line identification number and/or coordinates for each cross section.

3. Show existing grade and excavation neat line, actual excavation grades, and backfill.

4. Show survey point locations.

5. Show Work Zone boundaries.

6. Indicate applicable dates for excavation, backfilling, cover material placement and associated surveying activities.

7. Date and sign each cross section prior to submitting to the Engineer.

D. Conduct progress computations for any period for which progress payments are requested. For progress payments, prepare the excavation quantity calculations using the TIN volume technique, and using Autodesk Civil 3D, Autodesk Land Development Desktop, HYPACKTM MAX, Terramodel, or other commercially available software, as approved by the Engineer.

E. Survey Records: Prior to submitting a request for progress payment, furnish the Engineer copies of all field notes, computations, any records relating to the quantity survey or to the layout of the work, and a PC-compatible version of any computer software required to interpret the finished data and records. The Engineer will use them as necessary to verify the progress payment request. Retain copies of all such material furnished to the Engineer.

F. The Owner may conduct independent progress surveys for quality assurance purposes. The Owner will notify the Contractor if review of the survey data indicates a discrepancy between the Contractor's and the Owner's progress survey, and the Owner may request that the

Contractor re-survey the area(s) where discrepancies are present. Any re-surveying and associated re-work required due to surveying error(s) on the part of the Contractor or Contractor's independent surveyor shall be provided at no additional cost to the Owner.

G. In the event that the Contractor's or the Owner's progress surveys indicate that the work is out of compliance with the Contract Documents, the Owner may direct the Contractor to adjust excavation backfilling, and material placement procedures until compliance is achieved, at no additional expense to the Owner. The Owner further reserves the right to direct the Contractor to stop work if it is determined, in the opinion of the Owner, that the Contractor's methods are not suitable to achieve the specified construction tolerances. In the event that the Owner stops the work, take whatever measures are required, including mobilization of alternative equipment, to achieve the specified construction tolerances, at no additional cost to the Owner.

3.09 FINAL AS-BUILT SURVEY

A. Upon completion of the work, complete a Final As-Built Survey and plan drawings of the work for inclusion in the construction records report to be prepared by the Engineer.

B. The As-Built Survey shall include a topographic survey and a hydrographic survey of all excavation limits and final grades within the project limits. A separate plan drawing shall also be prepared showing the excavation limits and final grades within the work area.

C. The results of the As-Built Survey shall be presented in the form of contour plan drawings with 1-foot contour intervals. Break points shall be indicated for all slopes. Spot elevations shall be indicated in areas of limited topographic relief, as appropriate. The associated survey data shall also be submitted to the Engineer, in accordance with the requirements of Article 1.06 of this section.

END OF SECTION

SECTION 017419

STOCKPILING, WASTE MANAGEMENT, AND DISPOSAL

PART 1 – GENERAL

1.01 SUMMARY

A. This section includes the procedures and requirements for the temporary stockpiling, stockpile management, loading, transport, and disposal or recycling of materials generated by the construction activities.

B. Disposal work shall include furnishing all labor, tools, equipment, and incidentals required for transport and recycling or disposal of site demolition and deconstruction materials and debris, upland excavated soils to the Model Airplane Field Limited Purpose Landfill and/or the off-site disposal or recycling facility, as approved by the Engineer. Disposal work also includes all loading, transportation, and disposal fees.

1.02 GENERAL REQUIREMENTS

A. Dispose of all wastes generated during the course of the project in accordance with all applicable local, state, and federal regulations. Sediment and soils removed from intertidal areas will placed into temporary stockpiles on the Former Mill Site as shown on the Drawings. Stockpiled sediment will either be placed within a compacted on-site berm, transported to and placed at the Model Airplane Field Limited Purpose Landfill, or transported to and disposed of at a permitted landfill as approved by the Engineer. Demolished asphalt, concrete, and debris will be disposed of or recycled in off-site locations in accordance with applicable regulations, in an Owner- and Washington State Department of Ecology (Ecology)-approved facility. Wood, concrete, and other debris encountered during removal will be separated and salvaged, recycled, or disposed of off site.

1.03 SUBMITTALS

A. Submit a Stockpiling, Waste Management, Transportation, and Disposal Plan in accordance with Section 013300 – Submittal Procedures.

1.04 REQUIREMENTS FOR WASTE DISPOSAL AND RECYCLING SITES

A. Provide documentation acceptable to the Owner that the demolition and excavated materials can be accepted at the proposed disposal facility. Copies of the disposal facility permit must be submitted to the Engineer within 14 calendar days of Notice of Award.

B. For all disposal facilities proposed by the Contractor, provide the following information:

1. Location and owner of proposed disposal facility.

2. Documentation that proposed disposal facility is permitted and available to accept and dispose of the demolition and excavated materials.

3. Elimination of liability and acceptance of ownership by the disposal facility.

C. The selection of waste and recycling sites and their operation shall at all times be subject to the approval of the Engineer and Ecology.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Provide all of the materials and labor required for the packaging, labeling, marking, placarding, and transportation of waste materials in conformance with Department of Transportation (DOT) standards.

PART 3 – EXECUTION

3.01 GENERAL

A. Use only Ecology- and Engineer-approved waste disposal and recycling sites.

B. Transport all wastes in accordance with federal, state, and local transportation requirements, including driver training, placarding, and use of shipping papers or waste manifests.

C. Notify the Engineer at least 5 working days in advance of any proposed changes to the operations outlined in the approved Waste Management, Transportation, and Disposal Plan.

D. Transport soil and debris in leak-proof trucks or sealed containers meeting all requirements of state and federal DOTs and other applicable requirements. No spillage or drainage from trucks or containers is allowed at any time during hauling or transfer off site. Trucks and containers shall be not be overloaded, shall meet applicable weight restrictions, shall have adequate free-board so as to prevent spillage during transit, and shall be covered in accordance with applicable regulations. The Contractor's hauling methods and Waste Management, Transportation, and Disposal Plan shall address the possibility that free liquids could be generated in the material while being hauled.

E. The Engineer will conduct sampling of temporary stockpiles to determine the final disposition (placement location) of the material in that stockpile. The Contractor shall sequence their work to accommodate the Engineer's sampling and analysis to avoid any delays in the work schedule. Up to 2 months turnaround time may be necessary to receive stockpile sample results.

F. Upon approval of the Engineer, the Contractor may consolidate, within another location of the temporary stockpiling area, stockpiles that have the same final dispositions based on sampling results. Consolidation of stockpiles that is not pre-approved will not be paid.

G. During offloading, take care not to damage existing structures. Protection measures shall be discussed in the Waste Management, Transportation, and Disposal Plan. Repair, at no additional cost to the Owner, any damage determined by the Engineer to be the result of the Contractor's activities.

3.02 STAGING AND STOCKPILING AREA

A. Describe spill prevention measures and contingencies for cleanup in the Waste Management, Transportation, and Disposal Plan.

B. Upon completion of the work, remove all vestiges of stockpile containment materials and other materials and clean up the site to the pre-project condition.

3.03 STOCKPILE MANAGEMENT

A. Soil and sediment shall be stockpiled in piles with an approximate volume of 1,500 cubic yards for sampling and testing to determine suitability of disposal as shown on the Drawings.

B. Stockpiles shall be individually contained to prevent the lateral release of unfiltered water that drains from or that comes into contact with stockpiled materials. Subsurface infiltration from stockpiles will be allowed and will be the primary water management method. Impermeable surfaces beneath stockpile shall be demolished or perforated to facilitate infiltration of interstitial water from passive dewatering and run-on water from rainfall or sparging.

C. Stockpiles shall be managed to control dust and erosion.

D. Load trucks within the Staging and Stockpiling Areas so that stockpiled materials are contained within the area. Spilled material shall be immediately picked up and deposited in the appropriate stockpile area.

E. Temporary containment of excavated soil from beneath the groundwater table in Work Zone 2 shall include rinsing with clean fresh water source to remove sodium chloride. Provide means to apply water at up to 1 gallon per minute per 1,500-cubic yard stockpile, for up to 100 days to facilitate rinsing. Excavated shoreline soils from Work Zone 3 are relatively coarse-grained. Rinsing may be required; however, sparging to achieve MAF disposal criteria is anticipated to be accomplished relatively quickly. Water shall be applied with a sprinkler or other similar means to evenly distribute water at the top of the stockpile, minimizing pooling. Rinsate runoff will be monitored by the Engineer. After stockpiled soil has been sufficiently rinsed and approved by the Engineer for transport, the soil shall be transported to its final destination.

3.04 TRANSPORTATION AND DISPOSAL

A. Excavated material shall be temporarily placed at the Former Mill Site uplands in separate stockpiles. All material not otherwise designated as debris will be temporarily contained prior to being tested by the Engineer to determine the material's final disposition.

B. Debris that cannot be processed for reuse or recycling (e.g., logs, woody debris, and concrete and other deleterious materials) shall be transported to an appropriate licensed landfill facility approved by the Owner.

C. Depending on the results of testing, place material on site into a compacted embankment, transport off site and place at the Model Airplane Field Limited Purpose Landfill, or transport off site for permitted landfill disposal as directed by the Engineer.

D. In order to pass the Paint Filter Liquids Test (if the landfill facility requires passing this test in order to transport dredged sediment), the Contractor may elect to mix additives with the sediments to bind available water.

   1. The Engineer must approve the use of additives, and the proper storage and handling of additives must be outlined in the Waste Management, Transportation, and Disposal Plan.

   2. Additives that are easily windborne and/or that have an elevated pH (such as fly ash or lime) can pose a health hazard and result in damage to adjacent equipment or facilities.

These additives require approval by the Engineer and, if approved, must be properly controlled.

3. The Contractor has sole responsibility for cleanup and/or damage costs related to the use of additives.

E. Excavated material shall be dry enough when transported such that no free water is generated that cannot be retained in the truck, vehicle, or vessel during transport.

F. It is the Contractor's responsibility to verify rail access and capacity for rail car staging at potential off-site rail car staging locations, if used.

3.05 MODEL AIRPLANE FIELD LIMITED PURPOSE LANDFILL DISPOSAL

A. Transport materials to the MAF for placement in accordance with Section 352026 – Capping and Material Placement.

B. At the MAF, maintain a 30-foot-wide access corridor to the northern logging road.

C. Cleared material, consisting of stumps, brush, roots, rotten wood, and any other vegetation from the limits of clearing at the MAF, shall be sorted and stockpiled for off-site disposal. The surficial debris shall be segregated from the cleared trees and woody vegetation.

3.06 EMERGENCY CONTACTS

A. The Contractor shall be responsible for complying with the emergency contact provisions in 49 Code of Federal Regulations 172.604. Whenever the Contractor ships hazardous materials, the Contractor shall provide a 24-hour emergency response contact and phone number of a person knowledgeable about the hazardous materials being shipped and who has comprehensive emergency response and incident mitigation information for that material, or has immediate access to a person who possesses such knowledge and information. The phone must be monitored on a 24-hour basis at all times when the hazardous materials are in transportation including during storage incidental to transportation. Ensure that information regarding this emergency contact and phone number is placed on all hazardous materials shipping documents. Designate an emergency coordinator and post the following information at areas in which hazardous wastes are managed:

1. The name of the emergency coordinator.

2. The telephone number through which the emergency coordinator can be contacted on a 24-hour basis.

3. The telephone number of the local fire department.

4. The location(s) of fire extinguishers and spill control material.

3.07 SITE MAINTENANCE

A. Keep work area, site, and adjacent properties free from accumulations of waste materials, rubbish, and windblown debris resulting from Contractor's operations.

B. Provide on-site containers for collection of waste materials, debris, and rubbish. Periodically remove waste from the site.

C. Dispose of trash and debris in compliance with governing codes, ordinances, regulations, and anti-pollution laws.

D. Locate dumpster(s) or other waste containers or stockpiles inside the staging area or at a location designated by the Engineer.

E. Control all operations in accordance with Section 015000 – Temporary Facilities and Controls and Section 015719 – Temporary Environmental Controls.

3.08 HAZARDOUS MATERIAL

A. If encountered, hazardous material shall be disposed of in accordance with applicable federal, state, and local regulations. The Owner does not expect hazardous material to be encountered or removed during performance of the work. If such material or waste is encountered, immediately notify the Engineer to determine the course of action to be taken.

END OF SECTION

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SECTION 312300

EXCAVATION

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

1. The work includes furnishing all labor, materials, tools, equipment, and incidentals required for excavation, dewatering, and stockpiling as described in the Drawings and in these Specifications Perform Bank Excavation from the uplands “in the dry” above elevation -3 feet mean lower low water (MLLW). Stockpile clean riprap material removed during intertidal excavation at the Mill Site for reuse as armor material.

2. All material not otherwise designated as debris will be temporarily stockpiled and characterized prior to being moved into its final location as described in Section 017419 – Stockpiling, Waste Management and Disposal. Debris encountered during excavation will be offloaded, sorted, stockpiled, and transported and disposed of at an approved upland permitted landfill as described in Section 017419 – Stockpiling, Waste Management and Disposal.

B. Price and payment procedures

1. Measurement and Payment: Bid Items have been provided to furnish and install the required or perform.

1.02 CONSTRUCTION PERIOD

A. The in-water work window for Intertidal Excavation is June 1 to January 14.

1.03 DEFINITIONS

A. Excavation Limits: The horizontal limits by which Intertidal Excavation work will be completed under this Contract. The Excavation Limits are shown on the Drawings. There shall be no Intertidal Excavation outside of the Excavation Limits unless approved or directed by the Engineer.

B. Work Zone: A subarea within the Project Area used to delineate elements of the Work.

C. Cleanup Level: Dioxin/furan concentrations less than 12 ng/kg Toxicity Equivalent Quotient (TEQ) and carcinogenic polycyclic aromatic hydrocarbon (cPAH) TEQ concentrations less than 190 µg/kg.

D. MAF: Model Airplane Field Limited Purpose Landfill.

E. MAF Suitability Criteria: Dioxin/furan concentrations less than 45 ng/kg TEQ, cPAH TEQ concentrations less than 29,000 µg/kg, and soil porewater/leachate chloride concentrations less than 250 mg/kg.

1.04 JOB CONDITIONS

A. Character of Materials

1. The material to be excavated includes armor rock and coarse grained sediments.

B. Riprap and Debris

1. Debris that may be encountered during the work shall be managed in accordance with Section 017419 – Stockpiling, Waste Management, and Disposal.

2. Riprap excavated from the intertidal bank shoreline that is clean, intact, and reusable shall be stockpiled on site and replaced as armor material following excavation as described in Section 352026 – Capping and Material Placement. Riprap that is suitable for reuse as cap armor material is not considered debris.

C. Protection of Facilities

1. In addition to the measures outlined in Section 015719 – Temporary Environmental Controls, protection of facilities shall be provided as follows:

a. Any damage to existing facilities caused by the Contractor's operations, as determined by the Engineer, shall be repaired to the pre-project condition at the Contractor's expense.

b. Any penalties and costs associated with damage to existing facilities caused by the Contractor, shall be borne solely by the Contractor.

1.05 SEQUENCING AND SCHEDULING

A. Perform Work under this Section after erosion and sediment controls (TESC) meeting requirements of Section 01 57 00 and permit requirements have been established.

B. Establish site security prior to excavations.

C. Strip topsoil consistent with Section 31 10 00 – Site Clearing. Remove temporary facilities from the work site when advised by the Engineer.

D. Clean and repair damage caused by installation or use of temporary work.

1.06 SUBMITTALS

A. Excavation, Haul Truck Transport, and Water Management Plan

1. Prepare and submit a detailed, written Excavation, Haul Truck Transport, and Water Management Plan as part of the Construction Work Plan in accordance with Section 013300 – Submittal Procedures.

2. Prepare and submit daily and weekly Construction Submittals in accordance with Section 013300 – Submittal Procedures.

1.07 NOTIFICATIONS

A. Provide the necessary notifications as described in Section 014126 – Permits and the Contractor Communications Plan provided as Appendix D.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

3.01 PREPERATION

A. Verify that survey benchmark and intended elevations for the Work are as indicated.

B. Identify required lines, levels, contours and datum.

C. Locate, identify and flag locations of known utilities.

D. Protect site features to remain, including but not limited to benchmarks, survey control points, survey staking, vegetation, structures, fences, paving and curbs from damage by equipment.

E. Install environmental control measures in accordance with Section 015719 – Temporary Environmental Controls.

F. Install environmental control measures in accordance with Section 015719 – Temporary Environmental Controls.

3.02 ORDER OF WORK

A. Unless an alternate sequence is approved by the Engineer, excavate from south to north beginning in the southernmost area of Work Zone 3.

B. As excavation proceeds, stockpile excavated soils in accordance with this specification section and as shown on the Drawings.

C. Fill excavation with clean imported material and material that meets Cleanup Levels to existing grades and compact fill material as described in Section 35 20 26.

D. Place upland caps following upland backfill and material placement as described in Section 35 20 26 to the limits shown on the Drawings.

3.03 CONDUCT OF WORK

A. Excavation shall not begin until:

1. The Construction Work Plan has been reviewed and approved by the Engineer, and the Engineer has issued Notice to Proceed.

2. Agency-required notifications have been completed in accordance with the permits.

3. The Pre-construction Baseline Survey plan drawing and CAD files are approved by the Engineer as described in Section 017123 – Surveying.

4. The Contractor participates in the Pre-construction Meeting with the Engineer.

B. Layout of Work

1. Establish an accurate method of horizontal and vertical control and layout work before excavation begins as described in Section 017123 – Surveying.

C. Contaminated Soil Excavation (Work Zone 1 and Work Zone 2)

1. Make the cut to the lines and grades shown on the Drawings. No excessive excavation shall be allowed.

D. Work Zone 1 Excavation

1. Excavate to the limits and grades shown on the Drawings.
2. Once required Intertidal Excavation is completed, conduct an Acceptance Survey in accordance with Section 01 71 23 Surveying to verify that required elevations and grades have been met. If high spots remain above the required excavation elevations or required excavation limits have not been achieved, remove such high spots or extend excavation limits to the satisfaction of the Engineer.
3. Conduct confirmatory sampling via 10-point composite from the bottom of the excavation. Work Zone 1 shall not be backfilled until results of the confirmatory sampling are received.

E. Work Zone 2 Excavation

1. Excavate in lifts in accordance with the Drawings.
2. Proceed with excavation and stockpiling of material in an orderly way that prevents material from mixing together during or after excavation, and prevents cross-contamination from excavation and stockpiling equipment to clean material stockpile and placement areas
3. Maintain stable slope by following appropriate shoring procedures to be determined by the contractor.
4. Following the completion of each lift, perform a survey of the excavation grade to confirm the required elevation has been reached. If high spots remain above the required excavation elevations or required excavation limits have not been achieved, remove such high spots or extend excavation limits to the satisfaction of the Engineer. Do not proceed to excavate the next lift until the previous lift has been accepted by the Engineer.
5. Once groundwater is observed, manage water in accordance with Section 31 23 19 – Dewatering and Water Management.
6. Once required excavation is completed, conduct an Acceptance Survey to verify that required elevations and grades have been met. If high spots remain above the required excavation elevations or required excavation limits have not been achieved, remove such high spots or extend excavation limits to the satisfaction of the Engineer.
7. Following acceptance of the Acceptance survey, conduct verification sampling via 10-point composite from the bottom of the excavation. Proceed with backfilling Work Zone prior to receipt of results of the verification sampling.

F. Work Zone 3 Intertidal Excavation

1. Excavate the intertidal areas to the limits and grades shown on the Drawings.

2. Work above elevation -3 feet in the dry using land-based equipment to the extent practicable. Periodic excavation below the water surface may be necessary to accomplish the Intertidal Excavation work, depending on the tides. Land-based excavation below the water surface is subject to the approval of the Engineer.

3. Excavate from top of bank, working from higher elevations to lower elevations.

4. Excavate the Intertidal Excavation areas to the slopes and grades required to accommodate capping as shown on the Drawings.

5. Maintain a stable slope.

6. Excavate riprap located within Intertidal Excavation areas, and separate and stockpile clean reusable riprap for replacement on the shoreline following excavation.

7. Make the cut to the lines and grades shown on the Drawings. No excessive excavation shall be allowed.

8. Excavated areas must be capped with material in accordance with Section 35 20 26 – Capping and Material Placement within the same tidal cycle. The contractor shall avoid exposing open excavations to tides to the extent practicable.

9. Sequence beach backshore excavation with intertidal excavation to avoid tracking excavation equipment over previously capped areas.

10. Install BMPs along the upland limit of excavation, at the end of each work shift. Appropriate BMPs must be approved by the Engineer and prevent surface water run-on from adjacent upland areas to excavated and capped intertidal or beach backshore areas.

G. Work Zone 3 Upland Excavation

1. Demolish existing hardscape and stockpile for processing and disposal in accordance with Section 017419 – Waste Management and Disposal.

2. Make the cut to the lines and grades shown on the Drawings. No excessive excavation shall be allowed.

3.04 WATER MANAGEMENT

1. Manage groundwater encountered during excavation in accordance with Section 31 23 19 – Dewatering.

3.05 WATER QUALITY MONITORING

A. The Contractor is responsible for meeting water quality criteria as defined in the Water Quality Monitoring Plan in accordance with Section 015719 – Temporary Environmental Controls and applicable local, state, and federal standards.

3.06 STOCKPILE MANAGEMENT

A. Establish separate stockpiles in accordance with Section 01 74 19 – Stockpiling, Waste Management, and Disposal for the following:

1. Demolition debris, by material type as identified in the Bid Form.
2. Excavated hardscape material.
3. Material that is anticipated to meet the Cleanup Levels.
4. Material that is anticipated to exceed the Cleanup Levels but meet the MAF Suitability Criteria.
5. Material that is anticipated to exceed MAF Suitability Criteria and require disposal at an approved off-site commercial disposal facility.
6. Demolition debris, by material type as identified in the Bid Form.
7. Intertidal Excavation materials.
8. Riprap to be stockpiled and placed on the shoreline as armor material.

END OF SECTION

SECTION 312313

SITE CLEARING AND SUBGRADE PREPARATION

PART 1 – GENERAL

1.01 SUMMARY

A. This section includes removal and trimming of vegetation and trees, and stripping of topsoil and surface and subgrade preparations prior to placement of material in Work Zones 1, 2, 3, and 5.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and Payment: All work and costs of this Section are incidental to the Project and included in the total Bid.

1.03 REFERENCES

A. ASTM International:

1. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

2. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.04 QUALITY ASSURANCE

A. Meet requirements of Section 01 40 00 – Quality Requirements for quality assurance.

B. Disposal Site: Conform to all local regulations and acquire all permits and approvals required for use of the Contractor provided disposal site.

C. Protect trees close to the Work that are designated to remain but may be damaged by the Work in accordance with Section 329310 – Tree and Shrub Protection.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

3.01 GENERAL

A. Review clearing and grubbing limits in the field with the Project Representative prior to doing work. Limits will be clearly marked by the Project Representative.

B. Install fencing around the limits of the work prior to excavation and grading, utility work, and installation of temporary facilities.

C. Stockpile soil from Work Zone 1, 2, and 3 to eliminate contamination with other on-site material.

3.02 CLEARING AND GRUBBING

A. The MAF (Work Zone 5) is currently vegetated and consists of low brush and grasses. Prior to placing material, clear, grub, and scarify the subgrade surface in Work Zone 5 to provide bond between the foundation material and the fill material.

B. Clearing Trees: Cut down, remove, and dispose of trees and brush in the areas designated to be cleared. When grubbing is not required, trim stumps to no more than 6 inches above original ground level

C. Clearing Brush: Cut even with the ground surface.

D. Grubbing: Remove all vegetative roots to a minimum depth of 4 inches below the existing ground surface. Remove all stumps and large roots to a minimum depth of 8 inches below the deepest grading depth, as directed by the Engineer.

E. Remove topsoil from the areas to be further excavated, re-landscaped or re-graded.

F. Remove and segregate the upper 4 inches (minimum) of soil within the specified grubbing depth limits for offsite disposal.

G. Dispose of all soil and debris in accordance with Section 017419 – Stockpiling, Waste Management, and Disposal.

3.03 SUBGRADE PREPARATION

A. The Former Mill Site is currently covered with asphalt and concrete, with vegetation on the slopes above the site. Prior to any material being placed in the Upland Placement Area or Work Zone 2 Upland Cap Area, perforate the existing hardscape as shown on the Drawings to allow for water infiltration below the contained material.

B. Drain water from all low spots or ruts.

C. Shape the entire subgrade to a uniform surface including excavated surfaces.

D. Break down and flatten out the sides of stump holes, test pits, irrigation ditches/swales, utility excavation trenches and other similar cavities or depressions.

E. Where hardscape and other soil is removed, compact the uppermost 6 inches of the subgrade to at least 90% of maximum dry density as determined by the Modified Proctor in accordance with ASTM D 1557.

3.04 FIELD QUALITY CONTROL

A. Maintain and protect subgrade; keep free of ruts and irregularities until covered by material or surface pavement.

B. Keep foundation area free of standing water.

C. Repair at no expense to the Owner any portion of subgrade that loses stability because of hauling (evidenced by rutting).

END OF SECTION

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SECTION 312319

DEWATERING AND WATER MANAGEMENT

PART 1 – GENERALSUMMARY

A. This section describes the performance requirements for the dewatering of excavations associated with contaminated soil removal in Work Zone 2.

B. The Site has an NPDES individual permit that requires all construction-related water generated in the remediation areas to be collected and managed in accordance with these specifications.

C. Anticipated types of water to be managed include groundwater effluent that is generated from dewatering of excavations as part of excavation of Work Zone 2, stormwater that contacts site soils or groundwater during the Work, and other water that drains from stockpiled soils.

1.02 REFERENCES

A. NPDES Waste Discharge Permit No. WAR304947 Construction Stormwater General Permit January 1, 2021 through December 31, 2025

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 – Submittal Procedures:

1. Excavation, Haul Truck, and Water Management Plan, as part of the Construction Work Plan in accordance with Section 013300 – Submittal Procedures.

2. TESC Plan, as part of the EPP, in accordance with Section 013300 – Submittal Procedures.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

3.01 GENERAL

A. The Contractor is responsible for managing, collecting, and conveying all water generated during the Work. The Contractor must provide all means and methods for doing so in an approved Excavation, Haul Truck, and Water Management Plan.

B. Excavation in Work Zone 2 is likely to encounter groundwater at a depth of approximately 8 feet below ground surface (approximate elevation +8 feet MLLW). Groundwater must be managed in accordance with these Specifications.

C. Identify, select, furnish, install, maintain, and operate temporary pumps with adequate lift capacity, piping, hoses, valves, and other equipment necessary for removal of water from Work Zone 2.

D. If a generator is to be used to operate pumping equipment, the generator must be placed above the high-water line within an approved spill protection area.

E. Provide dewatering facilities capable of operating in freezing temperatures if freezing weather conditions occur or are expected to occur.

F. The Contractor must review available data provided as part of the EDR and as appendices to these specifications to satisfy themselves regarding geologic and groundwater conditions.

3.02 WATER MANAGEMENT

A. All water, including dewater effluent and stormwater, shall be managed via infiltration into the subsurface. The Contractor shall determine appropriate areas for infiltration and locations of storage tanks if necessary.

B. Effluent generated during excavation may contain suspended solids. If solids accumulate at the infiltration areas remove and dispose of them in appropriate stockpiles.

C. Establish means and methods to prevent spill of water generated during construction outside of infiltration areas.

3.03 DEWATERING

A. The Contractor is responsible for managing, collecting, and conveying all water generated during the Project to an on-site infiltration area or temporary storage tanks, if needed based on infiltration rates.

1. The Contractor will be responsible for selecting appropriate locations for storage tanks or infiltration areas. The location must be appropriately sized for the capacity of water generated during construction and stormwater.

2. Storage tanks may be used if adequate infiltration area is not available in the upland Mill Site. Storage tanks may consist of baker tanks, above ground storage ponds, or another approved means of water storage proposed by the Contractor.

B. The activities that are expected to generate water include, but may not be limited to, the following:

1. Excavation of Work Zone 2

a. Where excavation extends below the groundwater level, dewater the portion below the groundwater level in advance of or concurrent with excavation.

b. Dewater to maintain the stability of the excavation and allow construction work to be performed in the dry.

c. Maintain the dewatered water level until backfill has been placed.

d. After backfill has been placed, with approval of the Owner, allow groundwater to rise to natural levels.

e. Control pumping and dewatering operations so that the groundwater level rises slowly and uniformly.

2. Stormwater

    a. All stormwater that comes in contact with open excavations, contaminated soils, or stockpiled materials must be managed in accordance with these Specifications.

    b. Collect stormwater in accordance with Section 015719 – Temporary Environmental Controls.

3. Stockpiling

    a. All water that drains from stockpiled soil must be managed in accordance with these Specifications.

    b. Water that drains from stockpiled soil may infiltration directly into the subsurface. If stockpiles are stored in an area not adequate for infiltration, divert water to identified infiltration areas or storage tanks.

3.04 MAINTENANCE

A. The Contractor must maintain the dewatering system in good working order, subject to the Owner's observations and approval.

B. If replacement of infrastructure is needed due to breaks, tears, or other damages to the dewatering system, the Contractor must replace damaged materials or equipment in an expeditious manner. Equipment and materials are also subject to replacement due to poor functionality.

3.05 RESTORING WATER MANAGEMENT FOLLOWING CONSTRUCTION

A. Temporary pumps, pipe, and other equipment used for dewatering and water management must remain in place until construction is complete.

B. Following completion of the Work, remove temporary pumps, pipe, and other equipment and restore any site disturbances resulting from the installation of such equipment.

END OF SECTION

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SECTION 323129
FENCES

PART 1 – GENERAL

1.01 SUMMARY

A. This Work consists of installing a wood-rail fence and concrete footings, as indicated on the Drawings. The Work also consists of installing the herbivore exclosure fencing and waterfowl exclosure.

1.02 REFERENCES

A. MMCD 32 31 13, Chain Link Fences and Gates

B. MMCD 03 30 53, Cast-In-Place Concrete

1.03 QUALITY ASSURANCE

A. Manufacturer's Instructions: Adhere to manufacturer's instructions for product handling, assembly and installation, and maintenance.

B. Manufacturer’s original factory finish must be intact for the installation to be considered satisfactory. On-site touch-up will not be accepted.

C. Wood preservative: Treatment shall be applied by an organization regularly involved in the pressurized treatment of wood products. No field treatment will be permitted except for trimmed ends and other required field cuts. All lumber and timber shall be pressure-treated and shall conform to American Wood Preserver’s Association (AWPA) Standard C-2. In addition, wood treated with waterborne salts shall bear the AWPA quality mark designation of C-2.

1.04 SUBMITTALS

A. For each product specified, submit the following for approval prior to delivery:

1. Manufacturer's product data
2. Manufacturer's installation instructions
3. Color samples for each relevant product
4. Manufacturer’s warranty

B. For Fencing wood preservative, submit the following before installing any treated materials:

1. Manufacturer’s Certification of Compliance indicating that the material has been treated in accordance with the applicable codes, reference standards, and these Specifications.

PART 2 – PRODUCTS

2.01 WOOD-RAIL FENCE POSTS AND RAILS

A. Wood-rail fence shall have two hole posts with 3-meter (10-foot) long rails.

B. Fence posts and rails shall consist of Hemlock, Fir, Pine, or Larch in compliance with Section 06 10 00, Rough Carpentry, of good quality and approved by the Owner before use.

C. Peeler cores are acceptable for posts or rails.

D. Wood shall be preservative treated per Section 06 05 73, Wood Preservative Treatment.

E. Posts should be round in cross section, have a minimum girth of 15 cm (6 inches), and post tops shall be tapered.

F. Standard-weight rails with a minimum diameter of 10 cm (4 inches) shall be used.

G. Rails shall be tapered at the tips to fit into post slots as shown on the Drawings.

2.02 CONCRETE FOR POST FOOTING

A. All concrete for wood-rail fence footings shall comply with MMCD 03 30 53, Cast-In-Place Concrete.

PART 3 – EXECUTION

3.01 WOOD-RAIL FENCE CONSTRUCTION

A. Install wood-rail fence to the limits shown on the drawings.

B. Auger holes for post footings shall be advanced and sized as shown on the Drawings.

C. The Contractor shall over-excavate hole depths to 15 cm (6 inches) deeper than post bottoms. Over-excavated holes shall be filled with gravel in the bottom of the hole to provide a base to set posts on.

D. The Contractor shall place concrete around posts in a continuous placement and tamp for consolidation, checking each post for vertical and top alignment. Posts shall be supported plumb until concrete has cured.

E. Tops of post footings shall be flush with finished grade, troweled, and sloped outward to drain. Top of footing shall appear true and circular in shape with post at center of circle.

F. Posts shall be 3 meters (10 feet) on center, maximum.

G. Slots shall be cut out of posts and rails, with tapered tips meeting and rails installed in slots, as shown on the Drawings.

H. Following installation of wood-rail fence, plant a row of Nootka Roses along the interior of the fence within the Riparian Zone as shown on the Drawings in accordance with Section 329300 – Planting.

3.02 HERBIVORE EXCLOSURE FENCING

A. Install as shown on the Drawings.

B. Install following plant installation.

3.03 WATERFOWL EXCLOSURE

A. Install as shown on the Drawings.

B. Install following plant installation.

3.04 PROTECTED HABITAT RESTORATION AREA SIGNAGE

A. Install signage which reads “PROTECTED HABITAT RESTORATION AREA” along the exterior of the Riparian area approximately every 100 to 200 feet as shown on the Drawings.

B. Signs must be composed of aluminum composite material with two aluminum panels bonded to a thermoplastic core fixed to a treated wooden post as shown on the Drawings.

1. Panels must be fabricated from aluminum 6061-T6 or T3 alloy as per ASTM B209.
2. Panels must be minimum 11-inches by 14-inches and 0.063-inches thick.
3. Surface of panels must be aluminum white on face and backs and commercially flat and free of buckles, warps, dents, cockles, burrs, and any fabrication defects.
4. Signs must be screen-printed and non-reflective using appropriate colors.
5. Text on signs must be no smaller than 1/4-inch high using upper and lower case letters.
6. Panels must have corners with a safety radius of 1 inch unless otherwise specified.

C. Signage must be 5 feet tall and mounted on treated wood posts. Posts will be driven into the ground a minimum of 2 feet and backfilled with compacted native material and quick-set concrete as shown on the Drawings.

D. Signage must conform to the following specifications. Modifications may be made at the approval of the Engineer.

1. Wind pressure – 20 pounds per foot.
2. Soil – 1 tons per square foot or 2 kips per square foot minimum
3. Frost Depths – 2 feet minimum.
4. Quick-set Concrete – 3,000 pounds per square inch after 28 days.

3.05 CLEANING

A. Upon completion of Work, the Project Site shall be left clean and free of the cut-offs, staples, excess wire, pipe, or other construction debris. Any ruts caused by equipment shall be filled and levelled to specified surface tolerances to the Owner's satisfaction.

END OF SECTION

SECTION 329000
IRRIGATION

GENERAL

1.01 SUMMARY

A. Description of Work: The Contractor shall install a temporary irrigation system to deliver water to the riparian planting area (as shown on the plans). Work in this section must conform to the Owner's irrigation standards (listed in Part 2). The Work shall consist of preparation of an acceptable bidder-designed system. The Contractor shall provide and install all material necessary for a complete system, including pipe, valves, fittings, heads, connected to an existing water connection, and piping and all appurtenances related thereto. Included shall be all labor for trenching, plumbing, backfill, electrical adjustments, mechanical connections, and other labor necessary for installation of a satisfactorily operating system. Whether mentioned or not, the intent is that the Contractor furnish a complete and operable system covering the planting areas as indicated on the Drawings.

1.02 SUBMITTALS

A. Submit complete materials list 30 days prior to performing work. Submit manufacturer catalog data and full descriptive literature (catalog cut sheets).

B. Equipment or materials installed or furnished without prior approval of the Owner will be rejected, and such materials will be required to be removed and replaced with approved materials at the complete expense of the Contractor.

C. Qualifications of the bidder-designed irrigation sprinkler system designer: The Contractor shall submit the resume of the irrigation designer 30 days after acceptance of the Contract. Only a designer that meets the minimum qualifications provided in Paragraph 1.03.B shall be approved.

D. Submit design in the form of shop drawings for review and approval 60 days after acceptance of Contract. Shop drawings shall be drafted to scale at 1 inch = 20 feet and submitted in PDF file format showing the following:

1. Valve location, type, flow, and size
2. Sprinkler head layout and type
3. Pipe location and size (clearly indicate lateral versus mainline piping)
4. Wire locations
5. Sleeving plan showing size, location, and quantity

E. The design shall be prepared by a qualified irrigation sprinkler system designer that has been preapproved.

1.03 QUALITY ASSURANCE

A. Materials: Whenever any material is specified by name/number, such specifications are for the purpose of facilitating a description of materials and establishing quality and shall be deemed and construed to be followed by the words “or approved equal.” No substitutions that have not been submitted for prior approval to the Owner will be permitted. All materials shall be new, without flaws or defects, and shall be the best of their class and kind. Furnish sufficient descriptive literature and/or samples for any material submitted as “equal” substitutes. All materials shall be guaranteed for a period of 1 year against material defects and workmanship.

B. Qualifications: The bidder-designed irrigation sprinkler system improvements must be designed by a person with at least 3 years’ experience in commercial landscape irrigation design. In addition, the designer shall either be a Washington State registered landscape architect or a designer certified by either the American Society of Irrigation Consultants or the Irrigation Association. Irrigation sprinkler system installation shall be under the direction of a journeyman lawn sprinkler mechanic or experienced journeyman plumber. All electrical work must be done by a licensed electrical Contractor.

C. Quality of Work: All materials and equipment shall be installed in a neat and professional manner. The Owner reserves the right to direct removal and replacement of any items that, in its opinion, do not present an orderly and neat or professional appearance. Such removal and replacement shall be done, when directed in writing, at the Contractor’s expense without additional cost to the Owner.

D. Codes and regulations: All local, municipal, and state laws, rules, and regulations governing or relating to any of this Work are hereby incorporated into and made part of these Technical Specifications, and their provisions shall be carried out by the Contractor. Anything contained in these Technical Specifications shall not be construed to conflict with above-mentioned rules, regulations, or requirements. Where conflict may occur, rules, regulations, or requirements of the governing code shall be adhered to. However, when these Technical Specifications and/or Drawings call for or describe materials, quality, or construction of a better quality, higher standard, or larger size, these Technical Specifications and/or Drawings shall take precedence over the requirements of said rules, regulations, and codes.

E. Permits and inspections: Any permits for installation or construction of Work included under this Contract that are required by any legally constituted authorities having jurisdiction will be obtained and paid for by the Owner unless otherwise directed in this section. The Owner shall also arrange for and pay all costs in connection with any inspections and examinations required by these authorities. In all cases, where inspection of the irrigation system is required and/or where portions of the Work are specified to be performed under direction and/or inspection of the Owner, the Contractor shall notify the Owner 48 hours prior to the time when such inspection and/or direction is required. Re-excavation or alteration to the

system due to the Contractor's failure to have the required inspection shall be performed at the Contractor's expense.

F. System coverage: The system is to provide full coverage for the riparian planting areas shown on the plans. It is anticipated that the Contractor will exercise professional judgment in location and placement of all irrigation components. Should the Contractor elect to make changes to the approved design without prior written approval of the Owner, the responsibility for full coverage in the area to be affected rests solely with the Contractor.

G. Condition at Site: Before proceeding with any work, the Contractor shall inspect the Site, check all grades, and verify all dimensions and conditions affecting the Work to ensure the work may proceed safely. If the Contractor should find existing field conditions at variance with the Documents and Specifications, the Contractor shall notify the Owner in writing prior to installation of the irrigation system. Extra work arising from failure to do so shall be at the Contractor's expense.

1.04 SUBSTITUTIONS

A. Substitute equipment will be considered only when the performance by gallonage, pressure, flow rate, etc., is equal to the product originally specified.

1.05 DAMAGE TO PROPERTY

A. Exact location of all existing utilities and structures, whether or not indicated on the Drawings, shall be determined by the Contractor. Any of the Owner's property, including existing buildings, equipment, piping, pipe covering, sewers, sidewalks, landscaping, etc., damaged by the Contractor during the Work shall be replaced or repaired by the Contractor in a manner satisfactory to the Owner at the Contractor's expense before final payment is made.

PRODUCTS

2.01 GENERAL

A. All materials and equipment shall be new and the best grade of its kind. All items of equipment or material shall be as indicated or specified by patent or proprietary name and/or names of manufacturer or accepted equals. Substitution will be allowed as specified in Section 01 45 00 – Quality Control.

B. All materials and equipment shall be installed per manufacturers' specifications. Each type of material or model of equipment shall be of one manufacturer throughout.

2.02 IRRIGATION HEADS

A. Rotors

1. Hunter: All institutional, I-10, I-25, I-20, 1-inch inlet

B. Spray heads and pop ups:

1. Hunter Pro-spray: PRS40 with appropriate MP rotator nozzles

2. Rainbird Pop-ups: Standard spray head nozzles, 1800 series

C. Quick coupler:

1. Rainbird 44LRC

2.03 SWING JOINTS

A. Triple-swing joint construction only

2.04 AUTOMATIC CONTROL VALVES

A. Rainbird plastic valve, including PEB or PESB; choose the best valve that best matches existing automatic control valve system and controller.

B. Valves shall be installed using unions with a manual isolation valve upstream.

C. Wire splices

1. 3 M DBY or DBR per application

D. Wire size

1. 14-gauge heavy insulated wire to support commercial and public systems

2. Route all valve wiring through conduit; allow for 40% extra space for future usage.

E. Wire valves

1. The common wire will be white; zones will be red and, at minimum, one extra wire.

2.05 OTHER ITEMS

A. Valve boxes

1. CARSON, 8- by 8-inch metal plate on lid, 2 to 4 inches below grade

B. Manual drains

1. CHAMPION #200 Drain Valve or BUCKNER 80-M

2.06 PIPING

A. Mainline

1. Schedule 40 pipe for PVC lines size 4 inches and smaller, install with letters facing up.

2. When cutting tap into mainline, the Contractor is to flush each direction to ensure it is debris free.

B. Laterals

1. Class 200 pipe for PVC lines larger than 4 inches, install with letters facing up.

C. Sleeving

1. Schedule 40, twice the diameter of the insert

D. Pipe beveling

1. Bevel pipe ends on pipe 2 inches and larger

E. Glue

1. For welded pipe mainlines and laterals 3 inches or less, 705 Weldon CLEAR or GRAY (no BLUE). Use proper glue according to manufacturer's instructions and use P-70 primer.

2. For mainline larger than 3 inches, use gasket (O-ring) joining systems with joint restraints and appropriate thrust blocking.

EXECUTION

3.01 DESIGN

A. General: The Contractor is responsible for designing the irrigation system in accordance with these Technical Specifications and highest standards of durability, distribution uniformity, efficiency of design, and ease of maintenance. Irrigate all areas indicated on the Drawings.

B. Design parameters: The following shall be incorporated into the design:

1. Irrigation sprinkler heads shall be spaced to provide full coverage in all irrigated areas.

2. Minimum allowable PVC lateral line pipe size is 3/4 inch in diameter.

3. Irrigation mainline minimum allowable schedule 40 PVC pipe size is 2 inches in diameter.

4. Irrigation valve zones and head types shall be laid out according to similar types of planting requirements and overall exposure.

5. Provide quick-coupler valves every 100 feet along mainline.

C. Install all materials and equipment in strict accordance with manufacturer's written instructions and recommendations, local and state codes, laws, ordinances, and regulations.

D. Turn-off and turn-on: The following requirements are applicable to seasons during the construction Contract time frame until substantial completion. The Contractor shall turn off and winterize the entire system to prevent freezing damage at the end of the watering season during the first year. The system will be turned on by the Contractor in the spring, and the Contractor will check the system to ensure proper operation for the coming season in the first year.

3.02 EXCAVATION AND BACKFILLING

A. General: Excavate straight and true, with bottom uniformly sloped to low points.

B. Trench depth: Excavate straight trenches to a depth of 3 inches below invert of pipe, unless otherwise indicated. Unless otherwise specified, trenches shall be deep enough to allow

12 inches of cover over lateral lines and 18 inches of cover over supply mainlines. Maximum cover depth: 24 inches. All trenches must be straight and not have abrupt changes in grade. Trench bottoms with uniform slope, free of rocks or sharp edged objects.

C. Route irrigation lines around roots of existing trees. Care shall be exercised by the Contractor when excavating trenches near existing trees. Trenches having exposed tree roots shall be backfilled within 24 hours unless adequately protected by moist burlap or canvas directed by the Owner. Pipe shall lay side by side in trench. No stacking of pipe is permitted.

D. Backfill: Backfilling shall be done when the pipe is not in an expanded condition due to heat or pressure. Cooling of the pipe can be accomplished by operating the system for a short time before backfilling or by backfilling in the early part of the morning before the heat of the day. Backfill shall contain no lumps or rocks larger than 1 inch.

E. Compaction: Use hand-operated plate-type vibratory or other suitable hand tampers in areas not suitable for larger rollers or compactors. Compact initial backfill material surrounding pipes and conduit to 90% maximum density. For pipes, conduits, and sleeves under roads and slabs, compact backfill as specified herein for other utilities under roads and slabs.

3.03 INSTALLATION

A. General: The Contractor shall exercise care in handling, loading and unloading, and storing of irrigation equipment and materials to avoid damage. The pipe and fittings shall be stored under cover and shall be transported in a vehicle with a bed long enough to allow the length of pipe to lay flat.

B. Pipe: Install in a manner so as to provide for expansion and contraction as recommended by the manufacturer. Cut plastic pipe to ensure a square cut. Remove burrs at cut ends prior to installation. Solvent-weld or slip seal all plastic joints. Only approved solvent shall be used. Install all plastic pipe and fittings as shown and instructed by the pipe manufacturer. The Contractor shall assume full responsibility for correct installation. All mainline pipe is to be Schedule 40 PVC; all lateral piping is to be class 200 PVC. No PVC pipe shall be threaded.

C. Joints: All plastic-to-metal joints shall be made with plastic Schedule 80 male adapters. The male adapter shall be hand tightened, plus one turn with a strap wrench. Care should be

taken at solvent joints not to use an excess amount of solvent. Allow PVC joints to set at least 24 hours before pressure is applied to system. Use primer at joints.

D. Backfilling shall be done when the pipe is not in an expanded condition due to heat or pressure. Cooling of the pipe can be accomplished by operating the system for a short time before backfilling or by backfilling in the early part of the morning before the heat of the day.

E. Great care must be taken to ensure the inside of the pipe is absolutely clean. Any pipe ends not being worked must be protected and not left open.

3.04 CONTROL WIRE

A. Control wires are to be taped to the bottom of the supply line at 10-foot intervals with at least three wraps of electrical tape. Place in pipe sleeves or conduit under all paving.

B. Splices will be permitted only at the valves and never between valves or the valve controller. There must be a separate lead or “hot” wire to each automatic valve. One common wire will be acceptable. All splices shall be contained in valve boxes, with one unconnected spare control wire to run to the remote valves of the system for future repairs.

C. Three unconnected spare control wires are to be run from the controller through each intermediate control valve box in both directions.

3.05 AUTOMATIC CONTROL VALVES

A. Submit shop drawings for approval. The control valve assembly shall include gate valve, control valve, disc filter, and pressure regulator. Provide 6-inch drain rock in each vault. Stake all proposed control valve locations for approval.

3.06 OTHER IRRIGATION EQUIPMENT

A. General: Install all irrigation equipment materials per manufacturer’s recommendations and Owner-approved irrigation design shop drawings.

3.07 TESTING

A. Flushing: After all new irrigation piping and risers are in place and connected, all necessary division work has been completed, and prior to installation of irrigation heads, all control valves shall be opened sequentially and a full head of water used to flush out the system completely.

B. Pretest prior to request for system testing. Request no tests until confident work will pass. Notify Owner 48 hours prior to test.

C. Pressure test: After flushing is complete, pressure test mainline with all control valve assemblies installed (control valve isolation valve open, flow control in operating position), to

100 pounds per square inch. The system will pass test when it maintains less than a 2% drop in a 15-minute time period.

3.08 FINAL INSPECTION

A. Coverage: Before the sprinkler system will be accepted, the Contractor, in the presence of the Owner, shall perform a water coverage test to determine if the water coverage and operation of the system is adequate for planting. If the system is determined inadequate due to the Contractor's poor design, work quality, or materials, it shall be repaired or replaced at the Contractor's expense and the test repeated until accepted. Dry spots or areas without sufficient overlap will not be acceptable.

3.09 CLEANUP

A. Keep premises reasonably free from accumulation of debris. On completion of each division of work, remove all debris, equipment, and surplus materials, and leave the Site in a neat and orderly fashion.

3.10 AS-BUILT DRAWINGS

A. The Contractor shall record all changes that may be made during installation of the system. Immediately upon installation of any piping, valves, wiring, sprinkler heads, etc., in locations other than shown on the shop drawings or of sizes other than indicated, the Contractor shall clearly indicate such changes on a clean set of Drawings. Mainlines and remote control electric valves must be positively located by dimension from fixed reference points. Note mainline sizes clearly and accurately for maintenance reference. Submit three prints and one reproducible (Mylar) set of As-Built Drawings.

B. After final acceptance of the completed installation, the Contractor shall be responsible for having complete Drawings prepared showing all such changes, and these shall be submitted to the Owner for recording purposes per Section 01 70 00 – Execution and Closeout Requirements.

3.11 SYSTEM FAMILIARIZATION

A. Upon acceptance of the system by the Owner, the Contractor shall provide the necessary keys and/or other tools necessary to operate/drain/activate the system and shall spend sufficient time with the Owner to ensure the system operation/maintenance/winterizing can continue after the departure of the Contractor.

3.12 GUARANTEE

A. The system shall be guaranteed for all labor and materials for a period of 1 year from the date of written acceptance of the system. During the guarantee period, the Contractor shall check, clean, and adjust the sprinkler heads and otherwise ensure adequate operation of the

system as directed by the Owner and, in any event, on no less than two separate occasions a minimum of 4 months apart during the 1-year period.

3.13 SYSTEM PROTECTION

A. In the event the system is completed in a season when the system will not be in use, the Contractor will winterize the system upon completion of testing (and approval of the Owner) and reactivate the system in the spring. The Contractor shall, upon completion of the winterizing phase, submit a letter to the Owner certifying that the system was winterized and drained and indicating the date such action was accomplished. The Contractor will be liable for any damages resulting from failure to comply.

END OF SECTION

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SECTION 329000

HYDROSEEDING

PART 1 – GENERAL

1.01 SUMMARY

A. This section describes the requirements for furnishing all materials, equipment, and labor necessary for preparation, seeding, fertilizing, and protection of hydroseeded areas as shown on the plans.

1.02 REFERENCES

A. Ecology, *Stormwater Management Manual for Western Washington*, 2019.

B. *WSDOT Standard Specifications for Road, Bridge, and Municipal Construction* (2022 Edition) (WSDOT Standard Specifications).

1.03 SUBMITTALS

A. The Contractor must submit the Construction Work Plan and progress submittals in accordance with Section 01 33 00 – Submittal Procedures.

B. Submit product data for fertilizer, hydromulch, and seed.

C. Submit seed vendor's certification for required seed mixture, indicating percentage by weight and percentages of purity, rumination, and weed seed for each species.

D. Upon request, the Contractor must furnish to the Owner duplicate copies of a statement signed by the vendor certifying that each lot of seed has been tested by a recognized seed-testing laboratory.

E. Seed Supplier: Name and address of seed supplier. Should the Contractor require the source of seed supply to change during the construction, a written request must be provided to the Owner 48 hours in advance. The request is to be followed up by submission of proposed seed supplier and substitution seed analyses for Owner's review prior to the start of supply to the Site.

1.04 QUALITY ASSURANCE

A. Seed must be furnished in containers that show the following information: seed name, lot number, net weight, percentage of purity, germination, weed seed, and inert material. Seed that has become wet, moldy, or otherwise damaged will not be accepted. Seed must

conform to the requirements of the Washington State Seed Law and, when applicable, the Federal Seed Act and must be “certified” grade or better.

B. All seed must be delivered and stored in original containers in an enclosed storage facility protected from damage, weather, insects, and rodents.

1.05 FIELD QUALITY CONTROL

A. Grading Inspection

1. Finish grading must be inspected and approved by the Owner prior to seed application.

B. Hydroseeding Inspections

1. The Contractor must request a provisional inspection upon completion of the Work to verify seed has been placed evenly and appropriately. For the temporary seasonal cover, an inspection will also occur to verify that the bonded fiber matrix has been placed evenly and appropriately. Upon completion of the punchlist, the Owner will make provisional acceptance in writing.

2. Nine months after hydroseed has been placed, a secondary inspection will occur to determine if grass has grown in sufficiently. If any areas are unsatisfactory, the Contractor must make amendments per this Technical Specification.

3. Final acceptance will be at the end of the 1-year guarantee period and after all required repairs have been made, at which time the Owner will assume maintenance duties of hydroseeded areas.

1.06 GUARANTEE AND REPLACEMENTS

A. Hydroseeding is guaranteed as specified in the Technical Specifications. Hydroseed Mix No. 1 and No. 2 seeded areas must have a uniform stand of grass defined as uniform, vigorous growth with no bare spots over 3 feet by 3 feet (9 square feet) at the time of the 9-month secondary inspection. The Contractor must reseed at the original rate and fertilize at the rate of 1 pound of nitrogen per 1,000 square feet. All areas failing to vigorously establish for any reason whatsoever within 90 days after germination or a growing season, whichever is longest, must be reseeded.

PART 2 – PRODUCTS

2.01 GENERAL

A. Materials shall be of the quality, size, shape, and gradation or equal to that manufacture as specified in the Construction Work Plan. Material sources shall be selected well in advance of the time when the material will be required in the work.

2.02 FERTILIZER

A. Fertilizers for seeded areas shall be as specified below.

B. Finely ground dolomitic lime shall be retained by Taylor Standard Sieves as follows:

1. Number 20 sieve – retains 0.0 percent

2. Number 100 sieve – retains 25 percent

C. Installation fertilizer 15-22-15 shall be as manufactured by Lilly Miller (or approved equivalent).

D. Guaranteed Fertilizer Analysis:

1. Total Nitrogen (N) – 15 percent

a. Ammoniacal Nitrogen – 4.6 percent

b. Urea Nitrogen – 3.2 percent

c. Coated Slow Release Urea Nitrogen – 3.3 percent

d. Slowly Available Water Soluble Nitrogen – 2. 3 percent

e. Water Insoluble Nitrogen – 1.6 percent

2. Available Phosphoric Acid (P205) – 22 percent

3. Soluble Potash (K20) – 15 percent

4. Sulfur (S) – 4 percent

5. Boron (B) – 0.06 percent

6. Copper (Cu) – 0.06 percent

7. Iron (Fe) – 1 percent

8. Manganese (Mn) – 0.15 percent

9. Zinc (Zn) – 0.14 percent

Note: Derived from Urea, Sulfur-Coated Urea, Methylene Ureas, Ammonium Phosphate, Sulfate of Potash, Muriate of Potash, Iron Sulfate, Calcium and Sodium Borate, Copper Oxide and Sulfate, Iron Oxide Sulfate and Frit, Manganese Oxide and Sulfate, and Zinc Oxide and Sulfate.

* Slowly Available Water Soluble Nitrogen from Methylene Ureas

2.03 HYDROMULCH

A. Mulch shall be wood fiber from alder, containing no growth- or germination-inhibiting substances. A soil-binding agent (tackifier) is required. Mulch shall be dyed a suitable color to facilitate placement coverage observation. Wood fiber carrier shall consist of pure wood fiber products with tackifier, and shall be one of the following:

1. Conwed Fibers Hydro Mulch 2000

2. Or equal

2.04 SOIL BINDING AGENT (TACKIFIER)

A. Soil-binding agent shall consist of non-toxic, biodegradable materials that are environmentally safe, such as Hydrostraw Guar Plus ESI – TAK or approved equivalent. Tackifier shall be guar-based and shall be applied, at a minimum, in quantities sufficient to equal the retention properties of guar gum when applied at a rate of 60 gallons per ton of mulch.

2.05 SEED MIX

A. Seed to be used in hydroseeding shall meet the requirements of Section 9-14.2 of the WSDOT Standard Specifications (2014 edition). Seed shall be packed in clean, sound containers of uniform weight. Upon request, the Contractor shall furnish to the owner duplicate copies of a statement signed by the vendor certifying that each lot of seed has been tested by a recognized seed-testing laboratory. Seed that has become wet, moldy, or otherwise damaged in transit or storage will not be accepted.

B. Seed Mix shall be composed of the following species by weight:

% of Mix	Kind and Variety
40	Blue Wild Rye
15	Red Fescue
15	Roemer's Fescue
30	California Brome

1. The Seed Mix shall also meet or exceed the following:

    a. Minimum pure seed percent – 98 percent

    b. Minimum germination percent – 85 percent

    c. Maximum weed seed percent – 0.5 percent

PART 3 – EXECUTION

3.01 GENERAL

A. Application of seeding must be applied to the extents shown on the Drawings and in accordance with BMP C120 Temporary and Permanent Seeding of the Stormwater Management Manual for Western Washington, except as specified in this Technical Specification.

3.02 SITE PREPARATION

A. The Contractor shall notify the Engineer no less than 48 hours in advance of any seeding operation and shall not begin the Work until topsoil placement and finish grading has been approved by the Engineer. Following the Engineer's approval, seeding of the approved areas shall begin immediately. All soil preparation operations, compaction, and cleanup of debris shall be done prior to seeding and shall be approved by the Engineer.

3.03 WATERING

A. Any temporary irrigation system must be installed prior to hydroseed application and shall not be removed until the Contractor's warrantee expires.

3.04 HYDROSEEDING

A. Fertilizer, seed, and mulch shall be applied in one operation with approved hydraulic equipment. The Contractor shall apply materials at the following rates:

1. Mulch – 50 pounds per 1,000 square feet

2. Seed – 8 pounds per 1,000 square feet

3. Fertilizer – 15-22-15, 10 pounds per 1,000 square feet

4. Soil-Binding Agent – 1 pound per 1,000 square feet

B. Seeding shall not be done during windy weather or when the ground is frozen.

C. The Owner shall approve the Contractor's proposed watering methods prior to seeding.

D. The Contractor shall give the Owner 48 hours' notice prior to seeding operation. Equipment shall utilize water as carrying agent, utilizing a continuous built-in agitation system. Equipment with a gear pump is not acceptable.

E. The Contractor shall pump a continuous, non-fluctuating supply of homogenous slurry to provide a uniform distribution of material over designated areas.

3.05 MAINTENANCE

A. Maintenance of the hydroseeded surfaces must be performed as follows:

1. The Contractor must maintain seeded areas until hydroseed has fully germinated, is well established, and exhibits a vigorous growing condition.

2. Maintenance must include protection, weeding, mowing, and watering of hydroseeded areas.

3. When grass reaches 3 inches in height, turf shall be fertilized with 25-5-15 at the rate of 1 pound of nitrogen per 1,000 square feet.

4. If hydroseed is applied during the months of June, July, or August (with Owner approval as described in Section 3.03), supplemental watering is required for seed germination and establishment through September 15.

B. Maintenance shall be held to a 1-year warranty period.

3.06 PHYSICAL COMPLETION

A. Inspection to determine physical completion of seeded areas will be made by the Engineer upon Contractor's notification of completion. The Contractor may request a specific inspection date provided that the request is made at least 5 working days before requested

inspection date. Seeded areas will be accepted, provided all requirements, including maintenance, have been complied with and grass is well established and exhibits a vigorous growing condition. Areas failing to show uniform cover shall be reseeded at the Contractor's expense. Uniform cover is defined as vigorous grass growth with no bare spots greater than 2 square feet. Upon physical completion, the Owner will assume maintenance duties.

3.07 CLEANING

A. The Contractor must perform cleaning during the seeding and upon completion of the seeding. The Contractor must remove all excess materials, soil, debris, and equipment from the Site and must repair the damage resulting from seeding operations.

END OF SECTION

SECTION 329114

SOIL PREPARATION

PART 1 – GENERAL

1.01 SUMMARY

A. The Work includes:

1. Furnishing and installing topsoil and compost in planting areas as shown on the plans.

1.02 QUALITY ASSURANCE

A. All products supplied shall comply with applicable state and local codes.

1.03 SUBMITTALS

A. Submit the following samples to the Owner for approval:

1. Topsoil (5-pound bag) with manufacturer's data sheet and soil analysis test.

2. Compost (5-pound bag) with manufacturer's data sheet and soil analysis test.

PART 2 – PRODUCTS

2.01 COMPOSTED ORGANIC SOIL AMENDMENT

1. The Composted Organic Soil Amendment component shall meet the following specifications:

a. Composted Organic Soil Amendment shall consist of 100% decomposed organic mulch material; shall consist of yard waste debris or other organic waste materials that have been sorted, ground up, aerated, and aged; and shall be fully composted, stable, and mature (non-aerobic). The composting process shall be for at least 6 months, and the organic amendment shall have a uniform dark, soil-like appearance and consist of 100% recycled content. In addition, the organic amendment shall have the following physical characteristics:

1) Shall be certified by the Process to Further Reduce Pathogens (PFRP) guideline for hot composting as established by the U.S. Environmental Protection Agency (EPA).

2) Shall be fully mature and stable before usage.

3) Shall be screened using a sieve no finer than 0.25 inch and no greater than 0.5 inch. Based on dry weight of total organic amendment sample, it must comply with the following percent by weight passing:

Sieve Size	Maximum %	Minimum %
12.7 mm (0.5 inch)	0	100

Sieve Size	Maximum %	Minimum %
6.35 mm (0.25 inch)	100	95
4.76 mm	100	90
2.38 mm	100	75
1.00 mm	45	70
500 micron	30	0

2. Meets “composted materials” definition in Washington Administrative Code (WAC) 173-350 Section 220, available at: https://apps.leg.wa.gov/wac/default.aspx?cite=173-350-220

3. Has organic matter content 35% to 65% and carbon-to-nitrogen ratio of 25:1.

4. Shall have heavy metal concentrations below the Washington State Department of Agriculture (WSDA) per-year load limits as follows:

Metal	WSDA – Maximum pounds per acre per year
Arsenic	0.297
Cadmium	0.079
Cobalt	0.594
Lead	1.981
Mercury	0.019
Molybdenum	0.079
Nickel	0.713
Selenium	0.055
Zinc	7.329

5. Shall be certified by PFRP guidelines for composting as established by EPA.

2.02 TOPSOIL

A. Topsoil shall consist of 60% sand and 40% Composted Organic Soil Amendment by volume. Refer to 2.01 for Composted Organic Soil Amendment specifications. Sand shall meet or exceed the following specifications:

1. Sandy loam shall consist largely of sand, but with enough silt and clay present to give it a small amount of stability. Individual sand grains shall be of sufficient size to be seen and felt readily. On squeezing in the hand when dry, it shall form a cast that not only holds its shape when the pressure is released, but withstands careful handling without breaking.

2. The mixed soil shall meet the following gradation:

Screen Size	Percent Passing
3/8-inch	100%

US #4	95%
US #10	85%
US #30	70%
US #60	50%
US #100	30%
US #270	15%

B. Topsoil shall also have the following characteristics:

1. The pH range shall be from 5.5 to 7.5.
2. The Sodium Absorption Ratio shall be less than 6.0.
3. The Saturation Extract Concentration of Boron shall be less than 1.0 part per million (ppm).
4. The Water Percolation/Infiltration Rate of the disturbed soil sample shall be a minimum of 0.4 inch per hour.
5. The Soil Structure shall be loose, friable, and not subject to consolidation or compaction.
6. Non-soil components shall be less than 1% by volume (i.e., plastic, sticks, glass, etc.).

C. The Final Topsoil Mix shall contain sufficient quantities of available nitrogen, phosphorus, potassium, calcium, magnesium, sulfate, copper, zinc, manganese, iron, and boron to support normal plant growth. In the event of nutrient inadequacies, provisions shall be made to add required materials prior to planting.

D. The Contractor shall submit soil analysis results from a soils testing laboratory to the Owner. Indicate the source and obtain the Owner's approval before hauling to the site; an analysis test of a 5-pound bag sample is required.

E. Recommended Sources for Topsoil and Compost:

1. Indigo Topsoil Inc.

   22244 Port Gamble Rd. NE

   Poulsbo, Washington 98370

   (360) 598-2333

   http://www.indigotopsoilinc.com

2. Kitsap Topsoil

   26094 Bond Rd NE

   Kingston, Washington 98346

   (360) 326-2743

   http://www.northkitsaptopsoil.com/

PART 3 – EXECUTION

3.01 TOPSOIL

A. Tree and Shrub Planting Areas:

1. Refer to Section 329300 - Plants, for installing mulch at planting beds.

3.02 INSPECTION

A. The Contractor shall notify the Owner at least 48 hours in advance of the time of inspection required for completion of soil preparation before the planting of trees, shrubs, and groundcover can occur.

END OF SECTION

SECTION 329300
PLANTING

PART 1 – GENERAL

1.01 SUMMARY

A. Provide and plant trees, shrubs, and emergents as shown and specified. The work includes the following:

1. Plants and planting

2. Mulch and fertilizer

3. Maintenance until acceptance

1.02 QUALITY ASSURANCE

A. Comply with sizing and grading standards of the latest edition of the American Standard for Nursery Stock.

B. Nomenclature shall conform to Hortus Third: A Concise Dictionary of Plants Cultivated in the United States and Canada compiled by the L.H. Bailey Arboretum, Cornell University, 1976.

C. All plants shall be nursery grown or collected materials that have been held in a nursery for at least 1 year. Nursery climatic conditions must be similar to those in the locality of the project. All plants shall be weed free at the time of planting.

D. Stock furnished shall be at least the minimum size indicated. Larger stock is acceptable at no additional cost, and providing that the larger plants will not be cut back to size indicated. Provide plants indicated by two measurements so that only a maximum of 25% are of the minimum size indicated, and 75% are of the maximum size indicated.

1.03 SUBMITTALS

A. Plant nursery sources and photographs

1. The Contractor shall submit a list of nurseries supplying all plant species shown on the Drawings. Submit representative color and dated photographs of each plant species.

B. Submit the following material samples

1. Mulch submittal: The Contractor shall notify the Owner of the source of supply and provide a 5 gallon sample for approval before installation.

C. Submit the following material certification/data sheets

1. Planting fertilizer

2. Plant material sources, including names and photographs of representative plant species

D. Submit product data for the following fencing materials:

1. Plastic or galvanized metal mesh tubes/cylinders for the herbivory exclosure fencing
2. 2-inch by 2-inch wood post for the herbivory exclosure fencing
3. 2-inch mesh chicken wire for the waterfowl exclosure fencing

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver fertilizer materials in original, unopened, and undamaged containers showing weight, analysis, and name of manufacturer. Store in such a manner as to prevent wetting and deterioration of the fertilizer.

B. Dig, pack, transport, and handle plants with care to ensure protection against injury. Inspection certificates required by law shall accompany each shipment invoice or order to stock. On arrival, the certificate shall be filed with the Owner. Protect all plants from desiccation. Wilt-Pruf or another antidessicant shall be applied only with approval of the Owner. If plants cannot be planted immediately upon delivery, properly protect them with soil, wet peat moss, or in a manner acceptable to the Owner. Water heeled-in plantings daily. No plant shall be bound with rope or wire in a manner that could damage or break the branches.

C. Cover plants transported on open vehicles with a protective covering to prevent windburn.

D. Provide dry, loose soils for planting. Frozen or muddy soil is not acceptable.

E. Stock shall be handled by root balls only, not by the trunks, stems, or tops.

1.05 PROJECT CONDITIONS

A. Work notification: Notify the Owner at least 5 working days prior to the installation of plant material.

B. Protect existing utilities, paving, and other facilities from damage caused by planting operations.

C. Do not install plant material when ambient temperatures may be below 35ºF or above 80ºF.

D. Do not install plants when wind velocity exceeds 30 miles per hour (mph).

E. Confine work to designated areas. Do not disturb existing vegetation outside project limits, and protect all trees, shrubs, and ground covers within project limits not designated to be removed. Do not permit vehicular traffic or materials storage under or around new or existing trees.

1.06 SEQUENCING AND SCHEDULING

A. Planting vegetation shall be performed between October 1 and April 30. Planting at other times shall only by done by written permission by the Owner and only if an irrigation system is available at the Site at the time of planting.

1.07 WARRANTYS

A. Warrant plant material to remain alive and be in healthy, vigorous condition for a period of 1 year after the date of Physical Completion. Inspection of plants will be made by the Owner at the completion of planting.

B. Replace, in accordance with the Drawings and Technical Specifications, all plants that are dead or, as determined by the Owner, in an unhealthy or unsightly condition and have lost their natural shape due to dead branches or other causes due to the Contractor's negligence. The cost of such replacement(s) is at the Contractor's expense. Warrant all replacement plants for 1 year after Physical Completion or installation, whichever is longer.

C. Warranty shall not include damage or loss of trees, plants, or emergents caused by fires, floods, freezing rains, lightning storms, or winds over 75 mph, winter kill caused by extreme cold and severe winter conditions not typical of the planting area, acts of vandalism, or negligence on the part of the Owner.

D. Remove and immediately replace all plants, as determined by the Owner, deemed unsatisfactory during the initial planting installation.

E. This warranty also applies to existing trees, shrubs, and emergents to be removed and heeled-in for later replanting on site, if applicable.

PART 2 – PRODUCTS

2.01 PLANT MATERIALS

A. Plants: Provide plants typical of their species or variety, with normal, densely developed branches and vigorous, fibrous root systems. Provide only sound, healthy, vigorous plants free from weeds, defects, disfiguring knots, sunscald injuries, and abrasions of the bark, plant diseases, insect eggs, borers, and all forms of infestation. All plants shall have a fully developed form without voids, open spaces, broken branches, flush cuts, or stubs.

1. Container-grown stock (including plugs): Grown in a container for a sufficient time for the root system to have developed to hold its soil together, firm and whole.

    a. No plants shall be loose in the container.

    b. Container stock shall not be pot bound.

    c. No pruning wounds shall be present with a diameter of more than 0.5 inch, and such wounds must show vigorous callousing on all edges. Trees shall not be pruned within 6 months prior to delivery.

    d. Deciduous trees that have solitary leaders shall have only the lateral branches thinned by pruning. All conifer trees shall have only one leader (growing apex) and one terminal bud and shall not be sheared or shaped. Trees having a damaged or missing leader, multiple leaders, or Y-crotches will be rejected.

2.02 FERTILIZERS

A. Fertilizer shall conform to Commercial Fertilizers and Washington State Department of Agriculture laws 16-200 WAC and 15-54 RCW.

B. Fertilizer for all tree plantings shall be “BioPaks-16-6-8 plus minors and biostimulants” available from Reforestation Technologies International at phone: (800) 784-4769, or approved equivalent.

C. BioPak, or approved equivalent, shall consist of a 10-gram biodegradable planting packet containing a blend of 16.00% total nitrogen (N), 6.00% available phosphoric acid (P2O5), and 8.00% soluble potash (K2O). It shall also contain 6.92% combined sulfur (S), 0.52% zinc (Zn), 0.54% iron (Fe), 0.54% magnesium (Mg), 0.23% copper (Cu), 0.05% Boron (B), and 0.56% manganese (Mn). The N, phosphorous, and potassium sources shall be coated with a polyurethane coating to provide 15.69% coated slow-release nitrogen, 5.09% coated slow-release available phosphate, and 6.80% available soluble potash. It shall also contain 5.0% humic acid derived from rutile sands, 0.25% kelp extract, and 0.9% naphthalene acetic acid.

D. The soil conditioner shall consist of Mycor Tree Saver mycorrhizal fungal transplant inoculant for trees and shrubs or an approved equal consisting of the following:

1. Ectomycorrhizal fungi: 95 million spores per pound
2. Vesicular arbuscular mycorrhizal fungi: 5,300 spores per pound
3. Rhizosphere bacillus: 324 million colony-forming units per pound
4. Potassium polyacrylamide: 33%
5. Formononetin: 0.007%
6. Microbial Nutrients: 39.4%
7. Inert Ingredients: 27.3%

2.03 MULCH

A. Mulch shall consist of Bark or Wood Chip Mulch in conformance with WSDOT 9-14.5(3).

PART 3 – EXECUTION

3.01 INSPECTION

A. Finish grading shall be inspected and approved by the Owner prior to planting.

B. Plant material shall be inspected and approved by the Consultant and Owner at the nursery or Site prior to installation. Remove unsatisfactory material from the Site immediately.

3.02 PREPARATION AND SEQUENCING

A. The Contractor shall locate plants by staking with stakes and flags as indicated on the Drawings or as approved in the field. If obstructions not shown on the Drawings are encountered, do not proceed until the Owner has selected alternate plant locations.

B. Plant materials shall be installed after topsoil and irrigation have been installed and approved by the Owner.

3.03 PLANT INSTALLATION

A. Plants brought to the planting site shall be bare root, balled, and burlapped or in containers, depending on how specified in the planting schedule in the Contract for the particular type of planting material. Plants shall not be planted during freezing weather or when the ground is frozen. Plants shall not be planted during excessively wet conditions. Plants shall not be placed on any day in which temperatures are forecast to exceed 80°F, unless the Owner approves otherwise. Plants shall not be placed in areas below finished grade.

B. Space shrub and emergent plants using triangular spacing in accordance with indicated dimensions. Adjust spacing as necessary to evenly fill planting bed with indicated quantity of plants. Plant to within 18 inches of the trunks of trees within planting bed and to within 12 inches of bed edge.

C. Plants shall be removed from containers in a manner that prevents damage to the root system. Containers may require vertical cuts down the full depth of the container to accommodate removal. All circling roots shall be loosened to ensure natural directional growth after planting.

D. Excavate circular plant pits with scarified vertical sides, except for plants specifically indicated to be planted in beds. Provide planting pits at least twice the diameter of the root system or container. Pit depth shall accommodate the entire root system. Scarify the bottom and sides of the pit to a depth of 4 inches. If groundwater is encountered upon excavation of planting holes, the Contractor shall promptly notify the Owner.

E. Place specified planting soil for use around the balls and roots of the plants.

F. Install fertilizer packets around plant root balls based on plant size and manufacturer recommendations.

G. Set plant material in the planting pit to proper grade and alignment. Set plants upright, plumb, and faced to give the best appearance or relationship to each other or adjacent structure. Set crown of plant material at the finish grade. No filling will be permitted around trunks or stems or above grafts on grafted trees. Backfill the planting pit with specified soil or amendment. Do not use frozen or muddy mixtures for backfilling. Form a ring of soil around the edge of each planting pit to retain water.

H. Mulching

    1. Mulch tree and shrub planting pits and shrub beds with required mulching material immediately after planting. Thoroughly water mulched areas. After watering, rake mulch to provide a uniform finished surface.

I. Pruning: Prune all trees only to remove broken or damaged branches or for aesthetic purposes as directed by the Owner. Branches will be pruned at the branch collar. Neither stubs nor flush cuts will be acceptable.

3.04 MAINTENANCE

A. Maintain planting through a 1-year warranty period until acceptance by the Owner.

B. Maintenance shall include cultivating, weeding, watering, pruning (only as directed), and application of appropriate insecticides and fungicides necessary to maintain plants free of insects and disease.

1. Reset settled plants to proper grade and position. Restore planting saucer and adjacent material and remove dead material.

2. Correct defective work as soon as possible after deficiencies become apparent and weather and season permit.

3. Water trees, shrub, perennial and ground cover beds within the first 24 hours of initial planting and not less than twice per week (including rain) until Physical Completion.

3.05 PHYSICAL COMPLETION

A. Inspection to determine Physical Completion of planted areas will be made by the Owner, upon Contractor's request. Provide notification at least 10 working days before the requested inspection date.

1. Planted areas will be accepted, provided all requirements, including the maintenance period, have been complied with and plant materials are alive and in a healthy, vigorous condition.

B. Upon Physical Completion, the Owner will assume plant maintenance.

3.06 CLEANING

A. Perform cleaning during installation and upon completion of the work. Remove from the Site all excess materials, soil, debris, and equipment. Repair damage resulting from planting operations.

END OF SECTION

SECTION 329310
TREE AND SHRUB PROTECTION

PART 1 – GENERAL

1.01 SUMMARY

A. This section includes administrative and procedural requirements for the protection of existing trees, shrubs, and plant material not designated for removal. Such trees, shrubs, and plant materials shall be left in place and protected from damage or injury by the Contractor during construction using full and adequate methods of protection.

1.02 SUBMITTALS

A. The Contractor must submit the tree, shrub, and plant material protection area within the Demolition and Clearing Plan in accordance with Section 01 33 00 – Submittal Procedures.

PART 2 – PRODUCTS

2.01 GENERAL

A. The materials used in performing this Work must conform to the material specifications listed in this section and in the Construction Work Plan to be submitted by the Contractor.

2.02 TEMPORARY TREE PROTECTION FENCING

A. Temporary tree protection fencing shall be high-visibility construction fencing and shall include the following:

1. High visibility plastic fence in high visibility orange composed of a high-density polyethylene material, posts, ties, wire, or rope, at least 4 feet in height.
2. Posts shall be steel or wood placed every 6 feet on center (maximum) or as needed to ensure rigidity.
3. Fence tensile strength shall be 360 lbs/ft using the ASTM D4595 testing method and fastened to the post every 6 inches with a polyethylene tie.
4. Long continuous lengths of fencing shall use a tension wire or rope as a top stringer to prevent sagging between posts.

PART 3 – EXECUTION

3.01 PROTECTION WITHIN THE DRIPLINE

A. Where existing trees, shrubs, and plant materials are within the area of work or where existing trees, shrubs, and plant materials outside the area of work have driplines extending into the area of work, the Contractor shall employ all methods to minimize adverse impact to these existing trees, shrubs, and plant materials, including their limbs and roots. The Contractor shall notify the Owner of any construction work within the dripline of trees at least

1 working day before the scheduled activity. These methods may include but not be limited to the following:

1. Temporary high-visibility construction fencing
2. Temporary tie-up of low limbs
3. Application of a 4- to 6-inch-thick layer of mulch (or woodchips salvaged from clearing and grubbing operations) within the dripline of trees, shrubs, and plant materials
4. Timber or steel planking for protection of surface roots from equipment
5. Tree root pruning or other tree root treatment as directed by the Owner and/or Urban Forester

B. No storage of equipment or materials shall be allowed within the dripline of trees, shrubs, and plant materials not designated for removal. Steel planking or timber planking made of 4 inch-thick material, with each plank covering a minimum of 8 square feet, shall be used to support backhoe and other equipment stabilizers when set within the dripline of a tree or sodded planting strip.

C. Where sidewalk, curb, and pavement removal and placement operations that impact tree roots 2 inches or greater in diameter occur, the Owner will determine how these tree roots are to be handled.

3.02 ABOVE-GRADE WORK

A. Tree removal or tree trimming within 10 feet of any overhead utility line requires the contractor to notify the owner.

B. When the contractor anticipates construction operations that will unavoidably affect tree limbs, the contractor shall notify the owner at least 5 working days in advance of commencing such operations.

1. Before trimming any trees, the Contractor shall notify the Owner of the proposed method and amount of trimming required.
2. Trimming shall be done by a professional tree service company, the past and current performance of which is in accordance with National Arborist Association tree-pruning standards.

END OF SECTION

SECTION 352026

CAPPING AND MATERIAL PLACEMENT

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

A. The work consists of furnishing all transportation, labor, materials, equipment, and incidentals necessary to construct material placement, engineered caps, and shoreline armor within site areas, as shown on the Drawings.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM D6913 –Standard Test Methods for Particle-Size Distribution of Soils Using Sieve Analysis

2. ASTM D7928 Standard Test Methods for Particle-Size Distribution of Fine-Grained Soils

3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

B. U.S. Environmental Protection Agency Publication SW846 – Test Methods for Evaluating Solid Waste, Physical/Chemical Methods

1. SW846 Method 6010D/6020B/7471B Series for Priority Pollutant Metals

2. SW846 Method 8081B – Organochlorine Pesticides by Gas Chromatography (GC)

3. SW846 Method 8082A – Polychlorinated Biphenyls (PCBs) by GC

4. SW846 Method 8260D – Volatile Organic Compounds (VOCs) by Gas Chromatography/Mass Spectrometry (GC/MS)

5. SW846 Method 8270E – Semivolatile Organic Compounds by GC/MS

C. U.S. Environmental Protection Agency Publication Method 1613- Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS

1. Method 1613B – Dioxins/Furans

D. Puget Sound Estuarine Protocols (PSEP) – Recommended Protocols for Measuring Conventional Sediment Variables in Puget Sound.

1. PSEP Protocol – Total Organic Carbon (TOC)

2. SM Method 5310B – TOC by High-Temperature Combustion

1.03 DEFINITIONS

A. Placement Limits: The horizontal limits by which placement will be completed as shown on the Drawings. There shall be no placement outside of the Placement Limits

B. Allowable Tolerance: An additional increment above or below the Minimum Required Thickness to account for material placement tolerances.

C. Minimum Required Thickness: The Minimum Required Thickness is the thickness that the contractor shall place material within the Placement Limits as described in the Contract Documents.

D. Cap Type: Specified areas require placement of engineered cap materials. The engineered capping design is separated into several cap types, as described below and as shown on the Drawings. Each cap type has a different makeup for material types:

1. Intertidal Cap: This cap type consists of two layers – Rounded Habitat Substrate over Salvaged and Imported Angular Cap Substrate – and is designated for placement in the nearshore intertidal areas of the site as shown on the Drawings. These cap materials are described in Part 2 of this section.

    a. Minimum Required Thickness for Rounded Habitat Substrate is 12 inches.

    b. Minimum Required Thickness for Salvaged and Imported Angular Cap Substrate is 12 inches.

    c. The cap is to be overlain by a minimum of 12-inches of Sand/Gravel Habitat Substrate.

2. Beach Backshore Cap: This cap type consists of two layers – Rounded Beach Substrate over Salvaged and Imported Angular Cap Substrate – and is designated for placement in the nearshore areas of the site as shown on the Drawings. These cap materials are described in Part 2 of this section.

    a. Minimum Required Thickness for Salvaged and Imported Angular Cap Substrate is 12 inches.

    b. Minimum Required Thickness for Rounded Beach Substrate is 12 inches.

    c. The cap is to be overlain by a minimum of 12 inches of Clean Sand.

3. Riparian Area Cap: This cap type consists of Clean Sand and is designated for placement in the riparian areas of the site as shown on the Drawings. These materials are described in Part 2 of this section.

    a. Minimum Required Thickness for Clean Sand is 24 inches.

    b. The surface of the cap is to be prepared for planting with Compost and Mulch in accordance with Section 329300 – Planting.

4. Upland Cap: This cap type consists of two layers – Topsoil over Clean Imported Sand – and is designated for placement in areas shown on the Drawings. These cap materials are described in Part 2 of this section.

a. Minimum Required Thickness for Clean Sand is 18 inches.

b. Minimum Required Thickness for Topsoil 6 inches.

c. The cap will receive hydroseeded following placement in accordance with Section 329300 – Planting.

1.04 SUBMITTALS

A. Submit an Material Placement Plan as part of the Construction Work Plan in accordance with Section 013300 – Submittal Procedures.

B. Submit a Borrow Source Characterization Report in accordance with the requirements of this Specification and Section 013300 – Submittal Procedures.

C. Prepare and submit daily and weekly Construction Submittals in accordance with Section 013300 – Submittal Procedures, and Section 013200 – Construction Progress Documentation.

1.05 JOB CONDITIONS

A. The Contractor shall calculate its own estimate of the quantity of material to be used for the capping, backfill, and material placement activities based on the Contractor's own calculation methods, the excavation and material placement design as shown on the Drawings, and Contractor's means and methods for placement operations in order to account for Contractor's equipment tolerances. Contractor shall account for its own estimated quantities in the Contractor's bid.

PART 2 – PRODUCTS

2.01 GENERAL

A. The Contractor shall provide all required materials for the project.

B. Imported material shall have chemical concentrations that meet the criteria presented in Table 352026-1, presented at the end of this section. Salvaged and Imported Angular Cap Substrate material does not need to be tested for chemical criteria.

C. Complete sampling, testing, and reporting to meet imported fill material requirements prior to importing any material.

D. The Contractor may elect to propose an alternate material source that meets the requirements described in this section.

2.02 MATERIALS SOURCES CHARACTERIZATION

A. The following activities shall be performed by the Contractor, as specified below, to ensure that imported materials are natural, native, virgin materials and free of contaminants, including debris or recycled materials, and meet construction Specifications:

1. Characterization of any Contractor-proposed sources of imported material shall be performed by the Contractor prior to any on-site placement. The characterization will include analysis of a borrow source sample, site inspection, and site characterization.

The Contractor shall submit a Borrow Source Characterization Report summarizing all the information required within this section.

2. Material Sources: Submit a list of the sources for all materials to be placed. Coordinate with the Engineer for pre-construction inspection of the material supplier sources.

3. The borrow source shall be inspected by the Contractor. During such inspection, the Contractor shall ensure that the materials to be delivered to the site meet the appropriate Specifications. The Contractor shall provide notification to the Engineer within 14 calendar days of such inspections. At the Engineer's discretion, the Engineer or another Owner's Representative may accompany the Contractor to witness such inspections. This witnessing shall in no way release the Contractor from complying with the Specifications and shall in no way be construed as approval of any particular source of material.

4. The Contractor shall provide the Engineer with a 5-gallon sample from each borrow source. Note samples of Salvaged Angular Cap Substrate are not required. Each sample should be composed from no less than five sub-samples taken throughout any one source. The Contractor shall ensure that the samples are representative of all materials to be imported. Samples shall be provided to the Engineer at least 1 month prior to the start of material placement activities.

5. Testing: The Contractor (or its material supplier) shall conduct physical and chemical testing to confirm that the materials meet the Specification requirements for use at the site. Materials must meet the gradation Specifications provided in this section and the chemical quality as shown on Table 352026-1, attached at the end of this Specification.

    a. The Contractor shall note that stringent, site-specific chemical acceptance criteria for dioxin/furans and carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs) have been established for this work. It shall be the responsibility of the Contractor to ensure that the proposed material suppliers can provide materials that meet the requirements of these Specifications.

    b. The Owner reserves the right to request additional samples of materials in order to conduct its own testing for quality assurance purposes.

6. Testing Laboratory: Submit certificates for laboratories (certified by the Washington State Department of Ecology in Washington State) providing required testing to validate that the laboratory conforms to relevant paragraphs of ASTM D3740.

7. The Contractor shall test samples of all materials for chemical quality to be imported (except Angular Cap Substrate and Driftwood Key source material) for the following. Reporting limits and applicable maximum results are provided in Table 35 25 20-1:

    a. In situ moisture content (ASTM method D2216).

    b. Percent Solids by Standard Method (SM) 2540G.

    c. Priority Pollutant Metals per U.S. Environmental Protection Agency SW846, the 6010/6020A/7471A method series.

    d. VOCs per U.S. Environmental Protection Agency SW846, method 8260.

e. Semivolatile Organic Compounds per U.S. Environmental Protection Agency SW846, method 8270D.

f. PCBs per U.S. Environmental Protection Agency SW846, method 8082A.

g. Pesticides per U.S. Environmental Protection Agency SW846, method 8081A.

h. TOC per PSEP.

i. PAHs using Method 8270-SIM in Selected Ion Monitoring mode.

j. Dioxin/Furan per U.S. Environmental Protection Agency Method 1613B.

8. The Contractor shall test samples of all materials to be imported for grain size distribution (ASTM D7928).

9. The Contractor shall perform modified proctor testing (ASTM D1557) on all materials to be placed in Work Zone 1, Work Zone 2, and the Upland Placement Area and Riparian Area of Work Zone 3.

10. The Contractor shall provide the results of such tests at least 14 calendar days before delivery of the materials to the site. The results shall be provided in report form, with the reports clearly identifying the following:

a. Source of samples.

b. Sampling dates.

c. Chain of custody.

d. Sampling locations.

e. Material Certification: Submit certification from material supplier that the materials meet Specification requirements for gradation and chemical testing.

2.03 UPLAND BACKFILL

A. Material shall be clean, free-draining, granular material obtained from natural deposits. Individual particles shall be free from all objectionable coatings. The material shall contain no organic matter.

B. Backfill material will consist of excavated soils that meet Cleanup Levels and clean imported materials that meet the chemical and gradation requirements specified herein Imported material shall be graded between the limits specified below:

Sieve Size	Percent Passing (by weight)
1 inch	100%
U.S. No. 4	50% to 80%
U.S. No. 40	0% to 30%
U.S. No. 200	0% to 7%

2.04 SALVAGED AND IMPORTED ANGULAR CAP SUBSTRATE

A. Material shall be clean, free-draining, granular material obtained from natural deposits. Individual particles shall be free from all objectionable coatings. The material shall contain no organic matter, nor soft friable particles in quantities considered objectionable by the Engineer.

1. Salvaged Angular Cap Substrate materials shall be salvaged during excavation of the shoreline in Work Zone 3. Angular material that shall be stockpiled and retained on site for intertidal cap placement.

B. Imported Angular Cap Substrate material shall be graded between the limits specified below:

Sieve Size	Percent Passing (by weight)
12 inches	70% to 100%
9 inches	50% to 70%
6 inches	35% to 50%
2 inches	2% to 10%

2.05 ROUNDED BEACH SUBSTRATE

A. Material shall be clean, free-draining, granular material obtained from natural deposits. Individual particles shall be free from all objectionable coatings. The material shall contain no organic matter, nor soft friable particles in quantities considered objectionable by the Engineer.

B. Rounded Beach Substrate material shall be graded between the limits specified below:

Sieve Size	Percent Passing (by weight)
8 inches	99 % to 100%
6 inches	70% to 90%
3 inches	30% to 60%
3/4 inch	10% maximum

2.06 SAND/GRAVEL HABITAT SUBSTRATE

A. Material shall be clean, free-draining, granular material obtained from natural deposits. Individual particles shall be free from all objectionable coatings. The material shall contain no organic matter.

B. Sand/Gravel Habitat Substrate shall be graded between the limits specified below:

Sieve Size	Percent Passing (by weight)
2.5 inch	99% to 100%
2 inch	65% to 95%
1 inch	50% to 85%
3/8 inch	50% to 60%
U.S. No. 4	30% to 45%

Sieve Size	Percent Passing (by weight)
2.5 inch	99% to 100%
U.S. No. 40	15-20% maximum
U.S. No. 200	5% to 9%

2.07 CLEAN SAND

A. Material shall be clean, free-draining, granular material obtained from natural deposits. Individual particles shall be free from all objectionable coatings. The material shall contain no organic matter.

B. Clean Sand shall be graded between the limits specified below:

Sieve Size	Percent Passing (by weight)
U.S. No. 4	99% to 100%
U.S. No. 8	90% to 100%
U.S. No. 16	56% to 90%
U.S. No. 30	35% to 70%
U.S. No. 50	10% to 30%
U.S. No. 100	0% to 5%
U.S. No. 200	0% to 3%

2.08 GEOTEXTILE

A. The geotextile material shall by a non-woven product conform to the requirements of Section 9-33.1 and Table 1, “Moderate Survivability” of Section 9-33.2 of the WSDOT Standard Specifications (most recent edition).

2.09 2.04 JUTE MATTING

A. Jute matting shall be of a uniform, open, plain weave of unbleached, single jute yarn. The yarn shall be of a loosely twisted construction and shall not vary in thickness by more than half of its normal diameter. Jute matting shall be furnished in rolled strips approximately 50 yards in length. Matting width shall be 48 inches with an average weight of 0.92 pounds per square yard. A tolerance of plus or minus 1 inch in width and 5 percent in weight will be allowed.

2.10 WOOD STAKES FOR JUTE MATTING

A. Stakes shall be 2-inch by 2-inch Douglas fir with one tapered end, 2 feet in length. No split or badly splintered stakes will be accepted.

PART 3 – EXECUTION

3.01 GENERAL

A. Furnish and place materials as shown on the Drawings and described in these Specifications. Any material that is deposited other than in the area indicated on the Drawings, or as approved by the Engineer, will not be included in the measurement for

payment, and the Contractor may be required to remove such misplaced material and deposit it where directed at its own expense.

B. The Contractor shall submit a construction sequencing approach as part of the Contractor Construction Quality Assurance Plan. Key sequencing considerations include:

1. Preventing cross-contamination between excavated materials to be disposed, excavated materials to be salvaged, and imported materials.

2. Proposed stockpile locations for excavated material, timing for excavation, post excavation characterization, and on- and off-site transportation and the relationship of this work to imported material transportation, stockpiling and placement.

3. Working in the dry to the extent practicable, including consideration of tide elevations and times of day when tides are low.

4. Controlling turbidity, avoiding damaging remediation work, and optimizing efficiency for work.

C. Construct caps on slopes starting from the toe of the slope and working up the slope towards the top of slope to the extent practicable.

D. Place material up to the upland slope on the Southern Mill Site as shown on the drawings.

E. Intertidal material placement will be performed in the dry during the same tidal cycle as the area that was excavated.

F. The Contractor shall monitor the materials placement work throughout the course of work for depth, slopes, location, and tolerances, and shall be responsible for damages due to overplacement or material placement outside the specified limits.

G. Place material in a manner to minimize disturbance and mixing of cap material subgrade.

H. The Contractor will not be allowed to drag equipment over capped areas to even out high spots.

I. Once materials have been placed, the Contractor will complete surveys detailed in Section 017123 – Surveying to confirm that required elevations and grades have been met. If low or thin spots are identified, the Contractor shall place additional material to the satisfaction of the Engineer to achieve the required grade or thickness.

3.02 EQUIPMENT

A. Equipment to be used for cap material placement shall place the materials in a manner that does not disturb the subgrade or previous lifts of capping material.

3.03 QUALITY CONTROL

A. The Contractor shall establish procedures for monitoring the rate of placement of the capping materials including use of a positioning system as described in Section 017123 – Surveying.

The methods should be capable of determining the area of cap material coverage on a daily basis.

B. The Contractor shall supply the Engineer with information pertaining to the previous day's material placement activities on a daily basis in the Daily Construction Report in accordance with Section 013300 – Submittal Procedures.

3.04 STOCKPILING AND INSPECTION OF MATERIALS AT THE SITE

A. Truck loads of imported materials shall be visually inspected by the Contractor upon delivery for the presence of foreign, recycled, or reprocessed material. The Engineer may, at any and all times, perform an independent inspection. Materials may be rejected if identified as substandard or if test results show it to be substandard.

B. The Owner reserves the right to reject any materials that have been determined to be substandard for any reason. In the event of rejections, it shall be the responsibility of the Contractor to remove all stockpiles of rejected material from the site.

C. To the extent practical, stockpile clean import materials in proximity to the Work Zones they will be placed. Clean materials may not be stockpiled over contaminated soils or in an area where they may be contaminated.

D. Protect clean import backfill materials with clean plastic sheeting until they are needed.

3.05 SURVEYS AND PLACEMENT CONFIRMATION

A. Material Placement Acceptance Surveys: The Contractor shall conduct a survey verifying the thickness and/or elevation of each layer of material placement in accordance with Section 017123 – Surveying.

B. The Contractor must collect as-built surveys of the pre- and post- placement of each layer for subsequent review and approval by the Engineer in accordance with Section 017123 – Surveying. The Contractor must layout the work with grade stakes to allow for inspection and confirmation by the Engineer during construction and provide the Engineer with the tracked placement quantities by area to confirm and document cap layer thicknesses based on volumetric calculation.

C. The Owner may collect cores through the cap material layers. Cores may be used to measure material layer thickness.

3.06 CONDUCT OF MATERIAL PLACEMENT

A. Layout of Work:

1. Establish an accurate method of horizontal and vertical control, as described in Section 017123 – Surveying before material placement activities begin.

B. Backfill and Upland Cap Placement

1. Perform Acceptance Survey to verify that required grades have been achieved. Material placement shall not begin until verification of confirmation sampling has been received and approval by the Owner has been obtained.

2. Place High Visibility Geotextile Marker Layer on verified excavation surface.

3. Backfill excavations to the limits and grades show on the Drawings.

4. Compact backfill to a minimum of 90% density as determined by the Modified Proctor test.

    a. Work Zone 1:

        1) Backfill excavation with Clean Sand to restore existing ground surface grade.

    b. Work Zone 2:

        1) Backfill excavation with material that meets Cleanup Levels and Clean Sand to existing ground surface grade

        2) Place High Visibility Marker Geotextile layer.

        3) Place a Minimum Required Thickness 18 inches of Clean Sand followed by a Minimum Required Thickness of 6 inches of topsoil.

        4) Hydroseed in accordance with Section 329000 – Hydroseeding following acceptance that the Required Minimum Thickness for all cap layers has been achieved.

C. Intertidal Cap Placement

1. Place Intertidal Caps in the dry and during the same tidal cycle as the area was excavated. Following acceptance of the excavation of intertidal areas, begin placing intertidal cap material.

2. Verify the Required Minimum Thickness of each layer prior to placement of subsequent cap layers.

D. Beach Backshore Cap Placement

1. Sequence beach backshore material placement with intertidal material placement to avoid tracking excavation equipment over previously capped areas.

2. Verify the Required Minimum Thickness of each layer prior to placement of subsequent cap layers.

3. Following acceptance that the minimum Required Thickness of Beach Backshore Cap material has been achieved plant the Beach Backshore to the limits and density shown on the Drawings.

E. Riparian Area Cap Placement

1. Place High Visibility Geotextile Marker layer prior to placing cap materials.

2. Place 24 inch Clean Sand Cap atop the High Visibility Geotextile Marker Layer.

3. Compact backfill to a minimum of 90% density as determined by the Modified Proctor test.

4. Verify the Required Minimum Thickness of cap prior to preparing for planting.

5. Rototill 4 inches of Compost into the upper 12 inches of Clean Sand and cover with 3 inches of mulch.

F. Upland Placement Area

1. Ensure the subgrade beneath the Upland Placement Area has been perforated prior to accepting material.

2. Clear, grub, and scarify areas of the slope along the upland bluff as necessary prior to placement of material along the slope.

3. Place a high visibility geotextile marker layer atop the existing surface.

4. Place materials that meet Cleanup Levels over the geotextile marker layer to a minimum thickness of 24 inches.

5. Compact backfill and placement material to a minimum of 90% density as determined by the Modified Proctor test.

6. Following placement of material that meets Cleanup Standards, place 6 inches of Topsoil and Hydroseed in accordance with Section 329000 – Hydroseeding.

G. Model Airplane Field (Work Zone 5)

1. Prior to placement of material at the MAF, prepare the disposal area in accordance with Section 311000 – Site Clearing and Section 312313 – Subgrade Preparation.

2. Place materials that meet criteria for disposal at the MAF. Compact materials to a minimum of 90% density as determined by the Modified Proctor test.

3. Following placement of material at the MAF, place a highly visible geotextile marker layer over the Upland Containment Site at the MAF covering the entire placement area. The geotextile shall be protected from tears and punctures during construction activities, including geotextile placement, geotextile anchoring, and final grading of cover material. Both factory and field seams shall conform to the strength requirements for the geotextile specified.

   a. The Contractor shall prepare the installation site by clearing and grading the area and remove sharp objects, cobbles, shrubs, and debris that may tear the geotextile.

   b. The Contractor shall unroll the geotextile smoothly over the prepared subgrade. The Contractor shall not drag the fabric across the subgrade. The Contractor shall remove wrinkles and folds in the fabric by stretching and anchoring as required.

   c. The geotextile shall not be left exposed to the sunlight during installation for a total of more than 14 calendar days.

d. The geotextile shall either be overlapped a minimum of 12 inches at all longitudinal and transverse joints, or the geotextile joints shall be sewn.

e. Soil piles or the manufacturer's recommended method, shall be used as needed to hold the geotextile in place until topsoil cover material is placed.

f. If the geotextile seams are to be sewn, the seam, stitch type, and the equipment used to do the stitching shall be as recommended by the manufacturer of the geotextile and accepted by the Engineer.

g. Damage Repair: If Contractor tears or puncture the geotextile or disturbs the overlaps or sewn joint, the Contractor shall remove the topsoil material around the damaged or displaced area and repair the damage area at no cost to the Owner. Place geotextile patch over damaged area and extend 3 ft beyond the perimeter of the tear or damage. The Contractor shall replace the damaged sheets by sewing and replace the topsoil.

4. Place 1.5 feet of clean imported sand material over the Upland Containment Site at the MAF. Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades. Finish surfaces free from irregular surface changes.

5. Immediately following the establishment of the finished grade, install jute matting on the slopes of the MAF as shown on the Drawings.

   a. Jute matting shall be unrolled parallel to the flow of water. Where more than one strip of jute matting is required to cover the given area, it shall overlap the adjacent mat by a minimum of 4 inches. The upslope end of each strip of jute matting shall be staked and buried in a 6-inch-deep trench with the soil firmly tamped against the mat. Three stakes per width of matting (one stake at each overlap) shall be driven below the finish ground line prior to backfilling of the trench. The Owner may require that any other edge exposed to more than normal flow of water or strong prevailing winds be staked and buried in a similar manner.

   b. Jute matting and erosion control blanket must be spread evenly and smoothly, and be in contact with the soil at all points.

   c. Jute matting shall be held in place by approved wooden stakes driven vertically into the soil. The matting and blanket shall be fastened at intervals not more than 3 feet apart in three rows for each strip of the matting and blanket, with one row along each edge and one row alternately spaced in the middle. All ends of the matting and blanket and check slots shall be fastened at 24-inch intervals across their width. The length of fastening devices shall be sufficient to securely anchor the matting and blanket against the soil, and the fastening devices shall be driven flush with the finished grade.

6. Hydroseed the surface of the MAF in accordance with Section 322900 – Hydroseeding.

3.07 TRANSPORTING MATERIAL FOR PLACEMENT

A. Haul trucks shall be in good condition with no leaks.

3.08 WATER QUALITY MONITORING

A. In the unlikely event that intertidal excavation and capping needs to be performed “in-water” (during high tide periods when the work zone is submerged). The Contractor is responsible for meeting water quality criteria as defined in Appendix H – Water Quality Monitoring Plan in accordance with Section 015719 – Temporary Environmental Controls and applicable local, state, and federal standards.

Table 352026-1. Capping Material Sediment Quality Standards

Chemical	Container	Preservation	Maximum Holding Time (Days)	Required Reporting Limits	Maximum Level
Conventional Sediment Parameters					
Grain Size (%)	16 oz. glass	Cool, 4°C	180	1%	N/AP
Total Solids (%)	4 oz. glass	Cool, 4°C	14; 6 months stored frozen	0.1% (wet weight)	N/AP
Total Organic Carbon (%)	From total solids container	Cool, 4°C	14; 6 months stored frozen	1%	N/AP
Metals (mg/kg dw)	From total solids container	Cool, 4°C	180; 2 years stored frozen; 28 for Hg		
Arsenic				0.2	57
Cadmium				0.2	3
Chromium				0.5	260
Copper				0.5	390
Lead				1.0	450
Mercury				0.05	0.41
Silver				0.2	6.1
Zinc				4.0	410
PCBs (µ/kg dw)	4 oz. glass	Cool, 4°C	None		
Total PCBs				10	130
LPAH (µg/kg)	16 oz. glass	Cool, 4°C	14 days until extraction, 1 year stored frozen; 40 days until analysis		
Naphthalene				20	2100
Acenaphthylene				20	1300
Acenaphthene				20	500
Fluorene				20	540
Phenanthrene				20	1500
Anthracene				20	960
2-Methylnaphthalene				20	670
cPAH				5	16
Total LPAH					5200
HPAH (µg/kg)	Same container as LPAH	Cool, 4°C	14 days until extraction, 1 year stored frozen; 40 days until analysis		
Fluoranthene				20	1700
Pyrene				20	2600
Benzo(a)anthracene				20	1300
Chrysene				20	1400
Benzo(a)pyrene				20	1600
Indeno(1,2,3-Cd)Pyrene				20	600
Dibenzo(a,h)anthracene				20	230
Benzo(g,h,i)perylene				20	670
Total Benzofluoranthenes				20	3200
Total HPAH					12000

Chemical	Container	Preservation	Maximum Holding Time (Days)	Required Reporting Limits	Maximum Level
Chlorinated Hydrocarbons (µg/kg)	Same container as LPAH	Cool, 4°C	14 days until extraction, 1 year stored frozen; 40 days until analysis		
1,4-Dichlorobenzene				20	110
1,2-Dichlorobenzene				20	35
1,2,4-Trichlorobenzene				20	31
Hexachlorobenzene				20	22
Phthalates (µg/kg)	Same container as LPAH	Cool, 4°C	14 days until extraction, 1 year stored frozen; 40 days until analysis		
Dimethylphthalate					71
Diethylphthalate					200
Di-N-Butylphthalate					1400
Butylbenzylphthalate					63
Bis(2-Ethylhexyl)Phthalate					1300
Di-n-Octylphthalate					6200
Phenols (µg/kg)	Same container as LPAH	Cool, 4C	14 days until extraction, 1 year stored frozen; 40 days until analysis		
Phenol				20	420
2-Methylphenol				20	63
4-Methylphenol				20	670
2,4-Dimethylphenol				20	29
Pentachlorophenol				100	360
Misc Extractables (µg/kg)	Same container as LPAH	Cool, 4°C	14 days until extraction, 1 year stored frozen; 40 days until analysis		
Benzyl Alcohol				20	57
Benzoic Acid				200	650
Dibenzofuran				20	540
Hexachlorobutadiene				5	11
n-Nitroso-di-phenylamine				10	28
Dioxins and Furans (ng/kg)	4 oz. glass	Cool, 4°C	None	5	5 ng/kg TEQ (WHO 2005)

Notes:
N/AP = not applicable
mg/kg dw = milligrams/kilogram dry weight
µg/kg dw = micrograms/kilogram dry weight
ng/kg dw = nanograms/kilogram dry weight
cPAH = carcinogenic polycyclic aromatic hydrocarbons. cPAH calculated in accordance with WAC-173-340-708(e)
LPAH = low molecular weight polycyclic aromatic hydrocarbons
HPAH = high molecular weight polycyclic aromatic hydrocarbons
TEQ = toxicity equivalency factor
WHO 2005 = World Health Organization 2005 Human and Mammalian TEF from van den Berg, et al (2006)

END OF SECTION

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Appendix A
Permits

Kitsap County Department of Community Development

Notice of Administrative Decision

Date: 09/27/2023

To: Ptacek, Jacquie, jptacek@anchorqea.com
OPG PORT GAMBLE LLC, bob.hunter@raydient.com
Interested Parties and Parties of Record

RE: Permit Number: 22-04842
Project Name: Port Gamble Bay Habitat Restoration - Shoreline Project Substantial Development
Type of Application: SSDP

The Kitsap County Department of Community Development has **APPROVED** the land use application for **22-04842 : Port Gamble Bay Habitat Restoration - Shoreline Project Substantial Development, SSDP subject to the conditions outlined in this Notice and included Staff Report**.

THE DECISION OF THE DEPARTMENT IS FINAL, UNLESS TIMELY APPEALED TO THE KITSAP COUNTY HEARING EXAMINER ON OR BEFORE 14 DAYS FROM THE DATE OF DECISION PER KITSAP COUNTY CODE 21.04.290.

The written appeal shall be made on, or attached to, an appeal form titled: *'Appeal/Objection of an Administrative Decision'* found on DCD's website, through the Online Permit Application Portal: https://app.oncamino.com/kitsapcounty/login.

Please note affected property owners may request a change in valuation for property tax purposes, notwithstanding any program of revaluation. Please contact the Assessor's Office at 360-337-5777 to determine if a change in valuation is applicable due to the issued Decision.

The complete case file is available for review by contacting the Department of Community Development; if you wish to view the case file or have other questions, please contact help@kitsap1.com or (360) 337-5777.

CC: Kitsap County Health District, MS-30
Kitsap County Public Works Dept., MS-26
DCD Staff Planner: Kathlene Barnhart, kbarnhar@kitsap.gov
Interested Parties: None
Parks
Navy
DSE
Kitsap Transit
North Kitsap Fire District
North Kitsap School District

Puget Sound Energy
Point No Point Treaty Council
Suquamish Tribe
Port Gamble S'Klallam Tribe
Squaxin Island Tribe
Puyallup Tribe
WA Dept of Fish & Wildlife-SEPA
WA Dept of Health-SEPA
WA Dept of Natural Resources-SEPA
WA Dept of Transportation/Aviation
WA State Dept of Ecology-SEPA
WA State Dept of Ecology-Wetland Review
WA State Dept of Ecology- Shoreline Review
WA State Dept of Transportation- SEPA

Kitsap County Department of Community Development

Administrative
Staff Report

Report Date: 09/21/2023 **Application Submittal Date:** 09/30/2022
Application Complete Date: 02/13/2023

Project Name: Port Gamble Bay Habitat Restoration Project
Type of Application: Shoreline Substantial Development Permit
Permit Number: 22-04842

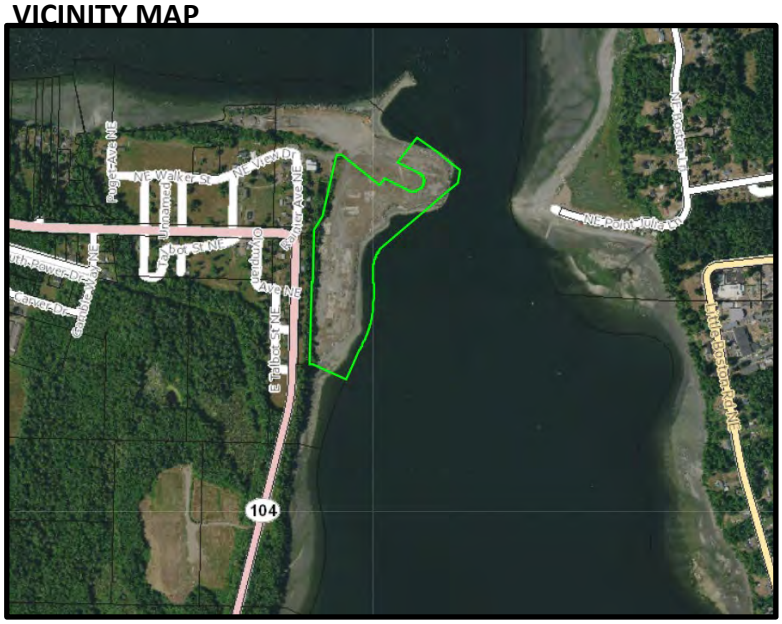
Project Location
5205 NE View Drive
Poulsbo, WA 98370
Commissioner District #1 (North)

Assessor's Account #
052702-3-004-2008

Applicant/Owner of Record
OPG Port Gamble, LLC
19950 7th Ave. NE STE 200
Poulsbo, WA 98370

Decision Summary
Approved subject to conditions listed under section 13 of this report.

VICINITY MAP



1. **Background**
   The project is being performed as part of a natural resource damage settlement agreement between OPG Port Gamble LLC; Pope Resources, a Delaware Limited Partnership; and OPG Properties LLC (collectively, the Companies) and the Port Gamble S'Klallam Tribe, the Suquamish Tribe, the Skokomish Indian Tribe, the Jamestown S'Klallam Tribe, the Lower Elwha Klallam Tribe, the U.S. Department of the Interior, and the Washington State Department of Ecology (Ecology; collectively, the Natural Resource Trustees). This Project is the outcome of a cooperative effort between the Companies and the Natural Resource Trustees.

2. **Project Request**
   The project proposal includes shoreline restoration along a portion of the Port Gamble Bay and former upland sawmill area (Mill Site), located in Port Gamble, Washington. The project will take place at the Mill Site, owned by Pope Resources, LP/OPG Properties LLC. Restoration activities include three parts: South Mill Site Shoreline Restoration, Western

Bay Nearshore Thin-Layer Sand Cover, and Western Bay Nearshore Eelgrass Transplanting. Overall, the project will restore shoreline processes and enhance habitat for benthos, forage fish, shellfish, and juvenile salmonids in Port Gamble Bay. Following completion of construction, the southern mill site shoreline restoration area will be protected under a natural resource damage conservation easement. To maximize restoration potential, most of the southern mill site shoreline restoration area will not be open to the public.

- **Southern Mill Site Shoreline Restoration.** This 9-acre portion of the project includes laying back intertidal slopes of the southern portion of the former sawmill facility shoreline to restore near-natural beach grades and placing intertidal cap and habitat layers, including a lower 1-foot-thick layer of angular cobble-sized armor, a middle 1-foot-thick layer of rounded cobble/gravel beach substrate, and an upper 1-foot-thick layer of sand/gravel habitat substrate. A habitat feeder berm will also be placed in the beach backshore. Near-surface hardscape will be removed within a 150-foot shoreline buffer, then soil treatments and native plantings will take place.
- **Western Bay Nearshore Thin Layer Sand Cover.** This portion of the project includes placing a sand cover layer over a minimum of 11 acres of lower intertidal to shallow subtidal zones within former log rafting areas in the western Port Gamble Bay to restore benthic habitat functions and concurrently provide suitable substrate in areas where eelgrass is absent or growing at very sparse densities.
- **Western Bay Nearshore Eelgrass Transplanting.** Eelgrass will be transplanted into western Port Gamble Bay areas where there is currently little or no eelgrass, including on and adjacent to the thin layer sand cover.

3. SEPA (State Environmental Policy Act)

The State Environmental Policy Act (SEPA), found in Chapter 43.21C RCW (Revised Code of Washington), is a state law that requires the County to conduct an environmental impact review of any action that might have a significant, adverse impact on the environment. The review includes the completion of an Environmental Checklist by the applicant and a review of that checklist by the County. If it is determined that there will be environmental impacts, conditions are imposed upon the applicant to mitigate those impacts below the threshold of "major" environmental impacts. If the impacts cannot be mitigated, an environmental impact statement (EIS) must be prepared. The decision following environmental review, which may result in a Determination of Nonsignificance (DNS), Mitigated DNS, or the necessity for an EIS is called a threshold determination. A separate notice of the threshold determination is given by the County. If it is not appealed, it becomes part of the hearing record as it was issued, since it cannot be changed by the Hearing Examiner.

Pursuant to WAC 197-11-355, the optional DNS process was utilized for this project The SEPA Comment period previously occurred concurrent with the Notice of Application dated 02/24/2023. A Determination of Nonsignificance (DNS) was issued on 08/28/2023. SEPA noted this project will be conditioned to meet the requirements of Kitsap County Code Title 12, Stormwater Drainage; Title 17 Zoning, Title 19 Critical Areas Ordinance, and Title 22 Shoreline Master Program.

The SEPA appeal period expired 09/11/2023. No appeals were filed; therefore, the SEPA determination is final.

4. Physical Characteristics

Upland areas were developed through historical fill activities on an existing tideflat adjacent to the Bay. The surficial fill typically consists of sand and gravel, with locally variable fines content, scattered debris, and woody organics. Portions of the uplands are paved with asphalt or concrete. Underlying the upland fill is a native sand layer of variable thickness. Transition slopes on the shoreline between the uplands and Port Gamble Bay are approximately 30% and are protected from erosion by rock riprap. Bluff slopes adjacent to the former sawmill site are approximately 30% to 50%. Work will also occur within Port Gamble Bay of Hood Canal.
The former sawmill site portion of the project site contains little to no vegetation, but the bluff adjacent to the mill site has deciduous and evergreen trees, as well as native and non-native shrubs. The western shoreline thin layer placement and eelgrass planting areas are adjacent to the Port Gamble Forest Heritage Park, which consists mainly of mature deciduous and evergreen trees.

Table 1 - Comprehensive Plan Designation and Zoning

Comprehensive Plan: LAMIRD Zone: Rural Historic Town Waterfront	Standard	Proposed
Minimum Density	NA	NA
Maximum Density	2.5 du/acre	
Minimum Lot Size	NA	NA
Maximum Lot Size	NA	NA
Minimum Lot Width	NA	NA
Minimum Lot Depth	NA	NA
Maximum Height	35 feet	NA
Maximum Impervious Surface Coverage	NA	NA
Maximum Lot Coverage	50%	NA

Staff Comment: Proposal is for ecological restoration. No structures are proposed for removal of addition. Impervious surfaces will be reduced.

Table 2 - Setback for Zoning District

	Standard	Proposed
Front	NA	NA
Side	Per Title 14	NA
Side	Per Title 14	NA
Rear	Per Title 14	NA

Staff Comment: Proposal is for ecological restoration. No structures are proposed for removal of addition. Setbacks do not apply.

Table 3 - Surrounding Land Use and Zoning

Surrounding Property	Land Use	Zoning
North	OPG: waterfront	Rural Historic Town Waterfront
South	OPG: vacant	Rural Historic Town Waterfront
East	Port Gamble Bay	Salt Water
West	OPG: commercial, residential	Rural Historic Town Residential; Rural Historic Town Commercial; Rural Historic Town Waterfront

Table 4 - Public Utilities and Services

	Provider
Water	Kitsap PUD #1
Power	Puget Sound Energy
Sewer	Kitsap County
Police	Kitsap County Sheriff
Fire	Kitsap County Fire District 18
School	North Kitsap School District #400

5. Access

From SR 104, access to the site is achieved by turning onto Rainier Ave NE, a County right-of-way. At the intersection with NE View Drive, a private access road to the right leads down to the industrial yard at the shoreline adjacent to the project site.

6. Site Design

Southern Mill Site Shoreline Restoration. Includes re-sloping/grading of beach and addition of a littoral drift feeder berm at the south end of the project. Restoration of nearshore riparian habitat includes removal of approximately 6,750 cy of surface hardscape over 122,000 square feet (2.79 acres) within the 150-foot wide riparian area, followed by placement of a minimum of 2 feet of clean sand. Soil treatments will include placing 4

inches of compost rototilled into the top 12 inches of clean sandy soil, overlaid with 3 inches of mulch. This includes a total of 22,000 cy of fill placed over an 223,000 square foot (5.3-acre) area. The 150-footwide riparian area will then be planted with a combination of native plants including deciduous or coniferous trees, shrubs, and beachgrass planted between mean higher high water and extreme high water in unamended sand/gravel soils.

Western Bay Thin Layer Placement and Eelgrass Restoration. An average of 6 inches of clean material (11,000 cy, including over-placement allowance) will be placed over a minimum of 11 acres of the western bay nearshore area (within the -2 to -15 feet MLLW elevation range). Approximately 1 year after completion of sand cover, eelgrass planting will begin. Eelgrass will be sourced from local donor beds at the same depths targeted for transplanting (-3 to -6 MLLW). Divers will plant shoots at a density of approximately 70 shoots per square meter.

7. Policies and Regulations Applicable to the Subject Proposal

The Growth Management Act of the State of Washington, RCW 36.70A, requires that the County adopt a Comprehensive Plan, and then implement that plan by adopting development regulations. The development regulations must be consistent with the Comprehensive Plan. The Comprehensive Plan process includes public involvement as required by law, so that those who are impacted by development regulations have an opportunity to help shape the Comprehensive Plan which is then used to prepare development regulations.

Kitsap County Comprehensive Plan, adopted June 30, 2016.

The following Comprehensive Plan goals and policies are most relevant to this application:

Environment Policy 5. Support projects that increase air quality, reduce carbon emissions, or reduce climate change impacts.

Environment Policy 13. Use the best scientific information available to direct how functions and values of critical areas are preserved or enhanced.

Environment Policy 24. Consider and identify the vital connection between protection of Kitsap County's rural character, environmental essential assets and environmental benefits and economic opportunities.

Policy SH-2. Recognize that nearly all shorelines, even substantially developed or degraded areas, retain important ecological functions.

Policy SH-22. Designate and maintain appropriate areas for protecting and restoring shoreline ecological functions and processes to control pollution and prevent damage to the shoreline environment and/or public health.

Policy SH-39. Encourage and facilitate restoration and enhancement projects for priority habitats and species (Washington Department of Fish and Wildlife, PHS Program).

Policy SH-40. Shoreline ecosystem protection and restoration projects shall be prioritized, located and designed utilizing the most current, accurate and complete scientific and technical information available to promote resiliency of habitats and species.

Policy SH-47. Recognize and protect the statewide interest over local interest.

Policy SH-48. Preserve the natural character of the shoreline.

a. Administer shoreline environments and regulations to minimize damage to the unique character and ecology of shorelines of statewide significance.

b. Where natural resources of statewide importance are being diminished over time by human activities, restoration of those resources should be facilitated.

c. In order to reduce adverse impacts to the environment while accommodating future growth, new intensive development activities should upgrade and redevelop those areas where intensive development already occurs, rather than allowing high-intensity uses to extend into low-intensity use or underdeveloped areas.

Policy SH-49. Result in the long-term over short-term benefit.

a. Preserve sufficient shorelands and submerged lands to accommodate current and projected demand for economic resources, such as shellfish beds and navigable harbors.

b. Actions that would convert resources into irreversible uses or detrimentally alter natural conditions that are characteristic of shorelines of statewide significance should be severely limited.

c. Evaluate the short-term economic gain or convenience of developments in relationship to long-term and potentially costly impairments to the natural environment.

d. Actively promote aesthetic considerations when contemplating new development, redevelopment of existing facilities, or for the general enhancement of shoreline areas.

The County's development regulations are contained within the Kitsap County Code. The following development regulations are most relevant to this application:

Code Reference	Subject
Title 12	Storm Water Drainage

Title 17	Zoning
Chapter 18.04	State Environmental Policy Act (SEPA)
Title 19	Critical Areas Ordinance (CAO)
Chapter 21.04	Land Use and Development Procedures
Title 22	Shoreline Master Program (SMP

8. Documents Consulted in the Analysis

Applicant Submittals	Dated or date stamped
SSDP Application	September 30, 2022
JARPA Supplemental Application	September 30, 2022
JARPA Plan Set	September 30, 2022
Environmental (SEPA) Checklist	September 30, 2022
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NOIC Response Memo	February 6, 2023
Additional Info Memo (Incl. Revised Geological Assessment)	August, 14, 2023

Staff Communication	Dated
Dev. Services & Engineering Memo	June 28, 2023

9. Public Outreach and Comments

Public comment began with the joint Notice of Application (NOA) and Notice of SEPA Comment Period, dated 2/24/2023. No project or SEPA comments were received and no SEPA appeals filed.

10. Analysis

a. Planning/Zoning

The proposal takes place within the Port Gamble LAMIRD, zoning Rural Historic Town Waterfront. The proposal is subject to KCC 17.700 Appendix F: *Allowed Uses and Additional Regulations for Parcels Located Within the Boundary of the Port Gamble Redevelopment Plan Approved Pursuant to Section 17.360C.030.* Under this appendix the Parks and Open Space use is permitted in the zone with no additional land use review. There are no development standards applicable to the use and the zone does not have applicable setbacks or landscape buffers. The use will not include public access and no parking is required.

b. Lighting

Not applicable to this proposal.

c. Off-Street Parking

Not applicable to this proposal.

d. Signage
Not applicable to this proposal.

e. Landscaping
Not applicable due to zoning; see Environmental Analysis for planting plan details.

f. Frontage Improvements
Not applicable to this proposal.

g. Design Districts/Requirements
Project is not located within a Design District.

h. Development Engineering/Stormwater
Applicant proposes habitat restoration along Port Gamble Bay with three main elements: Southern Mill Site shoreline restoration, Western Bay nearshore thin layer sand cover, and Western Bay nearshore eelgrass transplanting. The proposal does not include the addition of any impervious surfaces, therefore no permanent stormwater facilities are proposed to be installed.

Development Engineering has reviewed the proposal and finds the concept supportable in its approach to civil site development, with the conditions as provided for in Section 13 of the report.

i. Environmental
The proposal takes place in the Urban Conservancy, Natural and Aquatic Shoreline Environment Designations. There are not development standards in the Kitsap County Shoreline Master Program for "Restoration and Enhancement" development activities, however the Use and Activities Table in KCC 22.600 prescribes a Shoreline Substantial Development Permit. The activities do not qualify for any categorical exemptions for substantial development. This portion of the overall Port Gamble restoration effort are not part of the consent decree and are therefore are also not exempt from local shoreline permitting.

Absent an activity-specific set of standards, the project was reviewed using the General Goals and Policies of KCC 22.300 and General Regulations of KCC 22.400. The project was found to be consistent with the SMP Goals and Policies, Management Policies of each Environment Designation (KCC 22.200) including those for Shorelines of Statewide Significance. The nature of the proposal will improve critical saltwater habitats, enhance shoreline vegetated buffers, improve shoreline buffer area functions, and decrease impervious surfaces within the shoreline jurisdiction.

No FEMA Habitat Assessment was required since the project requires US Army Corps of Engineer Permitting and therefore will have undergone review by US Fish and Wildlife Service and other federal services.

Assessments provided demonstrated there are no wetlands or wetland buffers within the project area (there are more than 300-feet away and across SR 104). Geological Assessments have acknowledged the moderate seismic hazard at the immediate project area, but have concluded that the proposed shoreline re-grading and import material placement will have no adverse impact on erosion and liquefaction susceptibility. In general, reducing the shoreline slope angle and replacement of shoreline fill with coarse, angular fill should improve erosion, slope stability and liquefaction susceptibility along the shoreline.

The proposal is being conditioned to follow the recommendations of the geological assessment, current plans submitted, and compliance with Kitsap Public Health standards for disposal of hardscape and soils. A final planting plan shall be submitted with the associated Site Development Activity Permit.

j. Access, Traffic and Roads
No concerns; Not applicable to this proposal.

k. Fire Safety
No concerns; Not applicable to this proposal.

l. Solid Waste
Not applicable to this proposal. See environmental analysis regarding construction waste disposal for the project.

m. Water/Sewer
Not applicable to this proposal.

n. Kitsap Public Health District
Since the permit application materials were initially submitted on September 30, 2022, additional coordination has taken place with the Kitsap Public Health District that has resulted in slight changes to how materials are disposed of. Near-surface hardscape will be removed throughout the 150-foot shoreline buffer, followed by topsoil placement and native plantings. Hardscape material (asphalt or concrete) that is removed will be processed and disposed of at approved off-site landfills or recycling facilities, as appropriate, and will not be placed on site. Excavated soils will be stockpiled on site for profiling and disposed of as conditioned based on contamination levels. No excavated hardscape material or contaminated soils with concentrations greater than cleanup standards will be placed within the 200-foot shoreline jurisdiction.

11. Review Authority

The Director has review authority for this Shoreline Substantial Development Permit application under KCC, Sections 21.04.100 and 22.500.100. The Kitsap County Commissioners have determined that this application requires review and approval of the Director. The Director may approve, approve with conditions, or deny an Administrative Conditional Use Permit.

12. Findings

1. The proposal is consistent with the Comprehensive Plan.

2. The proposal complies or will comply with requirements of KCC Title 17 and complies with or will comply with all of the other applicable provisions of Kitsap County Code and all other applicable regulations, including all applicable development standards

   and design guidelines, through the imposed conditions outlined in this report.

3. The proposal is not materially detrimental to existing or future uses or property in the immediate vicinity.

4. The proposal is compatible with and incorporates specific features, conditions, or revisions that ensure it responds appropriately to the existing character, appearance, quality or development, and physical characteristics of the subject property and the immediate vicinity.

5. The applicant the applicant has demonstrated that the proposed development is consistent with the policies and procedures of the Act and this program, as well as criteria in WAC 173-27-150.

13. Decision

Based upon the analysis above and the decision criteria found in KCC 22.500.100, the Department of Community Development recommends that the Shoreline Substantial Development request for Port Gamble Bay Habitat Restoration Project be **approved**, subject to the following 10 conditions:

a. Planning/Zoning

None applicable at this time.

b. Development Engineering

1. The information provided demonstrates this proposal is a Large Project as defined in Kitsap County Code Title 12, and as such will require a Full Drainage Site Development Activity Permit (SDAP) from Development Engineering. (SDAP #22-04870 is being reviewed concurrently)

2. Erosion and sedimentation control shall be designed in accordance with Kitsap County Code Title 12 effective at the time of SDAP application. The submittal documents shall be prepared by a civil engineer licensed in the State of Washington. The fees and submittal requirements shall be in accordance with Kitsap County Code in effect at the time of SDAP application.
3. The application indicates that a significant quantity of grading material will be exported from the site. Prior to issuing the SDAP an approved fill site(s) must be identified.

4. If the project proposal is modified from that shown on the site plan approved for this permit application, Development Services and Engineering will require additional review and potentially new conditions.

c. Environmental

5. Construction activities shall be commenced or, where no construction activities are involved, the use or activity shall be commenced within two years of the effective date of a substantial development permit or shoreline exemption. A single extension for a period not to exceed one year may be authorized based on reasonable factors, if a request for extension has been filed before the expiration date and notice of the proposed extension is given to parties of record on the substantial development permit and to the Department of Ecology.

   Authorization to conduct development activities shall terminate five years after the effective date of an SDP. A single extension for a period not to exceed one year may be authorized based on reasonable factors, if a request for extension has been filed before the expiration date and notice of the proposed extension is given to parties of record and to the Department of Ecology.

6. Hardscape material (asphalt or concrete) that is removed will be processed and disposed of at approved off-site landfills or recycling facilities, as appropriate, and will not be placed on site.

7. Excavated soils will be stockpiled on site for profiling and further dewatering and/or “sparging” as needed for disposal at the Model Airplane Field (MAF) limited purpose landfill. Clean soil stockpiles with soil concentrations meeting cleanup standards (e.g., dioxin/furan concentrations less than 12 nanograms per kilogram [ng/kg] toxicity equivalence [TEQ]) will be transferred to an upland placement area behind the riparian zone (landward of the 150-foot shoreline buffer at the base of the bluff); existing hardscape within the upland placement area will be perforated prior to accepting material. Stockpiles with soil concentrations greater than cleanup standards but less than MAF suitability criteria (e.g., dioxin/furan concentrations less than 45 ng/kg TEQ) will be disposed

at the MAF, if approved by the Kitsap Public Health District. Stockpiles with soil concentration greater than MAF suitability criteria and any other stockpiles not approved by the Kitsap Public Health District for MAF disposal will be disposed of at an approved, off-site commercial landfill. No excavated hardscape material or contaminated soils with concentrations greater than cleanup standards will be placed within the 200-foot shoreline jurisdiction.

8. The project shall follow the Revised Geological Assessment and Revised JARPA figures as presented in the Memorandum Response to Information Request dated 8/14/23.

9. Provide a final restoration planting plan with Site Development Activity Permit application.

10. If archaeological resources are uncovered during excavation, developers and property owners must immediately stop work and notify Kitsap County, the Office of Archaeology and Historic Preservation and affected Indian tribes.

d. Traffic and Roads
None at this time.

e. Fire Safety
None at this time.

f. Solid Waste
None at this time.

g. Kitsap Public Health District
None at this time; see Environmental conditions.

Report prepared by:

Kathlene Barnhart, Staff Planner / Project Lead — 9/18/2023 Date

Report approved by:

Katharine Shaffer 9-19-23

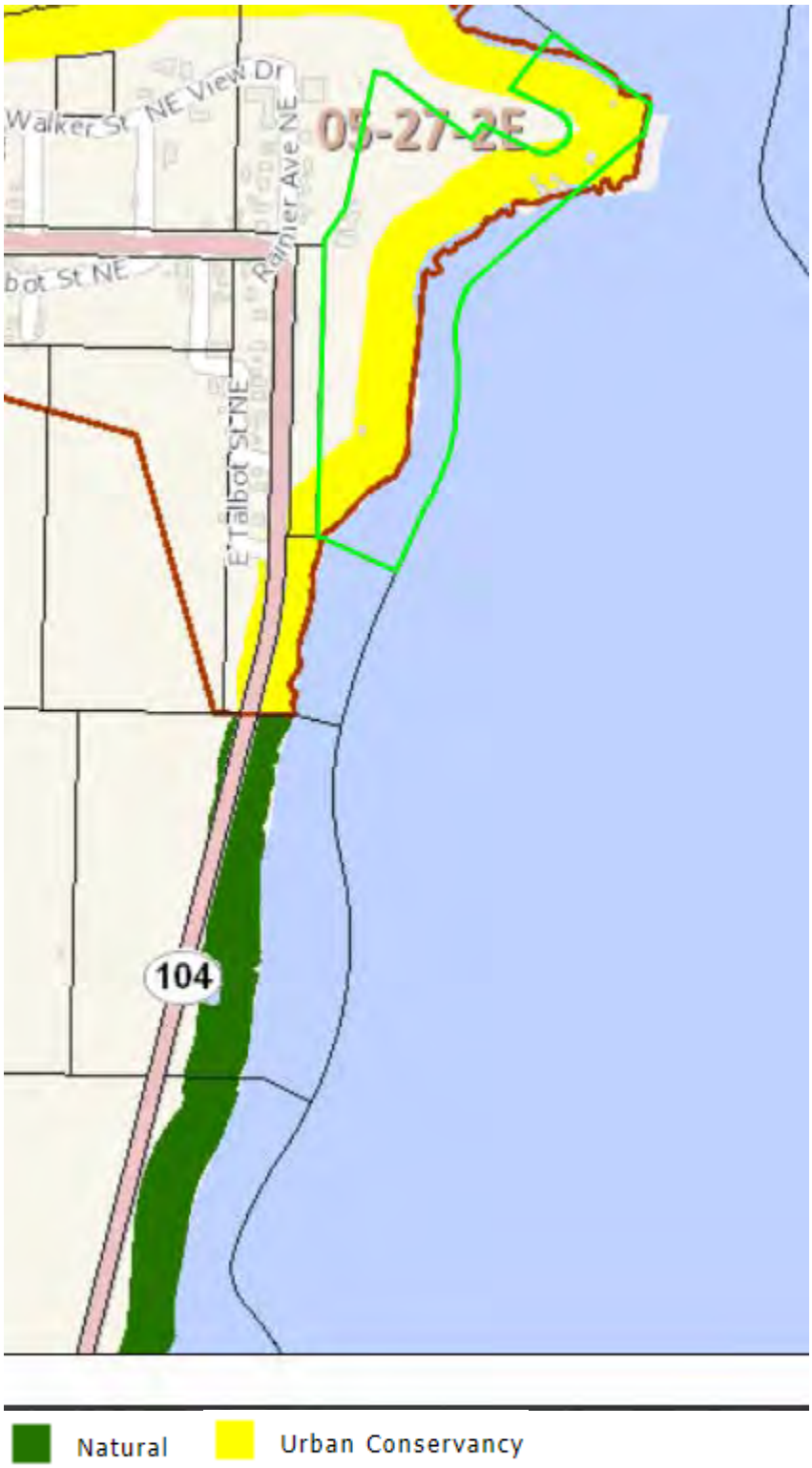
_____ _____

Katharine Shaffer, Supervisor Date

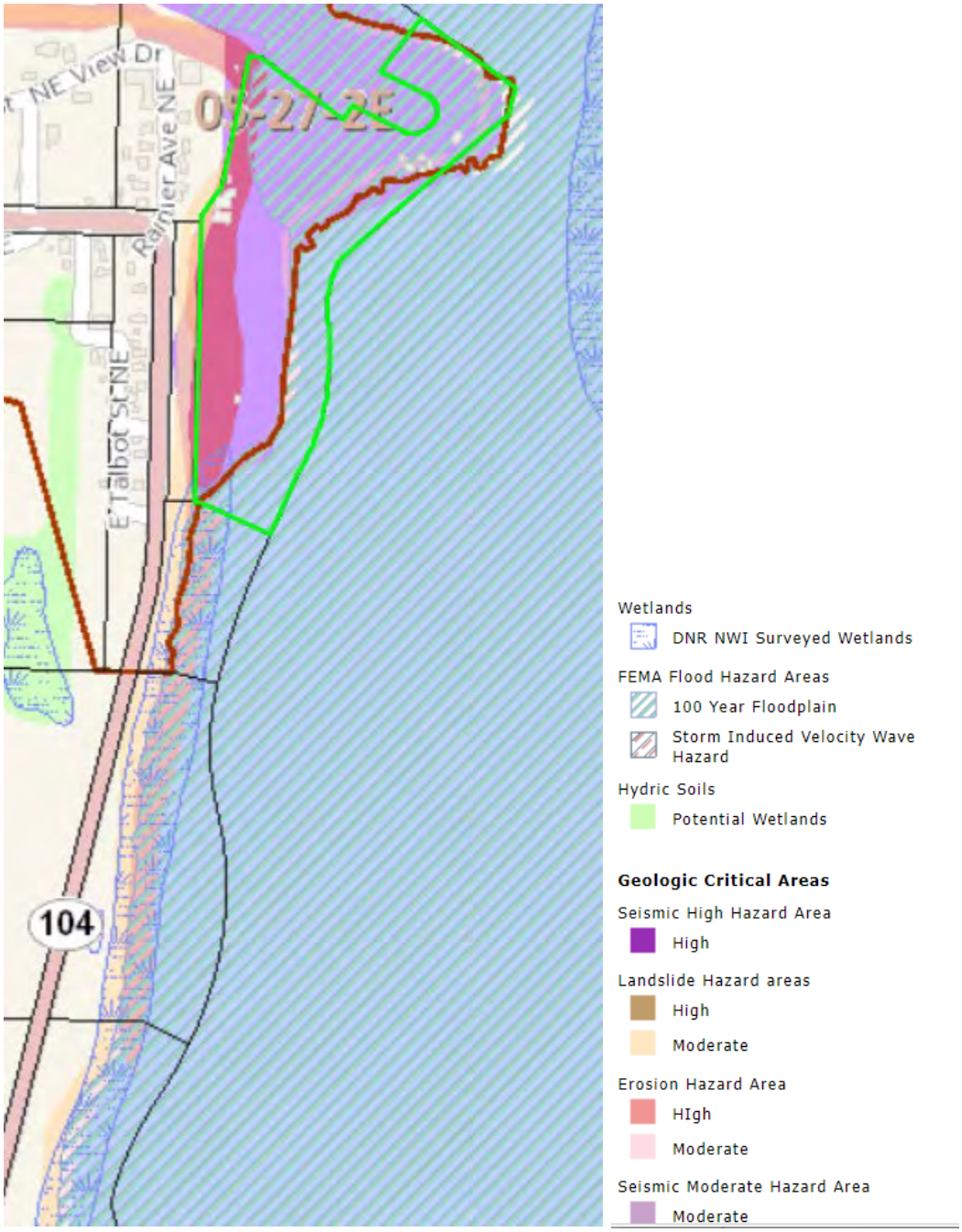
Attachments:
Attachment A – Shoreline Jurisdiction
Attachment B – Critical Areas
Attachment C – Zoning Map

CC: OPG Port Gamble, LLC, c/o Bob Hunter; bob.hunter@raydient.com
Anchor QEA, c/o Jacquie Ptacek; jptacek@anchorqea.com
Interested Parties:
Kitsap County Health District, MS-30
Kitsap County Public Works Dept., MS-26
DCD Staff Planner: Cecilia Olsen, Robert Hankins

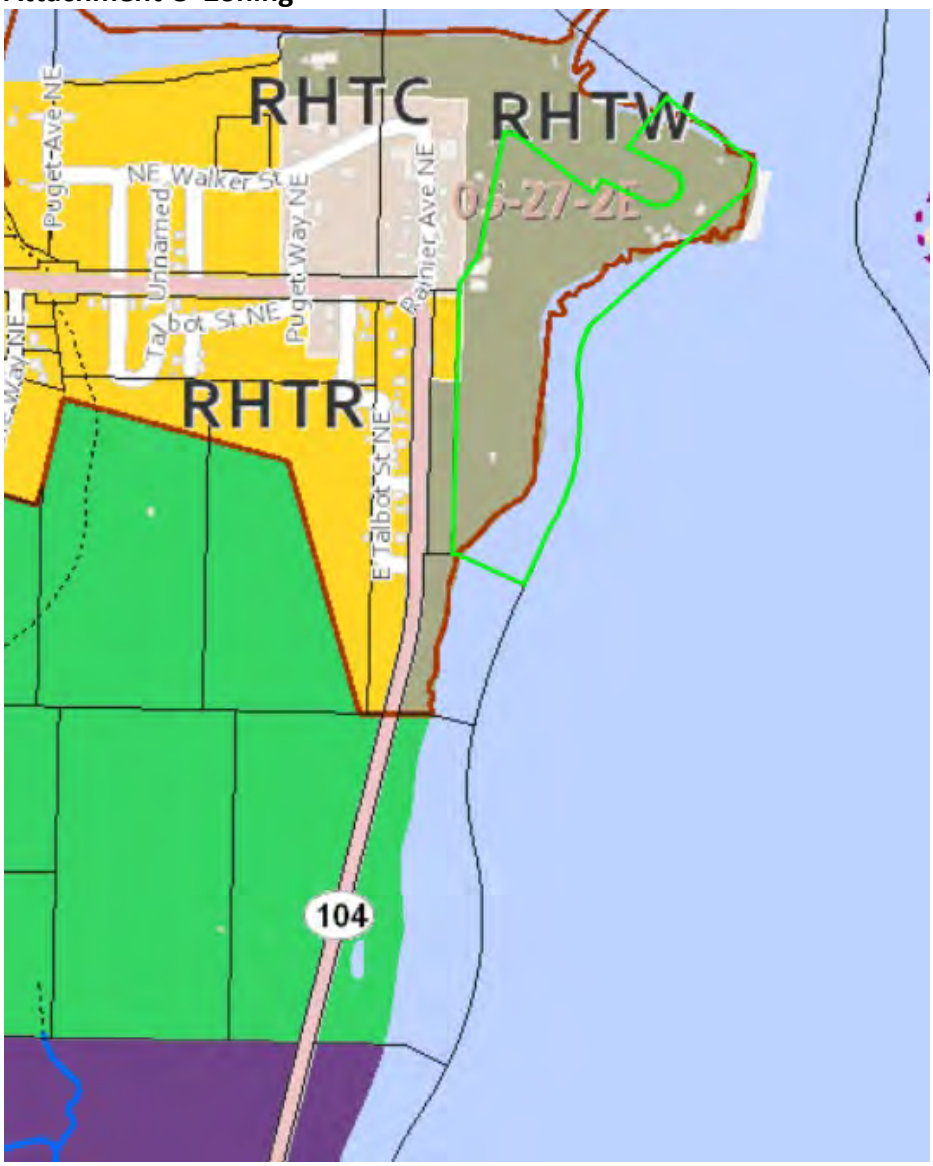
Attachment A- Shoreline Jurisdiction



Attachment B- Critical Areas



Attachment C- Zoning



Site Plan

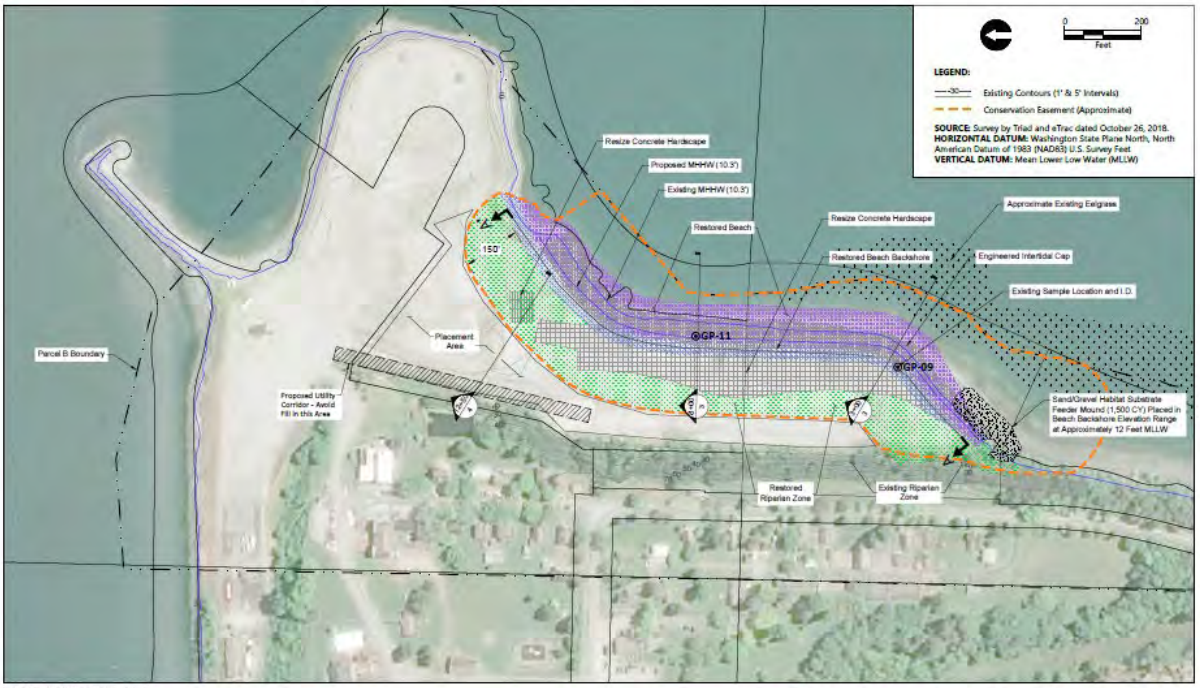


Figure 2
Southern Mill Site Shoreline Restoration Plan View
Biological Assessment
Port Gamble Mill Site and Bay Habitat Restoration

Publish Date: 2022/08/17 7:05 AM | User: dholmer
Filepath: K:\Projects\0388-Pope Resources\NRD Restoration Project Permitting\0388-BA-004.dwg Figure 6

ANCHOR QEA

Figure 6
Western Port Gamble Bay Restoration Plan
Biological Assessment
Port Gamble Bay Habitat Restoration

Kitsap County Department of Community Development

Administrative
Staff Report

Report Date: 09/21/2023 **Application Submittal Date:** 09/30/2022
Application Complete Date: 02/13/2023

Project Name: Port Gamble Bay Habitat Restoration Project
Type of Application: Shoreline Substantial Development Permit
Permit Number: 22-04842

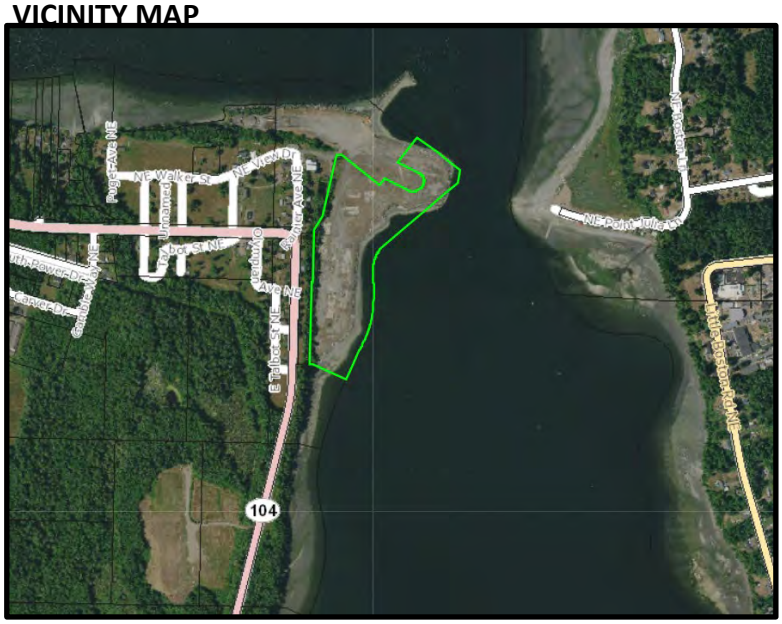
Project Location
5205 NE View Drive
Poulsbo, WA 98370
Commissioner District #1 (North)

Assessor's Account #
052702-3-004-2008

Applicant/Owner of Record
OPG Port Gamble, LLC
19950 7th Ave. NE STE 200
Poulsbo, WA 98370

Decision Summary
Approved subject to conditions listed under section 13 of this report.

VICINITY MAP



1. **Background**
   The project is being performed as part of a natural resource damage settlement agreement between OPG Port Gamble LLC; Pope Resources, a Delaware Limited Partnership; and OPG Properties LLC (collectively, the Companies) and the Port Gamble S'Klallam Tribe, the Suquamish Tribe, the Skokomish Indian Tribe, the Jamestown S'Klallam Tribe, the Lower Elwha Klallam Tribe, the U.S. Department of the Interior, and the Washington State Department of Ecology (Ecology; collectively, the Natural Resource Trustees). This Project is the outcome of a cooperative effort between the Companies and the Natural Resource Trustees.

2. **Project Request**
   The project proposal includes shoreline restoration along a portion of the Port Gamble Bay and former upland sawmill area (Mill Site), located in Port Gamble, Washington. The project will take place at the Mill Site, owned by Pope Resources, LP/OPG Properties LLC. Restoration activities include three parts: South Mill Site Shoreline Restoration, Western

Bay Nearshore Thin-Layer Sand Cover, and Western Bay Nearshore Eelgrass Transplanting. Overall, the project will restore shoreline processes and enhance habitat for benthos, forage fish, shellfish, and juvenile salmonids in Port Gamble Bay. Following completion of construction, the southern mill site shoreline restoration area will be protected under a natural resource damage conservation easement. To maximize restoration potential, most of the southern mill site shoreline restoration area will not be open to the public.

- **Southern Mill Site Shoreline Restoration.** This 9-acre portion of the project includes laying back intertidal slopes of the southern portion of the former sawmill facility shoreline to restore near-natural beach grades and placing intertidal cap and habitat layers, including a lower 1-foot-thick layer of angular cobble-sized armor, a middle 1-foot-thick layer of rounded cobble/gravel beach substrate, and an upper 1-foot-thick layer of sand/gravel habitat substrate. A habitat feeder berm will also be placed in the beach backshore. Near-surface hardscape will be removed within a 150-foot shoreline buffer, then soil treatments and native plantings will take place.
- **Western Bay Nearshore Thin Layer Sand Cover.** This portion of the project includes placing a sand cover layer over a minimum of 11 acres of lower intertidal to shallow subtidal zones within former log rafting areas in the western Port Gamble Bay to restore benthic habitat functions and concurrently provide suitable substrate in areas where eelgrass is absent or growing at very sparse densities.
- **Western Bay Nearshore Eelgrass Transplanting.** Eelgrass will be transplanted into western Port Gamble Bay areas where there is currently little or no eelgrass, including on and adjacent to the thin layer sand cover.

3. SEPA (State Environmental Policy Act)

The State Environmental Policy Act (SEPA), found in Chapter 43.21C RCW (Revised Code of Washington), is a state law that requires the County to conduct an environmental impact review of any action that might have a significant, adverse impact on the environment. The review includes the completion of an Environmental Checklist by the applicant and a review of that checklist by the County. If it is determined that there will be environmental impacts, conditions are imposed upon the applicant to mitigate those impacts below the threshold of "major" environmental impacts. If the impacts cannot be mitigated, an environmental impact statement (EIS) must be prepared. The decision following environmental review, which may result in a Determination of Nonsignificance (DNS), Mitigated DNS, or the necessity for an EIS is called a threshold determination. A separate notice of the threshold determination is given by the County. If it is not appealed, it becomes part of the hearing record as it was issued, since it cannot be changed by the Hearing Examiner.

Pursuant to WAC 197-11-355, the optional DNS process was utilized for this project The SEPA Comment period previously occurred concurrent with the Notice of Application dated 02/24/2023. A Determination of Nonsignificance (DNS) was issued on 08/28/2023. SEPA noted this project will be conditioned to meet the requirements of Kitsap County Code Title 12, Stormwater Drainage; Title 17 Zoning, Title 19 Critical Areas Ordinance, and Title 22 Shoreline Master Program.

The SEPA appeal period expired 09/11/2023. No appeals were filed; therefore, the SEPA determination is final.

4. Physical Characteristics

Upland areas were developed through historical fill activities on an existing tideflat adjacent to the Bay. The surficial fill typically consists of sand and gravel, with locally variable fines content, scattered debris, and woody organics. Portions of the uplands are paved with asphalt or concrete. Underlying the upland fill is a native sand layer of variable thickness. Transition slopes on the shoreline between the uplands and Port Gamble Bay are approximately 30% and are protected from erosion by rock riprap. Bluff slopes adjacent to the former sawmill site are approximately 30% to 50%. Work will also occur within Port Gamble Bay of Hood Canal.
The former sawmill site portion of the project site contains little to no vegetation, but the bluff adjacent to the mill site has deciduous and evergreen trees, as well as native and non-native shrubs. The western shoreline thin layer placement and eelgrass planting areas are adjacent to the Port Gamble Forest Heritage Park, which consists mainly of mature deciduous and evergreen trees.

Table 1 - Comprehensive Plan Designation and Zoning

Comprehensive Plan: LAMIRD Zone: Rural Historic Town Waterfront	Standard	Proposed
Minimum Density	NA	NA
Maximum Density	2.5 du/acre	
Minimum Lot Size	NA	NA
Maximum Lot Size	NA	NA
Minimum Lot Width	NA	NA
Minimum Lot Depth	NA	NA
Maximum Height	35 feet	NA
Maximum Impervious Surface Coverage	NA	NA
Maximum Lot Coverage	50%	NA

Staff Comment: Proposal is for ecological restoration. No structures are proposed for removal of addition. Impervious surfaces will be reduced.

Table 2 - Setback for Zoning District

	Standard	Proposed
Front	NA	NA
Side	Per Title 14	NA
Side	Per Title 14	NA
Rear	Per Title 14	NA

Staff Comment: Proposal is for ecological restoration. No structures are proposed for removal of addition. Setbacks do not apply.

Table 3 - Surrounding Land Use and Zoning

Surrounding Property	Land Use	Zoning
North	OPG: waterfront	Rural Historic Town Waterfront
South	OPG: vacant	Rural Historic Town Waterfront
East	Port Gamble Bay	Salt Water
West	OPG: commercial, residential	Rural Historic Town Residential; Rural Historic Town Commercial; Rural Historic Town Waterfront

Table 4 - Public Utilities and Services

	Provider
Water	Kitsap PUD #1
Power	Puget Sound Energy
Sewer	Kitsap County
Police	Kitsap County Sheriff
Fire	Kitsap County Fire District 18
School	North Kitsap School District #400

5. Access

From SR 104, access to the site is achieved by turning onto Rainier Ave NE, a County right-of-way. At the intersection with NE View Drive, a private access road to the right leads down to the industrial yard at the shoreline adjacent to the project site.

6. Site Design

Southern Mill Site Shoreline Restoration. Includes re-sloping/grading of beach and addition of a littoral drift feeder berm at the south end of the project. Restoration of nearshore riparian habitat includes removal of approximately 6,750 cy of surface hardscape over 122,000 square feet (2.79 acres) within the 150-foot wide riparian area, followed by placement of a minimum of 2 feet of clean sand. Soil treatments will include placing 4

inches of compost rototilled into the top 12 inches of clean sandy soil, overlaid with 3 inches of mulch. This includes a total of 22,000 cy of fill placed over an 223,000 square foot (5.3-acre) area. The 150-footwide riparian area will then be planted with a combination of native plants including deciduous or coniferous trees, shrubs, and beachgrass planted between mean higher high water and extreme high water in unamended sand/gravel soils.

Western Bay Thin Layer Placement and Eelgrass Restoration. An average of 6 inches of clean material (11,000 cy, including over-placement allowance) will be placed over a minimum of 11 acres of the western bay nearshore area (within the -2 to -15 feet MLLW elevation range). Approximately 1 year after completion of sand cover, eelgrass planting will begin. Eelgrass will be sourced from local donor beds at the same depths targeted for transplanting (-3 to -6 MLLW). Divers will plant shoots at a density of approximately 70 shoots per square meter.

7. Policies and Regulations Applicable to the Subject Proposal

The Growth Management Act of the State of Washington, RCW 36.70A, requires that the County adopt a Comprehensive Plan, and then implement that plan by adopting development regulations. The development regulations must be consistent with the Comprehensive Plan. The Comprehensive Plan process includes public involvement as required by law, so that those who are impacted by development regulations have an opportunity to help shape the Comprehensive Plan which is then used to prepare development regulations.

Kitsap County Comprehensive Plan, adopted June 30, 2016.

The following Comprehensive Plan goals and policies are most relevant to this application:

Environment Policy 5. Support projects that increase air quality, reduce carbon emissions, or reduce climate change impacts.

Environment Policy 13. Use the best scientific information available to direct how functions and values of critical areas are preserved or enhanced.

Environment Policy 24. Consider and identify the vital connection between protection of Kitsap County's rural character, environmental essential assets and environmental benefits and economic opportunities.

Policy SH-2. Recognize that nearly all shorelines, even substantially developed or degraded areas, retain important ecological functions.

Policy SH-22. Designate and maintain appropriate areas for protecting and restoring shoreline ecological functions and processes to control pollution and prevent damage to the shoreline environment and/or public health.

Policy SH-39. Encourage and facilitate restoration and enhancement projects for priority habitats and species (Washington Department of Fish and Wildlife, PHS Program).

Policy SH-40. Shoreline ecosystem protection and restoration projects shall be prioritized, located and designed utilizing the most current, accurate and complete scientific and technical information available to promote resiliency of habitats and species.

Policy SH-47. Recognize and protect the statewide interest over local interest.

Policy SH-48. Preserve the natural character of the shoreline.

a. Administer shoreline environments and regulations to minimize damage to the unique character and ecology of shorelines of statewide significance.

b. Where natural resources of statewide importance are being diminished over time by human activities, restoration of those resources should be facilitated.

c. In order to reduce adverse impacts to the environment while accommodating future growth, new intensive development activities should upgrade and redevelop those areas where intensive development already occurs, rather than allowing high-intensity uses to extend into low-intensity use or underdeveloped areas.

Policy SH-49. Result in the long-term over short-term benefit.

a. Preserve sufficient shorelands and submerged lands to accommodate current and projected demand for economic resources, such as shellfish beds and navigable harbors.

b. Actions that would convert resources into irreversible uses or detrimentally alter natural conditions that are characteristic of shorelines of statewide significance should be severely limited.

c. Evaluate the short-term economic gain or convenience of developments in relationship to long-term and potentially costly impairments to the natural environment.

d. Actively promote aesthetic considerations when contemplating new development, redevelopment of existing facilities, or for the general enhancement of shoreline areas.

The County's development regulations are contained within the Kitsap County Code. The following development regulations are most relevant to this application:

Code Reference	Subject
Title 12	Storm Water Drainage

Title 17	Zoning
Chapter 18.04	State Environmental Policy Act (SEPA)
Title 19	Critical Areas Ordinance (CAO)
Chapter 21.04	Land Use and Development Procedures
Title 22	Shoreline Master Program (SMP

8. Documents Consulted in the Analysis

Applicant Submittals	Dated or date stamped
SSDP Application	September 30, 2022
JARPA Supplemental Application	September 30, 2022
JARPA Plan Set	September 30, 2022
Environmental (SEPA) Checklist	September 30, 2022
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b. Lighting

Not applicable to this proposal.

c. Off-Street Parking

Not applicable to this proposal.

d. Signage
Not applicable to this proposal.

e. Landscaping
Not applicable due to zoning; see Environmental Analysis for planting plan details.

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Absent an activity-specific set of standards, the project was reviewed using the General Goals and Policies of KCC 22.300 and General Regulations of KCC 22.400. The project was found to be consistent with the SMP Goals and Policies, Management Policies of each Environment Designation (KCC 22.200) including those for Shorelines of Statewide Significance. The nature of the proposal will improve critical saltwater habitats, enhance shoreline vegetated buffers, improve shoreline buffer area functions, and decrease impervious surfaces within the shoreline jurisdiction.

No FEMA Habitat Assessment was required since the project requires US Army Corps of Engineer Permitting and therefore will have undergone review by US Fish and Wildlife Service and other federal services.

Assessments provided demonstrated there are no wetlands or wetland buffers within the project area (there are more than 300-feet away and across SR 104). Geological Assessments have acknowledged the moderate seismic hazard at the immediate project area, but have concluded that the proposed shoreline re-grading and import material placement will have no adverse impact on erosion and liquefaction susceptibility. In general, reducing the shoreline slope angle and replacement of shoreline fill with coarse, angular fill should improve erosion, slope stability and liquefaction susceptibility along the shoreline.

The proposal is being conditioned to follow the recommendations of the geological assessment, current plans submitted, and compliance with Kitsap Public Health standards for disposal of hardscape and soils. A final planting plan shall be submitted with the associated Site Development Activity Permit.

j. Access, Traffic and Roads
No concerns; Not applicable to this proposal.

k. Fire Safety
No concerns; Not applicable to this proposal.

l. Solid Waste
Not applicable to this proposal. See environmental analysis regarding construction waste disposal for the project.

m. Water/Sewer
Not applicable to this proposal.

n. Kitsap Public Health District
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11. Review Authority

The Director has review authority for this Shoreline Substantial Development Permit application under KCC, Sections 21.04.100 and 22.500.100. The Kitsap County Commissioners have determined that this application requires review and approval of the Director. The Director may approve, approve with conditions, or deny an Administrative Conditional Use Permit.

12. Findings

1. The proposal is consistent with the Comprehensive Plan.

2. The proposal complies or will comply with requirements of KCC Title 17 and complies with or will comply with all of the other applicable provisions of Kitsap County Code and all other applicable regulations, including all applicable development standards

   and design guidelines, through the imposed conditions outlined in this report.

3. The proposal is not materially detrimental to existing or future uses or property in the immediate vicinity.

4. The proposal is compatible with and incorporates specific features, conditions, or revisions that ensure it responds appropriately to the existing character, appearance, quality or development, and physical characteristics of the subject property and the immediate vicinity.

5. The applicant the applicant has demonstrated that the proposed development is consistent with the policies and procedures of the Act and this program, as well as criteria in WAC 173-27-150.

13. Decision

Based upon the analysis above and the decision criteria found in KCC 22.500.100, the Department of Community Development recommends that the Shoreline Substantial Development request for Port Gamble Bay Habitat Restoration Project be **approved**, subject to the following 10 conditions:

a. Planning/Zoning

None applicable at this time.

b. Development Engineering

1. The information provided demonstrates this proposal is a Large Project as defined in Kitsap County Code Title 12, and as such will require a Full Drainage Site Development Activity Permit (SDAP) from Development Engineering. (SDAP #22-04870 is being reviewed concurrently)

2. Erosion and sedimentation control shall be designed in accordance with Kitsap County Code Title 12 effective at the time of SDAP application. The submittal documents shall be prepared by a civil engineer licensed in the State of Washington. The fees and submittal requirements shall be in accordance with Kitsap County Code in effect at the time of SDAP application.
3. The application indicates that a significant quantity of grading material will be exported from the site. Prior to issuing the SDAP an approved fill site(s) must be identified.

4. If the project proposal is modified from that shown on the site plan approved for this permit application, Development Services and Engineering will require additional review and potentially new conditions.

c. Environmental

5. Construction activities shall be commenced or, where no construction activities are involved, the use or activity shall be commenced within two years of the effective date of a substantial development permit or shoreline exemption. A single extension for a period not to exceed one year may be authorized based on reasonable factors, if a request for extension has been filed before the expiration date and notice of the proposed extension is given to parties of record on the substantial development permit and to the Department of Ecology.

   Authorization to conduct development activities shall terminate five years after the effective date of an SDP. A single extension for a period not to exceed one year may be authorized based on reasonable factors, if a request for extension has been filed before the expiration date and notice of the proposed extension is given to parties of record and to the Department of Ecology.

6. Hardscape material (asphalt or concrete) that is removed will be processed and disposed of at approved off-site landfills or recycling facilities, as appropriate, and will not be placed on site.

7. Excavated soils will be stockpiled on site for profiling and further dewatering and/or “sparging” as needed for disposal at the Model Airplane Field (MAF) limited purpose landfill. Clean soil stockpiles with soil concentrations meeting cleanup standards (e.g., dioxin/furan concentrations less than 12 nanograms per kilogram [ng/kg] toxicity equivalence [TEQ]) will be transferred to an upland placement area behind the riparian zone (landward of the 150-foot shoreline buffer at the base of the bluff); existing hardscape within the upland placement area will be perforated prior to accepting material. Stockpiles with soil concentrations greater than cleanup standards but less than MAF suitability criteria (e.g., dioxin/furan concentrations less than 45 ng/kg TEQ) will be disposed

at the MAF, if approved by the Kitsap Public Health District. Stockpiles with soil concentration greater than MAF suitability criteria and any other stockpiles not approved by the Kitsap Public Health District for MAF disposal will be disposed of at an approved, off-site commercial landfill. No excavated hardscape material or contaminated soils with concentrations greater than cleanup standards will be placed within the 200-foot shoreline jurisdiction.

8. The project shall follow the Revised Geological Assessment and Revised JARPA figures as presented in the Memorandum Response to Information Request dated 8/14/23.

9. Provide a final restoration planting plan with Site Development Activity Permit application.

10. If archaeological resources are uncovered during excavation, developers and property owners must immediately stop work and notify Kitsap County, the Office of Archaeology and Historic Preservation and affected Indian tribes.

d. Traffic and Roads
None at this time.

e. Fire Safety
None at this time.

f. Solid Waste
None at this time.

g. Kitsap Public Health District
None at this time; see Environmental conditions.

Report prepared by:

Kathlene Barnhart, Staff Planner / Project Lead — 9/18/2023 Date

Report approved by:

Katharine Shaffer 9-19-23

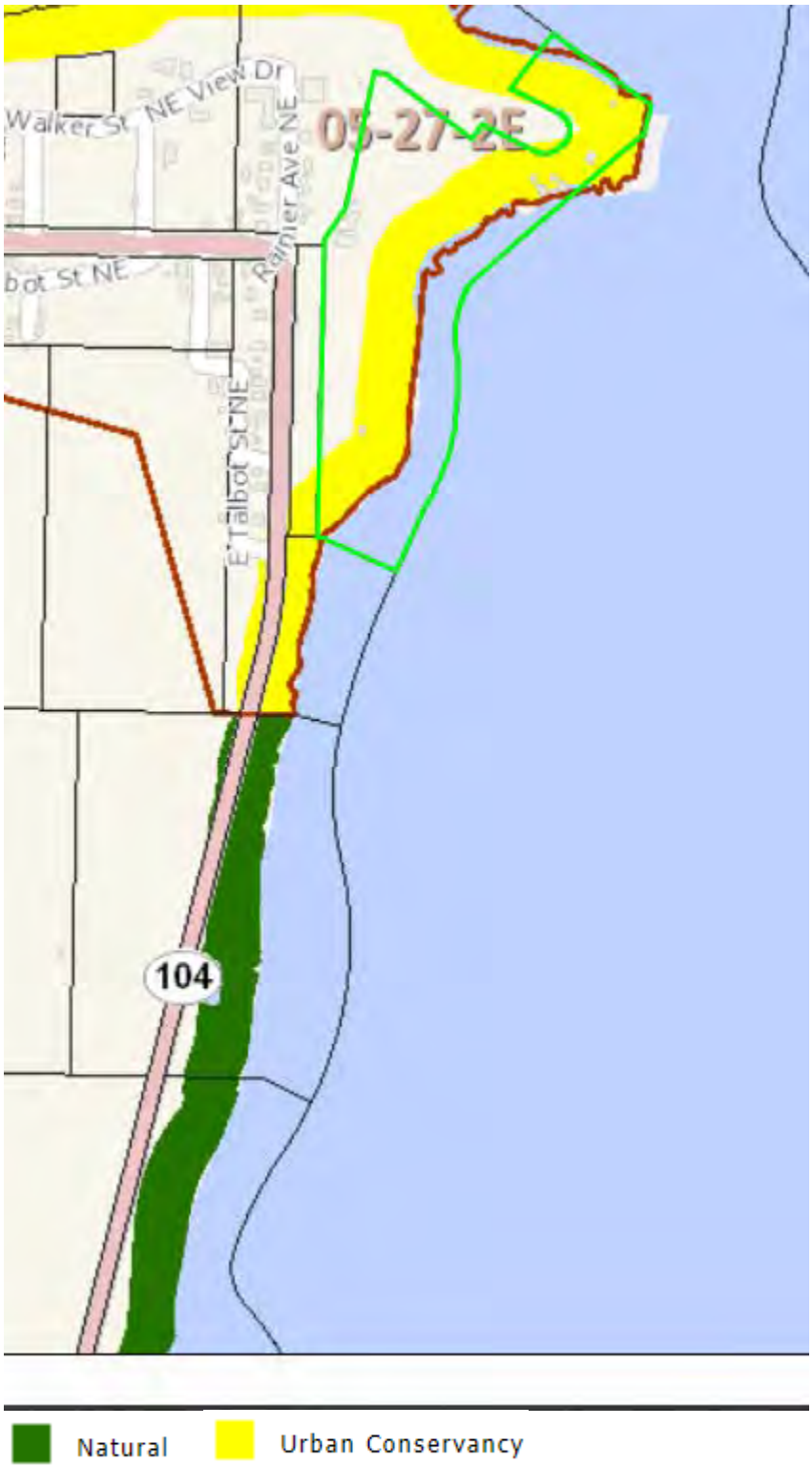
_____ _____

Katharine Shaffer, Supervisor Date

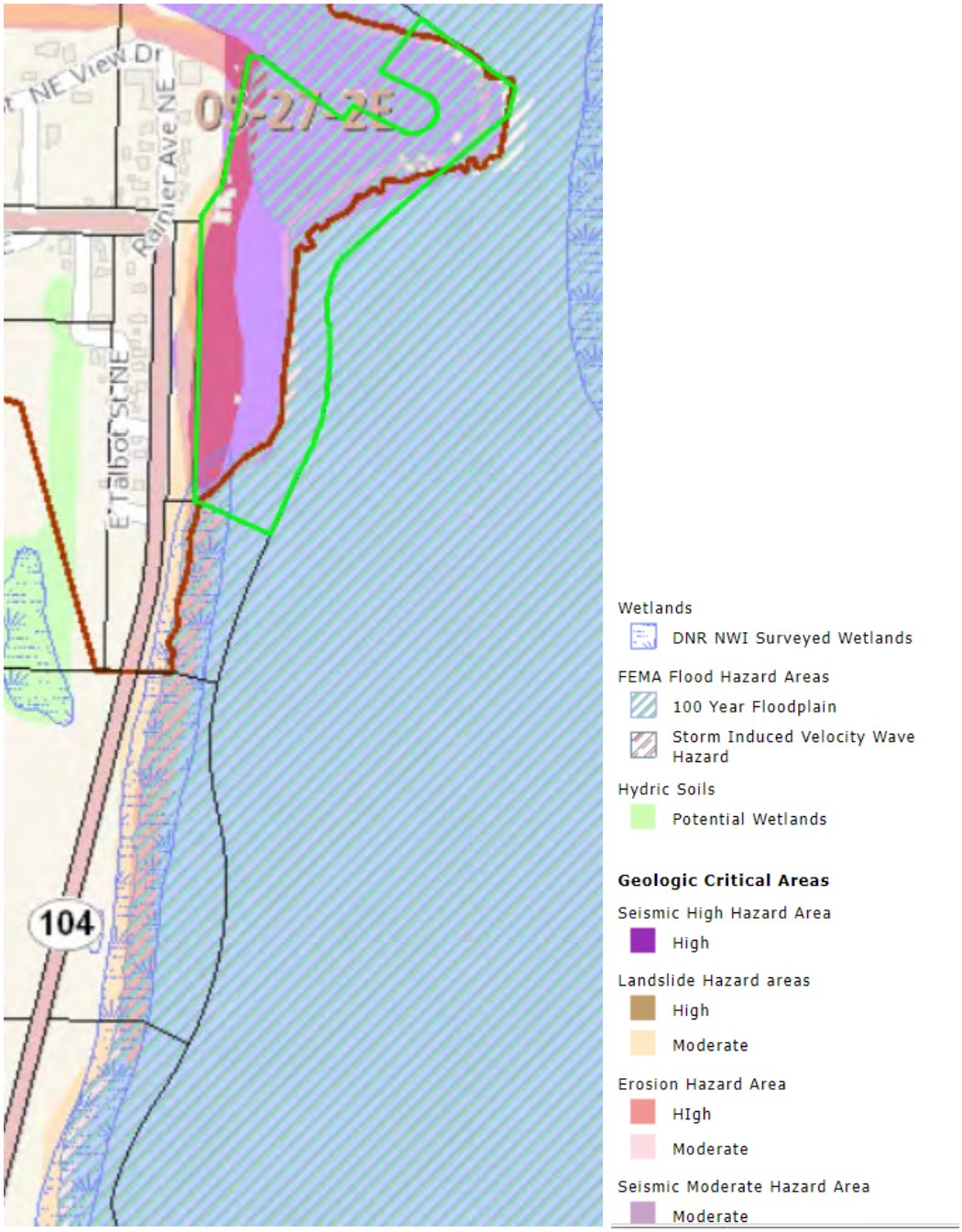
Attachments:
Attachment A – Shoreline Jurisdiction
Attachment B – Critical Areas
Attachment C – Zoning Map

CC: OPG Port Gamble, LLC, c/o Bob Hunter; bob.hunter@raydient.com
Anchor QEA, c/o Jacquie Ptacek; jptacek@anchorqea.com
Interested Parties:
Kitsap County Health District, MS-30
Kitsap County Public Works Dept., MS-26
DCD Staff Planner: Cecilia Olsen, Robert Hankins

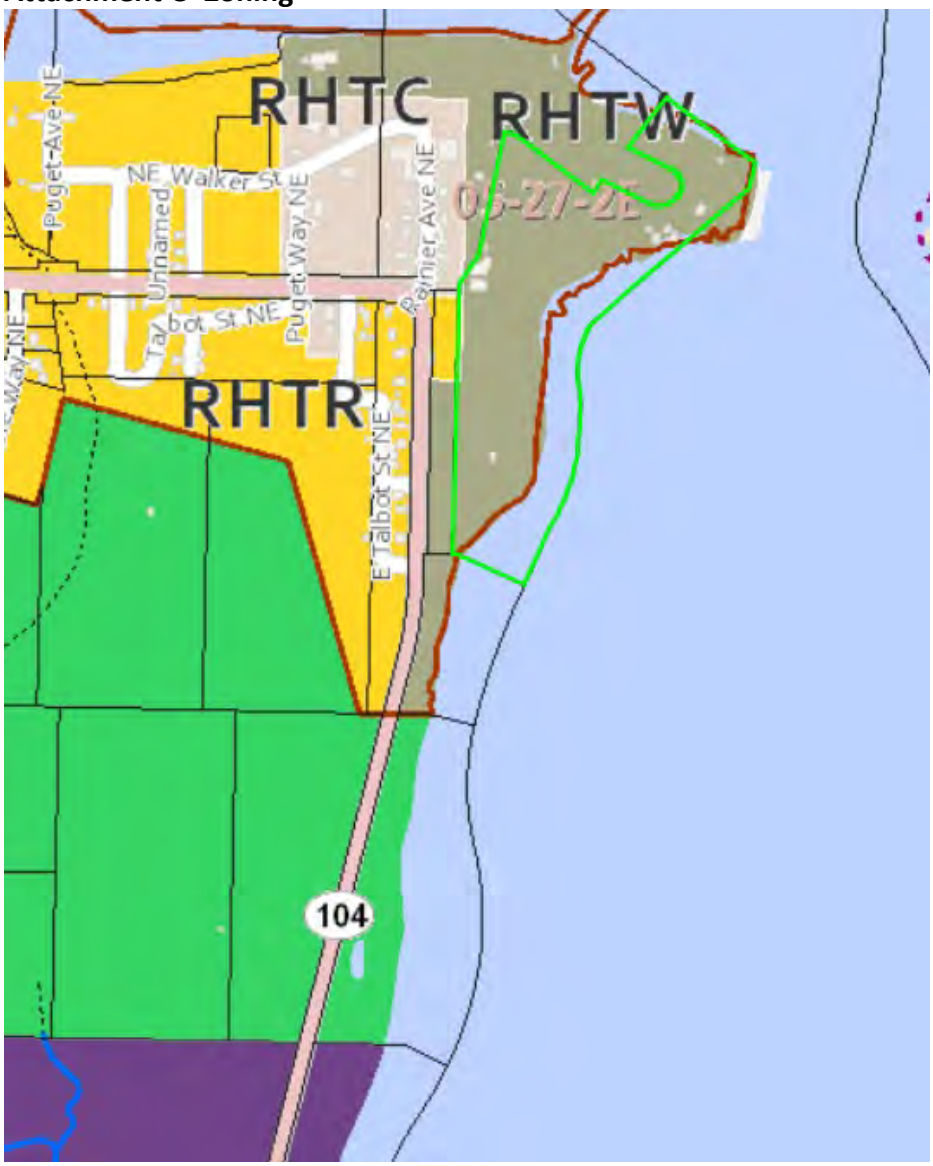
Attachment A- Shoreline Jurisdiction



Attachment B- Critical Areas



Attachment C- Zoning



Site Plan

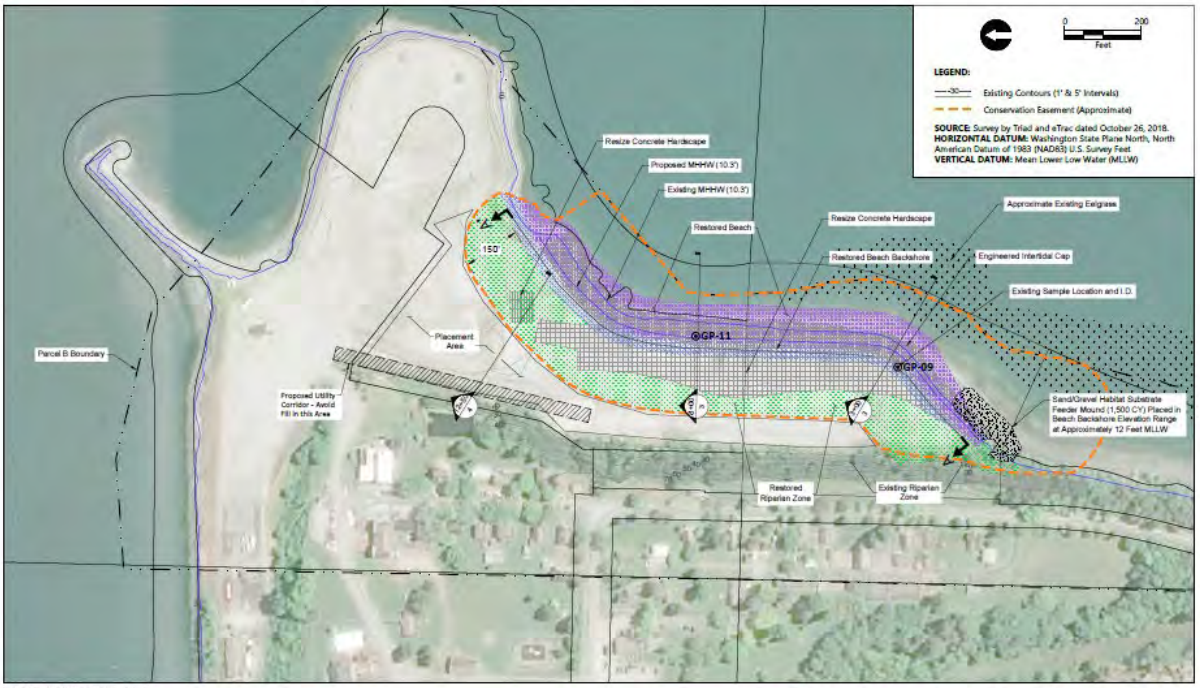


Figure 2
Southern Mill Site Shoreline Restoration Plan View
Biological Assessment
Port Gamble Mill Site and Bay Habitat Restoration

Publish Date: 2022/08/17 7:05 AM | User: dholmer
Filepath: K:\Projects\0388-Pope Resources\NRD Restoration Project Permitting\0388-BA-004.dwg Figure 6

ANCHOR QEA

Figure 6
Western Port Gamble Bay Restoration Plan
Biological Assessment
Port Gamble Bay Habitat Restoration

KITSAP COUNTY DEPARTMENT OF COMMUNITY DEVELOPMENT
619 DIVISION STREET MS-36, PORT ORCHARD WASHINGTON 98366-4682 Jeff Rimack, Director
(360) 337-5777 HOME PAGE - www.kitsapgov.com/dcd/

DETERMINATION OF NONSIGNIFICANCE

Description of Proposal: **Port Gamble South Mill Site and Western Bay Restoration Project (22-04842);** The shoreline habitat restoration project includes three main activities: South Mill Site Shoreline Restoration, Western Bay Nearshore Thin-Layer Sand Cover, and Western Bay Nearshore Eelgrass Transplanting. The project will restore shoreline processes and enhance habitat for benthos, forage fish, shellfish, and juvenile salmonids in Port Gamble Bay in compliance with a natural resource damage settlement agreement. Following completion of construction, the southern mill site shoreline restoration area will be protected under a natural resource damage conservation easement. To maximize restoration potential, most of the southern mill site shoreline restoration area will not be open to the public.

- South Mill Site Restoration
  - 9 acres (27,000 cy excavation)
  - Layer and sloping of the beach (8H:1V slope; 3-foot cap and habitat layers)
  - Placement of a feeder berm (Min. 0.35 acre, 1,500cy at south end of mill site at approx. +11 feet MLLW)
  - Hardscape removed from the site and disposed at approved upland disposal facility (6,750 cy hardscape removed; replaced with 22,000cy sand and topsoil fill)
  - Native vegetation planting
- Western Bay Nearshore Thin Layer Placement
  - 11 acres
  - Sand cover over lower inter-tidal to shallow subtidal elevations (6-inch cover within -2 to-15 MLLW depth range)
- Western Bay Eelgrass Transplanting
  - Transplant eelgrass on and adjacent to the layer sand cover

Proponent: OPG PORT GAMBLE LLC

Lead Agency: KITSAP COUNTY

Location of proposal: 5205 NE VIEW DR POULSBO WA 98370; Kitsap County; Parcel # 052702-3-004-2008

The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency for consistency with KCC Title 17 Zoning, Title 19 Critical Areas, and Title 12 Stormwater. This information is available to the public on request.

This DNS is issued after using the optional DNS process in WAC 197-11-355. The comment period occurred with the Notice of Application dated 2/24/23. There is no further comment period on the DNS.

COMMENTS:

1. This project will be conditioned to meet the requirements of Kitsap County Code Title 12, Stormwater Drainage; Title 17 Zoning, Title 19 Critical Areas Ordinance, and Title 22 Shoreline Master Program.

Responsible Official: Steve Heacock Contact: Kathlene Barnhart, kbarnhar@kitsap.gov
Position/Title: SEPA COORDINATOR, Dept. of Community Development Phone: (360) 337-5777

Address: 614 Division Street, Port Orchard, WA 98366

DATE: August 28, 2023 Signature: 

You may appeal this determination to the Dept. of Community Development, at 619 Division Street, Port Orchard WA 98366, no later than September 11, 2023 in writing, with payment of the appeal fee. Payment information and current DCD Fee schedule can be found at: https://www.kitsapgov.com/dcd/Pages/Payments.aspx. You should be prepared to make specific factual objections. Contact Kathlene Barnhart to read or ask about the procedures for SEPA appeals.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600, Olympia, WA 98504-7600 • 360-407-6000

October 6, 2023

OPG Port Gamble, LLC
ATTN: Jaime Northrup
Rayonier Inc.
1 Rayonier Way
Wildlight, Florida 32097

Re: Coastal Zone Management Federal Consistency Decision for Port Gamble Bay Habitat Restoration project (Corps No. NWS-2022-0717), within Port Gamble Bay, Port Gamble, Kitsap County, Washington

Dear Jaime Northrup:

On January 30, 2023, the Department of Ecology (Ecology) received a Certification of Consistency with the Washington State Coastal Zone Management Program (CZMP) for the above project. The request was modified on April 3, 2023. Pursuant to Section 307(c)(3) of the Coastal Zone Management Act of 1972 as amended, Ecology concurs with OPG Port Gamble, LLC's (Jaime Northrup) determination that the proposed work is consistent with Washington's CZMP.

On June 12, 2023, OPG Port Gamble, LLC (Jaime Northrup) and Ecology agreed to stay the CZM until the Applicant obtains the Section 401 Water Quality Certification and their shoreline permits. A second stay was agreed to on August 30, 2023, extending the review period until December 31, 2023, in order for the Applicant to obtain their shoreline permit.

This determination is for the restoration work in Port Gamble as described below:

Southern Mill Site Shoreline Restoration: This 9-acre project includes laying back intertidal slopes of the southern portion of the former sawmill facility shoreline to restore near-natural beach grades. Restored intertidal caps will include a lower layer of angular cobble-sized armor, a middle layer of rounded cobble/gravel beach substrate, and an upper layer of sand/gravel habitat substrate to optimize habitat functions and concurrently remain protective. Near-surface hardscape will be removed within a 150-foot shoreline buffer, followed by placement of imported topsoil and mulch and native plantings. Material for the intertidal cap and habitat

layers (14,800 cy), and feeder berm (1,500 cy) will be clean and sourced from an approved off-site vendor. Materials will be placed using standard upland construction equipment.

Western Bay Nearshore Thin Layer Sand Cover: This project includes placing a sand cover layer over a minimum of 11 acres of lower intertidal to shallow subtidal zones (approximately -2 to -15 feet mean lower low water [MLLW]) within former log rafting areas in the western bay to restore benthic habitat functions and concurrently provide suitable substrate in areas where eelgrass is absent or growing at very sparse densities. As practicable, the sand cover will be placed using clean navigation channel maintenance dredge material from the nearby Driftwood Key, or other similar marine source, which is expected to contain eelgrass seed and maximize restoration potential. (Maintenance dredging activities at Driftwood Key are addressed under a separate application.)

Western Bay Nearshore Eelgrass Transplanting: Eelgrass will be transplanted into western bay areas where there is currently little or no eelgrass, including on and adjacent to the thin layer sand cover. Eelgrass transplanting will be performed following placement and consolidation of the cover, informed by monitoring and adaptive management methods patterned after those used successfully at other western Washington sites.

The project site is located within Port Gamble Bay, Kitsap County, Washington, Section 5 and 8, Township 27 N., Range 2 E., within Water Resource Inventory Area (WRIA) 15 (Kitsap).

If you have any questions regarding Ecology's decision, please contact Laura Inouye at (360) 515-8213.

Your right to appeal

You have a right to appeal this decision to the Pollution Control Hearings Board (PCHB) within 30 days of the date of receipt. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal, you must do all of the following within 30 days of the date of receipt of this decision:

- File your notice of appeal and a copy of this decision with the PCHB (see filing information below). "Filing" means actual receipt by the PCHB during regular business hours as defined in WAC 371-08-305 and -335. "Notice of appeal" is defined in WAC 371-08-340.

- Serve a copy of your notice of appeal and this decision on the Department of Ecology mail, in person, or by email (see addresses below).

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

Filing an appeal

Filing with the PCHB

For the most current information regarding filing with the PCHB, visit: https://eluho.wa.gov/ or call: 360-664-9160.

Service on Ecology

Street Addresses:

Department of Ecology
Attn: Appeals Processing Desk
300 Desmond Drive SE
Lacey, WA 98503

Mailing Addresses:

Department of Ecology
Attn: Appeals Processing Desk
PO Box 47608
Olympia, WA 98504-7608

E-Mail Address:

ecologyappeals@ecy.wa.gov

Sincerely,

Loree' Randall, Section Manager
Aquatic Permitting & Protection Section
Shorelands and Environmental Assistance Program

Sent via e-mail: jaime.northrup@rayonier.com

E-cc: Sarah Albright-Garland, U.S. Army Corps of Engineers
Laura Inouye, Ecology
fedconsistency@ecy.wa.gov

US Army Corps of Engineers ®
Seattle District

CERTIFICATE OF COMPLIANCE WITH DEPARTMENT OF THE ARMY PERMIT

Permit Number: NWS-2022-717

Name of Permittee: Ms. Jaime Northrup

Date of Issuance: November 7, 2023

Upon completion of the activity authorized by this permit, please check the applicable boxes below, date and sign this certification, and return it to the following email or mailing address:

NWS.Compliance@usace.army.mil OR

Department of the Army
U.S. Army Corps of Engineers Seattle District, Regulatory Branch
4735 E. Marginal Way S, Bldg 1202
Seattle, Washington 98134-2388

Please note that your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with the terms and conditions of your authorization, your permit may be subject to suspension, modification, or revocation.

☐	The work authorized by the above-referenced permit has been completed in accordance with the terms and conditions of this permit. Date work complete: _____ ☐ Photographs and as-built drawings of the authorized work (OPTIONAL, unless required as a Special Condition of the permit).

☐	If applicable, the mitigation required (e.g., construction and plantings) in the above-referenced permit has been completed in accordance with the terms and conditions of this permit (not including future monitoring). Date work complete: _____ ☐N/A ☐ Photographs and as-built drawings of the mitigation (OPTIONAL, unless required as a Special Condition of the permit).

☐	Provide phone number/email for scheduling site visits (must have legal authority to grant property access). Printed Name: _____ Phone Number: _____ Email: _____

Printed Name: _____

Signature: _____

Date: _____

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600, Olympia, WA 98504-7600 • 360-407-6000

October 6, 2023

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ecologyappeals@ecy.wa.gov

Sincerely,

Loree' Randall, Section Manager
Aquatic Permitting & Protection Section
Shorelands and Environmental Assistance Program

Sent via e-mail: jaime.northrup@rayonier.com

E-cc: Sarah Albright-Garland, U.S. Army Corps of Engineers
Laura Inouye, Ecology
fedconsistency@ecy.wa.gov

SALISH SEA NEARSHORE PROGRAMMATIC (SSNP) CONSULTATIONS
Version: August 02, 2022

Notification Summary Sheet

The following information is provided as notification and/or a request for verification for Section 7 Endangered Species Act and/or Magnuson-Stevens Fishery Conservation Management Act coverage under the Salish Sea Nearshore Programmatic (SSNP) consultations with the National Marine Fisheries Service (NMFS), WCRO-2019-04086, and the U.S. Fish and Wildlife Service (USFWS), FWS/R1/2002-0048454.

Date of Notification:	5/17/23	
Project Name:	OPG Port Gamble, LLC (Shoreline Restoration)	
Corps Reference Number:	NWS-2022-717	
Location (Lat./Long.):	47.853925, -122.582112	
Type of Request	NMFS	USFWS
	☐ Notification Only ☐ Notification and Verification ▣ Minor Alteration Request and Verification	☐ Notification Only ▣ Minor Alteration Notification
Statutory Authority	▣ NMFS: ESA and EFH ☐ NMFS: EFH Only	▣ USFWS: ESA Only
General Information	▣ JARPA enclosed ▣Project Drawings Enclosed	
Project Description including conservation offsets, if applicable.	Southern Mill Site Shoreline Restoration: This 9-acre project includes laying back intertidal slopes of the southern portion of the former sawmill facility shoreline to restore near-natural beach grades. Restored intertidal caps will include a lower layer of angular cobble-sized armor, a middle layer of rounded cobble/gravel beach substrate, and an upper layer of sand/gravel habitat substrate to optimize habitat functions and concurrently remain protective. Near-surface hardscape will be removed within a 150-foot shoreline buffer, followed by placement of imported topsoil and mulch and native plantings. Material for the intertidal cap and habitat layers (14,800 cy), and feeder berm (1,500 cy) will be clean and sourced from an approved off-site vendor. Materials will be placed using standard upland construction equipment. Western Bay Nearshore Thin Layer Sand Cover: This project includes placing a sand cover layer over a minimum of 11 acres of lower intertidal to shallow subtidal zones (approximately -2 to -15 feet mean lower low water [MLLW]) within former log rafting areas in the western bay to restore benthic habitat functions and concurrently provide suitable substrate in areas where eelgrass is absent or growing at very sparse densities. As practicable, the sand cover will be placed using clean navigation channel maintenance dredge material from the nearby Driftwood Key, or other similar marine source, which is expected to contain eelgrass seed and maximize restoration potential. (Maintenance dredging activities at Driftwood Key are addressed under NWS-2023-147.) Western Bay Nearshore Eelgrass Transplanting: Eelgrass will be transplanted into western bay areas where there is currently little or no eelgrass, including on and adjacent to the thin layer sand cover. Eelgrass transplanting will be performed following placement and consolidation of the cover, informed by monitoring and adaptive management methods patterned after those used successfully at other western Washington sites.	

Activity Category:

☐	Culvert and bridge repair and replacement resulting in improvements for fish passage	PDC #1
☐	Utilities	PDC #2
☐	Stormwater facilities and outfalls	PDC #3
☑	Shoreline modifications	PDC #4
☐	Expand or install a new in-water or overwater structure	PDC #5
☐	Repair or replace an existing structure	PDC #6
☐	Minor maintenance of an existing structure	PDC #7
☐	Repair, replace, or install a new aid to navigation, scientific measurement device, or tideland marker	PDC #8
☐	Dredging for vessel access	PDC #9
☐	Dredging and debris removal to maintain functionality of culverts, water intakes, or outfalls	PDC #10
☑	Habitat enhancement activities	PDC #11
☐	Set-back or removal of existing tidegates, berms, dikes or levees	PDC #12
☑	Beach nourishment	PDC #13
☐	Sediment remediation	PDC #14

Review the PDC checklist(s) for each applicable activity category.

1. Are all applicable project design criteria met? Yes
    a. If no, describe why and how the work would not result in any adverse effects beyond those considered in the programmatics:

2. If applicable, provide a list of the required monitoring plans/reports enclosed or required post-construction:

General Construction Measures (GCM):

☑	Minimize Construction Impacts at Project Site	GCM #1
☑	In-Water Work Timing	GCM #2
☐	Isolation of Concrete Work	GCM #3
☐	Fish Screens	GCM #4
☐	Drilling, Boring, and Tunneling	GCM #5
☐	Pile Installation	GCM #6
☐	Marbled Murrelet Monitoring Plan	GCM #7

☐	Treated Wood Piles	GCM #8
☐	Pile Removal – Intact	GCM #9
☐	Pile Removal – Broken or Intractable	GCM #10
☐	Treated Wood for Uses Other Than Piles	GCM #11
☐	Barge Use	GCM #12
☐	Stormwater Management	GCM #13
☑	Pollution and Erosion Control	GCM #14
☐	Fish Capture and Release	GCM #15
☐	Marine Mammals	Program Administration # 9

Review the applicable GCM List of Requirements specific to the proposed work.

1. Are all applicable GCM's met? No
    a. If no, describe why and how the work would not result in any adverse effects beyond those considered in the programmatic:

    GCM 2: Proposed modification to in-water work window; see attached email for rationale

2. If applicable, provide a list of the required monitoring plans/reports enclosed or required post-construction:

Project Modifications:

☑	Work outside the specified in-water work period when the change would not result in any adverse effects beyond those considered in the programmatic consultation.
☐	Alternate location for equipment, refueling, and staging due to topographical or other site-specific constraints.
☐	Not installing an anti-perch device (on piling).
☐	Marina facility expansion with no more than 1,000 square feet of additional over water coverage or 10 new slips. Whichever is less so long as the other criteria in PDC #5 are met.
☐	Underwater sound attenuation methods demonstrating equivalent sound attenuation to bubble curtains.

If an alteration is requested, include information detailing why the alteration is needed and how the proposal would not result in any adverse effects beyond those considered in the programmatic consultations:

Modification requesting to extend the in-water work window for intertidal excavation and fill placement to begin on June 1st instead of July 16th. Please see attached email dated 12 May 2023 for rationale

Essential Fish Habitat Conservation Measures:

Applicable	If applicable but will not be implemented, explain.	
☐		1. All projects resulting in a loss of eelgrass habitat, are required to follow eelgrass mitigation monitoring requirements put forth in the Washington Department of Fish and Wildlife "Eelgrass/Macroalgae Habitat Interim Survey Guidelines" unless it conflicts with Seattle District Corps guidelines, in which case the Corps guidelines apply.
☐		2. All new moorings buoys should be anchored in areas where SAV (e.g., eelgrass, kelp) habitat is absent. This will reduce adverse impacts to SAV. Additionally, all new mooring buoys should, to the maximum extent practicable, be in waters deep enough so that the bottom of the vessel remains a minimum of 18 inches off the substrate during extreme low tide events. This will reduce adverse grounding impacts to benthic habitat.
☐		3. When repairing or replacing mooring buoys, located within SAV habitat should be of the type that use midline floats, where appropriate, to prevent chain scour to the substrate. This will reduce adverse impacts to SAV and other benthic habitat.
☐		4. Encircle the pile with a silt curtain that extends from the surface of the water to the substrate, where appropriate and feasible.
☐		5. Drive piles during low tide periods when substrates are exposed in intertidal areas, where appropriate and feasible. This minimizes the direct impacts to fish from sound waves and minimizing the amount of sediments re-suspended in the water column.
☐		6. Any cross or transverse bracing should be placed above the plane of MHHW, where appropriate and feasible, to avoid impacts to water flow and circulation.
☐		7. Minimize, to the maximum extent practicable, the footprint of the overwater structure.
☐		8. Design structures in a north-south orientation, to the maximum extent practicable, to minimize persistent shading over the course of a diurnal cycle.

☐		9. For residential dock and pier structures, the height of the structure above water should be a minimum of 5 feet above MHHW, where appropriate and feasible.
☐		10. The use of floats should be minimized to the extent practicable and should be restricted to terminal platforms placed in deep water where appropriate and feasible and when the Corps determines there will not be a navigation hazard.
☐		11. When breakwaters are required, floating breakwaters are preferred. Encourage seasonal use of breakwaters.
☑		12. Use soft approaches (e.g., beach nourishment, soft or hybrid armoring, vegetative plantings, and placement of LWD) in lieu of “hard” shoreline stabilization and modifications (such as concrete bulkheads and seawalls, concrete or rock revetments), where appropriate and feasible.
☑		13. If planting in the riparian zone, use an adaptive management plan with ecological indicators and performance standards to oversee monitoring and ensure mitigation objectives are met, unless it is contrary to a Corps approved riparian planting plan.

US Army Corps of Engineers
Seattle District

NATIONWIDE PERMIT 27
Terms and Conditions

2021 NWPs - Final 41; Effective Date: February 25, 2022

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In addition to any special condition that may be required on a case-by-case basis by the District Engineer, the following terms and conditions must be met, as applicable, for a Nationwide Permit (NWP) authorization to be valid in Washington State.

A. DESCRIPTION OF AUTHORIZED ACTIVITIES

27. Aquatic Habitat Restoration, Enhancement, and Establishment Activities. Activities in waters of the United States associated with the restoration, enhancement, and establishment of tidal and non-tidal wetlands and riparian areas, the restoration and enhancement of non-tidal streams and other non-tidal open waters, and the rehabilitation or enhancement of tidal streams, tidal wetlands, and tidal open waters, provided those activities result in net increases in aquatic resource functions and services.

To be authorized by this NWP, the aquatic habitat restoration, enhancement, or establishment activity must be planned, designed, and implemented so that it results in aquatic habitat that resembles an ecological reference. An ecological reference may be based on the characteristics of one or more intact aquatic habitats or riparian areas of the same type that exist in the region. An ecological reference may be based on a conceptual model developed from regional ecological knowledge of the target aquatic habitat type or riparian area.

To the extent that a Corps permit is required, activities authorized by this NWP include, but are not limited to the removal of accumulated sediments; releases of sediment from reservoirs to maintain sediment transport continuity to restore downstream habitats; the installation, removal, and maintenance of small water control structures, dikes, and berms, as well as discharges of dredged or fill material to restore appropriate stream channel configurations after small water control structures, dikes, and berms are removed; the installation of current deflectors; the enhancement, rehabilitation, or re-establishment of riffle and pool stream structure; the placement of in-stream habitat structures; modifications of the stream bed and/or banks to enhance, rehabilitate, or re-establish stream meanders; the removal of stream barriers, such as undersized culverts, fords, and grade control structures; the backfilling of artificial channels; the removal of existing drainage structures, such as drain tiles, and the filling, blocking, or reshaping of drainage ditches to restore wetland hydrology; the installation of structures or fills necessary to restore or enhance wetland or stream hydrology; the construction of small nesting islands; the construction of open water areas; the construction of oyster habitat over unvegetated bottom in tidal waters; coral restoration or relocation activities; shellfish seeding; activities needed to reestablish vegetation, including plowing or discing for seed bed preparation and the planting of appropriate wetland species; re-establishment of submerged aquatic vegetation in areas where those plant communities previously existed; re-establishment of tidal wetlands in tidal waters where those wetlands previously existed; mechanized land clearing to remove non-native invasive, exotic, or nuisance vegetation; and other related activities. Only native plant species should be planted at the site.

This NWP authorizes the relocation of non-tidal waters, including non-tidal wetlands and streams, on the project site provided there are net increases in aquatic resource functions and services.

Except for the relocation of non-tidal waters on the project site, this NWP does not authorize the conversion of a stream or natural wetlands to another aquatic habitat type (e.g., the conversion of a stream to wetland or vice versa) or uplands. Changes in wetland plant communities that occur when wetland hydrology is more fully restored during wetland rehabilitation activities are not considered a conversion to another aquatic habitat type. This NWP does not authorize stream channelization. This NWP does not authorize the relocation of tidal waters or the conversion of tidal waters, including tidal wetlands, to other aquatic uses, such as the conversion of tidal wetlands into open water impoundments.

Compensatory mitigation is not required for activities authorized by this NWP since these activities must result in net increases in aquatic resource functions and services.

Reversion. For enhancement, restoration, and establishment activities conducted: (1) In accordance with the terms and conditions of a binding stream or wetland enhancement or restoration agreement, or a wetland establishment agreement, between the landowner and the U.S. Fish and Wildlife Service (FWS), the Natural Resources Conservation Service (NRCS), the Farm Service Agency (FSA), the National Marine Fisheries Service (NMFS), the National Ocean Service (NOS), U.S. Forest Service (USFS), or their designated state cooperating agencies; (2) as voluntary wetland restoration, enhancement, and establishment actions documented by the NRCS or USDA Technical Service Provider pursuant to NRCS Field Office Technical Guide standards; or (3) on reclaimed surface coal mine lands, in accordance with a Surface Mining Control and Reclamation Act permit issued by the Office of Surface Mining Reclamation and Enforcement (OSMRE) or the applicable state agency, this NWP also authorizes any future discharge of dredged or fill material associated with the reversion of the area to its documented prior condition and use (i.e., prior to the restoration, enhancement, or establishment activities). The reversion must occur within five years after expiration of a limited term wetland restoration or establishment agreement or permit, and is authorized in these circumstances even if the discharge of dredged or fill material occurs after this NWP expires. The five-year reversion limit does not apply to agreements without time limits reached between the landowner and the FWS, NRCS, FSA, NMFS, NOS, USFS, or an appropriate state cooperating agency. This NWP also authorizes discharges of dredged or fill material in waters of the United States for the reversion of wetlands that were restored, enhanced, or established on prior-converted cropland or on uplands, in accordance with a binding agreement between the landowner and NRCS, FSA, FWS, or their designated state cooperating agencies (even though the restoration, enhancement, or establishment activity did not require a section 404 permit). The prior condition will be documented in the original agreement or permit, and the determination of return to prior conditions will be made by the Federal agency or appropriate state agency executing the agreement or permit. Before conducting any reversion activity, the permittee or the appropriate Federal or state agency must notify the district engineer and include the documentation of the prior condition. Once an area has reverted to its prior physical condition, it will be subject to whatever the Corps Regulatory requirements are applicable to that type of land at the time. The requirement that the activity results in a net increase in aquatic resource functions and services does not apply to reversion activities meeting the above conditions. Except for the activities described above, this NWP does not authorize any future discharge of dredged or fill material associated with the reversion of the area to its prior condition. In such cases a separate permit would be required for any reversion.

Reporting. For those activities that do not require pre-construction notification, the permittee must submit to the district engineer a copy of: (1) the binding stream enhancement or restoration agreement or wetland enhancement, restoration, or establishment agreement, or a project description, including project plans and location map; (2) the NRCS or USDA Technical Service Provider documentation for the voluntary stream enhancement or restoration action or wetland restoration, enhancement, or establishment action; or (3) the SMCRA permit issued by OSMRE or the applicable state agency. The report must also include information on baseline ecological conditions on the project site, such as a delineation of wetlands, streams, and/or other aquatic habitats. These documents must be submitted to the district engineer at least 30 days prior to commencing activities in waters of the United States authorized by this NWP.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing any activity (see general condition 32), except for the following activities:

(1) Activities conducted on non-Federal public lands and private lands, in accordance with the terms and conditions of a binding stream enhancement or restoration agreement or wetland enhancement, restoration, or establishment agreement between the landowner and the FWS, NRCS, FSA, NMFS, NOS, USFS or their designated state cooperating agencies;

(2) Activities conducted in accordance with the terms and conditions of a binding coral restoration or relocation agreement between the project proponent and the NMFS or any of its designated state cooperating agencies;

(3) Voluntary stream or wetland restoration or enhancement action, or wetland establishment action, documented by the NRCS or USDA Technical Service Provider pursuant to NRCS Field Office Technical Guide standards; or

(4) The reclamation of surface coal mine lands, in accordance with an SMCRA permit issued by the OSMRE or the applicable state agency.

However, the permittee must submit a copy of the appropriate documentation to the district engineer to fulfill the reporting requirement. (Authorities: Sections 10 and 404)

Note: This NWP can be used to authorize compensatory mitigation projects, including mitigation banks and in-lieu fee projects. However, this NWP does not authorize the reversion of an area used for a compensatory mitigation project to its prior condition, since compensatory mitigation is generally intended to be permanent.

B. CORPS NATIONAL GENERAL CONDITIONS FOR ALL 2021 NWPs - FINAL 41

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP. Every person who may wish to obtain permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR 330.1 through 330.6 apply to every NWP authorization. Note especially 33 CFR 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

1. Navigation. (a) No activity may cause more than a minimal adverse effect on navigation.

(b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

(c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his or her authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species. If a bottomless culvert cannot be

used, then the crossing should be designed and constructed to minimize adverse effects to aquatic life movements.

3. Spawning Areas. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. Migratory Bird Breeding Areas. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. Shellfish Beds. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. Suitable Material. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see section 307 of the Clean Water Act).

7. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. Adverse Effects From Impoundments. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. Management of Water Flows. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization, storm water management activities, and temporary and permanent road crossings, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. Fills Within 100-Year Floodplains. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. Equipment. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. Soil Erosion and Sediment Controls. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow, or during low tides.

13. Removal of Temporary Structures and Fills. Temporary structures must be removed, to the maximum extent practicable, after their use has been discontinued. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. Proper Maintenance. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. Single and Complete Project. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. Wild and Scenic Rivers. (a) No NWP activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status.

(b) If a proposed NWP activity will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, the permittee must submit a pre-construction notification (see general condition 32). The district engineer will coordinate the PCN with the Federal agency with direct management responsibility for that river. Permittees shall not begin the NWP activity until notified by the district engineer that the Federal agency with direct management responsibility for that river has determined in writing that the proposed NWP activity will not adversely affect the Wild and Scenic River designation or study status.

(c) Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: http://www.rivers.gov/.

17. Tribal Rights. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

18. Endangered Species. (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify designated critical habitat or critical habitat proposed for such designation. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless ESA section 7 consultation addressing the consequences of the proposed activity on listed species or critical habitat has been completed. See 50 CFR 402.02 for the definition of "effects of the action" for the purposes of ESA section 7 consultation, as well as 50 CFR 402.17, which provides further explanation under ESA section 7 regarding "activities that are reasonably certain to occur" and "consequences caused by the proposed action."

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA (see 33 CFR 330.4(f)(1)). If pre-construction notification is required for the proposed activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be necessary for the activity and the respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed such designation) might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat or critical habitat proposed for such designation, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation), the pre-construction notification must include the name(s) of the endangered or threatened species (or species proposed for listing) that might be affected by the proposed activity or that utilize the designated critical habitat (or critical habitat proposed for such designation) that might be affected by the proposed activity. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant

of the Corps' determination within 45 days of receipt of a complete pre-construction notification. For activities where the non-Federal applicant has identified listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation) that might be affected or is in the vicinity of the activity, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification that the proposed activity will have "no effect" on listed species (or species proposed for listing or designated critical habitat (or critical habitat proposed for such designation), or until ESA section 7 consultation or conference has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(d) As a result of formal or informal consultation or conference with the FWS or NMFS the district engineer may add species-specific permit conditions to the NWPs.

(e) Authorization of an activity by an NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

(f) If the non-federal permittee has a valid ESA section 10(a)(1)(B) incidental take permit with an approved Habitat Conservation Plan for a project or a group of projects that includes the proposed NWP activity, the non-federal applicant should provide a copy of that ESA section 10(a)(1)(B) permit with the PCN required by paragraph (c) of this general condition. The district engineer will coordinate with the agency that issued the ESA section 10(a)(1)(B) permit to determine whether the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation conducted for the ESA section 10(a)(1)(B) permit. If that coordination results in concurrence from the agency that the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation for the ESA section 10(a)(1)(B) permit, the district engineer does not need to conduct a separate ESA section 7 consultation for the proposed NWP activity. The district engineer will notify the non-federal applicant within 45 days of receipt of a complete pre-construction notification whether the ESA section 10(a)(1)(B) permit covers the proposed NWP activity or whether additional ESA section 7 consultation is required.

(g) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the FWS and NMFS or their world wide web pages at http://www.fws.gov/ or http://www.fws.gov/ipac and http://www.nmfs.noaa.gov/pr/species/esa/ respectively.

19. Migratory Birds and Bald and Golden Eagles. The permittee is responsible for ensuring that an action authorized by an NWP complies with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The permittee is responsible for contacting the appropriate local office of the U.S. Fish and Wildlife Service to determine what measures, if any, are necessary or appropriate to reduce adverse effects to migratory birds or eagles, including whether "incidental take" permits are necessary and available under the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act for a particular activity.

20. Historic Properties. (a) No activity is authorized under any NWP which may have the potential to cause effects to properties listed, or eligible for listing, in the National Register of Historic Places until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

(b) Federal permittees should follow their own procedures for complying with the requirements of section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)(1)). If pre-construction notification is required for the proposed NWP activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will

verify that the appropriate documentation has been submitted. If the appropriate documentation is not submitted, then additional consultation under section 106 may be necessary. The respective federal agency is responsible for fulfilling its obligation to comply with section 106.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the NWP activity might have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties might have the potential to be affected by the proposed NWP activity or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of, or potential for, the presence of historic properties can be sought from the State Historic Preservation Officer, Tribal Historic Preservation Officer, or designated tribal representative, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts commensurate with potential impacts, which may include background research, consultation, oral history interviews, sample field investigation, and/or field survey. Based on the information submitted in the PCN and these identification efforts, the district engineer shall determine whether the proposed NWP activity has the potential to cause effects on the historic properties. Section 106 consultation is not required when the district engineer determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR 800.3(a)). Section 106 consultation is required when the district engineer determines that the activity has the potential to cause effects on historic properties. The district engineer will conduct consultation with consulting parties identified under 36 CFR 800.2(c) when he or she makes any of the following effect determinations for the purposes of section 106 of the NHPA: no historic properties affected, no adverse effect, or adverse effect.

(d) Where the non-Federal applicant has identified historic properties on which the proposed NWP activity might have the potential to cause effects and has so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects to historic properties or that NHPA section 106 consultation has been completed. For non-federal permittees, the district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA section 106 consultation is required. If NHPA section 106 consultation is required, the district engineer will notify the non-Federal applicant that he or she cannot begin the activity until section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (54 U.S.C. 306113) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts. Permittees that discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by an NWP, they must immediately notify the district engineer of what they have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal,

and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters. Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.

(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, 52, 57 and 58 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, 38, and 54, notification is required in accordance with general condition 32, for any activity proposed by permittees in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after she or he determines that the impacts to the critical resource waters will be no more than minimal.

23. Mitigation. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal:

(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects.

(d) Compensatory mitigation at a minimum one-for-one ratio will be required for all losses of stream bed that exceed 3/100-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. This compensatory mitigation requirement may be satisfied through the restoration or enhancement of riparian areas next to streams in accordance with paragraph (e) of this general condition. For losses of stream bed of 3/100-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects. Compensatory mitigation for losses of streams should be provided, if practicable, through stream rehabilitation, enhancement, or preservation, since streams are difficult-to-replace resources (see 33 CFR 332.3(e)(3)).

(e) Compensatory mitigation plans for NWP activities in or near streams or other open waters will normally include a requirement for the restoration or enhancement, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, the restoration or maintenance/protection of riparian areas may be the only compensatory mitigation required. If restoring riparian areas involves planting vegetation, only native species should be planted. The width of the

required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to restore or maintain/protect a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or maintaining/protecting a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of minimization or compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(f) Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in no more than minimal adverse environmental effects. For the NWPs, the preferred mechanism for providing compensatory mitigation is mitigation bank credits or in-lieu fee program credits (see 33 CFR 332.3(b)(2) and (3)). However, if an appropriate number and type of mitigation bank or in-lieu credits are not available at the time the PCN is submitted to the district engineer, the district engineer may approve the use of permittee-responsible mitigation.

(2) The amount of compensatory mitigation required by the district engineer must be sufficient to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.1(e)(3)). (See also 33 CFR 332.3(f).)

(3) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, aquatic resource restoration should be the first compensatory mitigation option considered for permittee-responsible mitigation.

(4) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) through (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)). If permittee-responsible mitigation is the proposed option, and the proposed compensatory mitigation site is located on land in which another federal agency holds an easement, the district engineer will coordinate with that federal agency to determine if proposed compensatory mitigation project is compatible with the terms of the easement.

(5) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan needs to address only the baseline conditions at the impact site and the number of credits to be provided (see 33 CFR 332.4(c)(1)(ii)).

(6) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan (see 33 CFR 332.4(c)(1)(ii)).

(g) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any NWP activity resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that an NWP activity already

meeting the established acreage limits also satisfies the no more than minimal impact requirement for the NWPs.

(h) Permittees may propose the use of mitigation banks, in-lieu fee programs, or permittee-responsible mitigation. When developing a compensatory mitigation proposal, the permittee must consider appropriate and practicable options consistent with the framework at 33 CFR 332.3(b). For activities resulting in the loss of marine or estuarine resources, permittee-responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(i) Where certain functions and services of waters of the United States are permanently adversely affected by a regulated activity, such as discharges of dredged or fill material into waters of the United States that will convert a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse environmental effects of the activity to the no more than minimal level.

24. Safety of Impoundment Structures. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state or federal, dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. Water Quality. (a) Where the certifying authority (state, authorized tribe, or EPA, as appropriate) has not previously certified compliance of an NWP with CWA section 401, a CWA section 401 water quality certification for the proposed discharge must be obtained or waived (see 33 CFR 330.4(c)). If the permittee cannot comply with all of the conditions of a water quality certification previously issued by certifying authority for the issuance of the NWP, then the permittee must obtain a water quality certification or waiver for the proposed discharge in order for the activity to be authorized by an NWP.

(b) If the NWP activity requires pre-construction notification and the certifying authority has not previously certified compliance of an NWP with CWA section 401, the proposed discharge is not authorized by an NWP until water quality certification is obtained or waived. If the certifying authority issues a water quality certification for the proposed discharge, the permittee must submit a copy of the certification to the district engineer. The discharge is not authorized by an NWP until the district engineer has notified the permittee that the water quality certification requirement has been satisfied by the issuance of a water quality certification or a waiver.

(c) The district engineer or certifying authority may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

26. Coastal Zone Management. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). If the permittee cannot comply with all of the conditions of a coastal zone management consistency concurrence previously issued by the state, then the permittee must obtain an individual coastal zone management consistency concurrence or presumption of concurrence in order for the activity to be authorized by an NWP. The district engineer or a state may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. Regional and Case-By-Case Conditions. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its CWA section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. Use of Multiple Nationwide Permits. The use of more than one NWP for a single and complete project is authorized, subject to the following restrictions:
(a) If only one of the NWPs used to authorize the single and complete project has a specified acreage limit, the acreage loss of waters of the United States cannot exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.
(b) If one or more of the NWPs used to authorize the single and complete project has specified acreage limits, the acreage loss of waters of the United States authorized by those NWPs cannot exceed their respective specified acreage limits. For example, if a commercial development is constructed under NWP 39, and the single and complete project includes the filling of an upland ditch authorized by NWP 46, the maximum acreage loss of waters of the United States for the commercial development under NWP 39 cannot exceed 1/2-acre, and the total acreage loss of waters of United States due to the NWP 39 and 46 activities cannot exceed 1 acre.

29. Transfer of Nationwide Permit Verifications. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

"When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

_____
(Transferee)

_____
(Date)

30. Compliance Certification. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and implementation of any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

(a) A statement that the authorized activity was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;

(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

(c) The signature of the permittee certifying the completion of the activity and mitigation.

The completed certification document must be submitted to the district engineer within 30 days of completion of the authorized activity or the implementation of any required compensatory mitigation, whichever occurs later.

31. Activities Affecting Structures or Works Built by the United States. If an NWP activity also requires review by, or permission from, the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers (USACE) federally authorized Civil Works project (a "USACE project"), the prospective permittee must submit a pre-construction notification. See paragraph (b)(10) of general condition 32. An activity that requires section 408 permission and/or review is not authorized by an NWP until the appropriate Corps office issues the section 408 permission or completes its review to alter, occupy, or use the USACE project, and the district engineer issues a written NWP verification.

32. Pre-Construction Notification. (a) *Timing*. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

(1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or are in the vicinity of the activity, or to notify the Corps pursuant to general condition 20 that the activity might have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)) has been completed. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) *Contents of Pre-Construction Notification*: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed activity;

(3) Identify the specific NWP or NWP(s) the prospective permittee wants to use to authorize the proposed activity;

(4) (i) A description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or

other appropriate unit of measure; a description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity; and any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings for linear projects that require Department of the Army authorization but do not require pre-construction notification. The description of the proposed activity and any proposed mitigation measures should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no more than minimal and to determine the need for compensatory mitigation or other mitigation measures.

(ii) For linear projects where one or more single and complete crossings require pre-construction notification, the PCN must include the quantity of anticipated losses of wetlands, other special aquatic sites, and other waters for each single and complete crossing of those wetlands, other special aquatic sites, and other waters (including those single and complete crossings authorized by an NWP but do not require PCNs). This information will be used by the district engineer to evaluate the cumulative adverse environmental effects of the proposed linear project, and does not change those non-PCN NWP activities into NWP PCNs.

(iii) Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the activity and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

(5) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial and intermittent streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. Furthermore, the 45-day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

(6) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands or 3/100-acre of stream bed and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(7) For non-federal permittees, if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation) might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat (or critical habitat proposed for such designation), the PCN must include the name(s) of those endangered or threatened species (or species proposed for listing) that might be affected by the proposed activity or utilize the designated critical habitat (or critical habitat proposed for such designation) that might be affected by the proposed activity. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with the Endangered Species Act;

(8) For non-federal permittees, if the NWP activity might have the potential to cause effects to a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, the PCN must state which historic property might have the potential to be affected by the proposed activity or include a vicinity map indicating the location of the historic property. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with section 106 of the National Historic Preservation Act;

(9) For an activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a “study river” for possible inclusion in the system while the river is in an official study status, the PCN must identify the Wild and Scenic River or the “study river” (see general condition 16); and

(10) For an NWP activity that requires permission from, or review by, the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, the pre-construction notification must include a statement confirming that the project proponent has submitted a written request for section 408 permission from, or review by, the Corps office having jurisdiction over that USACE project.

(c) *Form of Pre-Construction Notification*: The nationwide permit pre-construction notification form (Form ENG 6082) should be used for NWP PCNs. A letter containing the required information may also be used. Applicants may provide electronic files of PCNs and supporting materials if the district engineer has established tools and procedures for electronic submittals.

(d) *Agency Coordination*: (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the activity's adverse environmental effects so that they are no more than minimal.

(2) Agency coordination is required for: (i) all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States; (ii) NWP 13 activities in excess of 500 linear feet, fills greater than one cubic yard per running foot, or involve discharges of dredged or fill material into special aquatic sites; and (iii) NWP 54 activities in excess of 500 linear feet, or that extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes.

(3) When agency coordination is required, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (FWS, state natural resource or water quality agency, EPA, and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to notify the district engineer via telephone, facsimile transmission, or e-mail that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse environmental effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure that the net adverse environmental effects of the proposed activity are no more than minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(4) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(5) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

C. SEATTLE DISTRICT REGIONAL GENERAL CONDITIONS: The following conditions apply to the 2021 NWPs - Final 41 NWPs for the Seattle District in Washington State, as applicable.

RGC 1, Project Drawings
Drawings must be submitted with pre-construction notification (PCN). Drawings must provide a clear understanding of the proposed project, and how waters of the United States will be affected. Drawings

must be originals and not reduced copies of large-scale plans. Engineering drawings are not required. Existing and proposed site conditions (manmade and landscape features) must be drawn to scale.

RGC 2, Aquatic Resources Requiring Special Protection
A PCN is required for activities resulting in a loss of waters of the United States in wetlands in dunal systems along the Washington coast, mature forested wetlands, bogs and peatlands, aspen-dominated wetlands, alkali wetlands, vernal pools, camas prairie wetlands, estuarine wetlands, and wetlands in coastal lagoons.

RGC 3, New Bank Stabilization in Tidal Waters of Puget Sound
Activities involving new bank stabilization in tidal waters in Water Resource Inventory Areas (WRIAs) 8, 9, 10, 11 and 12 (within the areas identified on Figures 1a through 1e) cannot be authorized by NWP.

RGC 4, Commencement Bay
No permanent losses of wetlands or mudflats within the Commencement Bay Study Area may be authorized by any NWP (see Figure 2).

RGC 5, Bank Stabilization
All projects including new or maintenance bank stabilization activities in waters of the United States where salmonid species are present or could be present, requires PCN to the U.S. Army Corps of Engineers (Corps) (see NWP general condition 32).
For new bank stabilization projects only, the following must be submitted to the Corps:

a. The cause of the erosion and the distance of any existing structures from the area(s) being stabilized.
b. The type and length of existing bank stabilization within 300 feet of the proposed project.
c. A description of current conditions and expected post-project conditions in the waterbody.
d. A statement describing how the project incorporates elements avoiding and minimizing adverse environmental effects to the aquatic environment and nearshore riparian area, including vegetation impacts in the waterbody.

In addition to a. through d., the results from any relevant geotechnical investigations can be submitted with the PCN if it describes current or expected conditions in the waterbody.

RGC 6, Crossings of Waters of the United States
Any project including installing, replacing, or modifying crossings of waters of the United States, such as culverts or bridges, requires submittal of a PCN to the U.S. Army Corps of Engineers (see NWP general condition 32).
If a culvert is proposed to cross waters of the U.S. where salmonid species are present or could be present, the project must apply the stream simulation design method from the Washington Department of Fish and Wildlife located in the *Water Crossing Design Guidelines* (2013), or a design method which provides passage at all life stages at all flows where the salmonid species would naturally seek passage. If the stream simulation design method is not applied for a culvert where salmonid species are present or could be present, the project proponent must provide a rationale in the PCN sufficient to establish one of the following:

a. The existence of extraordinary site conditions.
b. How the proposed design will provide equivalent or better fish passage and fisheries habitat benefits than the stream simulation design method.

Culverts installed under emergency authorization that do not meet the above design criteria will be required to meet the above design criteria to receive an after-the-fact nationwide permit verification.

RGC 7, Stream Loss
A PCN is required for all activities that result in the loss of any linear feet of streams.

RGC 8, Construction Boundaries
Permittees must clearly mark all construction area boundaries within waters of the United States before beginning work on projects that involve grading or placement of fill. Boundary markers and/or construction fencing must be maintained and clearly visible for the duration of construction. Permittees

should avoid and minimize removal of native vegetation (including submerged aquatic vegetation) to the maximum extent possible.

RGC 9, ESA Reporting to NMFS
For any nationwide permit that may affect threatened or endangered species;
Incidents where any individuals of fish species, marine mammals and/or sea turtles listed by National Oceanic and Atmospheric Administration Fisheries, National Marine Fisheries Service (NMFS) under the Endangered Species Act appear to be injured or killed as a result of discharges of dredged or fill material into waters of the U.S. or structures or work in navigable waters of the U.S. authorized by this Nationwide Permit verification shall be reported to NMFS, Office of Protected Resources at (301) 713-1401 and the Regulatory Office of the Seattle District of the U.S. Army Corps of Engineers at (206) 764-3495. The finder should leave the animal alone, make note of any circumstances likely causing the death or injury, note the location and number of individuals involved and, if possible, take photographs. Adult animals should not be disturbed unless circumstances arise where they are obviously injured or killed by discharge exposure or some unnatural cause. The finder may be asked to carry out instructions provided by the NMFS to collect specimens or take other measures to ensure that evidence intrinsic to the specimen is preserved.

D. SEATTLE DISTRICT REGIONAL SPECIFIC CONDITIONS FOR THIS NWP:

NWP 27 Specific Regional Conditions:
1. A pre-construction notification (PCN) must be submitted to the district engineer (see NWP general condition 32) for any proposed project located in a Department of the Army permit compensatory mitigation site, Comprehensive Environmental Response, Compensation and Liability Act (Superfund) site, Resource Conservation and Recovery Act hazardous waste clean-up site, Washington State Department of Ecology compensatory mitigation site, or Washington State Model Toxics Control Act clean-up site.

2. For projects subject to PCN, if there is a loss of waters of the U.S. the project proponent must explain in the PCN why the loss is necessary. The project proponent must also demonstrate how despite the loss of waters the overall project would result in a net increase in aquatic/ecological functions .

3. The PCN must contain a description of pre-project site conditions including presence of wetlands (including photographs) and aquatic/ecological functions the site provides within the watershed.

4. For projects that would result in a loss of waters of the U.S., the project proponent must include maintenance and monitoring plans with the PCN.

5. Restoration projects involving shellfish seeding must use shellfish native to the watershed.

E. 401 WATER QUALITY CERTIFICATION: Depending on the geographic region of the work authorized by this verification, the appropriate 401 certifying authority has made the following determinations:

Washington Department of Ecology (Ecology) (Projects in all areas except as described for the other certifying agencies listed below): General and Specific WQC Conditions

A. State General Conditions for all Nationwide Permits

In addition to all of the U.S. Army Corps of Engineers' (Corps) national and Seattle District'sregional permit conditions, the following state general Water Quality Certification (WQC) conditions **apply to all NWPs whether granted or granted with conditions** in Washington where Ecology is the certifying authority.

Due to the lack of site specific information on the discharge types, quantities, and specific locations, as well as the condition of receiving waters and the quantity of waters (including wetlands) that may be lost,

Ecology may need to review the project if one of the following stategeneral conditions is triggered.

This case-by-case review may be required, and additional information regarding the project and associated discharges may be needed, to verify that the proposed project would comply with state water quality requirements and if an individual WQC is required or if the project meets this programmatic WQC.

1. **In-water construction activities**. Ecology WQC review is required for projects or activities authorized under NWPs where the project proponent has indicated on the Joint Aquatic Resource Permit Application (JARPA) question 9e that the project or activity will not meet State water quality standards, or has provided information indicating that the project or activity will cause, or may be likely to cause or contributeto an exceedance of a State water quality standard (Chapter 173-201A WAC) or sediment management standard (Chapter 173-204 WAC).

Note: In-water activities include any activity within a jurisdictional wetland and/orwaters.

2. **Projects or Activities Discharging to Impaired Waters**. Ecology WQC review is required for projects or activities that will occur in a 303(d) listed segment of a waterbody or upstream of a listed segment and may result in further exceedances of the specific listedparameter to determine if the project meets this programmatic WQC or will require individual WQC.

To determine if your project or activity is in a 303(d) listed segment of a waterbody, visitEcology's Water Quality Assessment webpage for maps and search tools.

3. **Aquatic resources requiring special protection**. Certain aquatic resources are unique and difficult-to-replace components of the aquatic environment in Washington. Activities that would affect these resources must be avoided to the greatest extent practicable. Compensating for adverse impacts to high value aquatic resources is typically difficult, prohibitively expensive, and may not be possible in some landscapesettings.

Ecology WQC review is required for projects or activities in areas identified below to determine if the project meets this programmatic WQC or will require individual WQC.

a. Activities in or affecting the following aquatic resources:
    i. Wetlands with special characteristics (as defined in the Washington State Wetland Rating Systems for western and eastern Washington, Ecology Publications #14-06-029 and #14-06-030):
        - Estuarine wetlands.
        - Wetlands of High Conservation Value.
        - Bogs.
        - Old-growth forested wetlands and mature forested wetlands.
        - Wetlands in coastal lagoons.
        - Wetlands in dunal systems along the Washington coast.
        - Vernal pools.
        - Alkali wetlands.

    ii. Fens, aspen-dominated wetlands, camas prairie wetlands.

    iii. Category I wetlands.

    iv. Category II wetlands with a habitat score ≥ 8 points.

b. Activities in or resulting in a loss of eelgrass (Zostera marina) beds.

This state general condition does not apply to the following NWPs:

NWP 20 – Response Operations for Oil and Hazardous Substances
NWP 32 – Completed Enforcement Actions
NWP 48 – Commercial Shellfish Mariculture Activities

4. **Loss of More than 300 Linear Feet of Streambed.** For any project that results in the lossof more than 300 linear feet of streambed Ecology WQC review is required to determineif the project meets this programmatic WQC or will require individual WQC.

5. **Temporary Fills.** For any project or activity with temporary fill in wetlands or other waters for more than six months Ecology WQC review is required to determine if theproject meets this programmatic WQC or will require individual WQC.

6. **Mitigation.** Project proponents are required to show that they have followed the mitigation sequence and have first avoided and minimized impacts to aquatic resourceswherever practicable. For projects requiring Ecology WQC review or an individual WQC with unavoidable impacts to aquatics resources, a mitigation plan must be provided.

    a. Wetland mitigation plans submitted for Ecology review and approval shall be based on the most current guidance provided in Wetland Mitigation in Washington State, Parts 1 and 2 (available on Ecology's website) and shall, at aminimum, include the following:

        i. A description of the measures taken to avoid and minimize impacts to wetlands and other waters of the U.S.

        ii. The nature of the proposed impacts (i.e., acreage of wetlands and functions lost or degraded).

        iii. The rationale for the mitigation site that was selected.

        iv. The goals and objectives of the compensatory mitigation project.

        v. How the mitigation project will be accomplished, including construction sequencing, best management practices to protect water quality, proposed performance standards for measuring success and the proposed buffer widths.

        vi. How it will be maintained and monitored to assess progress toward goals and objectives. Monitoring will generally be required for a minimum of five years. For forested and scrub-shrub wetlands, 10 years of monitoring will often be necessary.

        vii. How the compensatory mitigation site will be legally protected for the long term.

Refer to Wetland Mitigation in Washington State – Part 2: Developing Mitigation Plans (Ecology Publication #06-06-011b) and Selecting Wetland Mitigation Sites Using a Watershed Approach (Ecology Publications #09-06-032 (Western Washington) and #10-06-007 (Eastern Washington)) for guidance on selecting suitable mitigation sites and developing mitigation plans.

Ecology encourages the use of alternative mitigation approaches, includingcredit/debit methodology, advance mitigation, and other programmatic approaches such as mitigation banks and in-lieu fee programs. If you are interested in proposing use of an alternative mitigation approach, consult with the

appropriate Ecology regional staff person. Information on alternative mitigation approaches is available on Ecology's website.

b. Mitigation for other aquatic resource impacts will be determined on a case-by-case basis.

7. **Stormwater Pollution Prevention**. All projects involving land disturbance or impervious surfaces must implement stormwater pollution prevention or control measures to avoiddischarge of pollutants in stormwater runoff to waters.

a. For land disturbances during construction, the applicant must obtain and implement permits (e.g., Construction Stormwater General Permit) where required and follow Ecology's current stormwater manual.

b. Following construction, prevention or treatment of on-going stormwater runofffrom impervious surfaces shall be provided.

Ecology's Stormwater Management and Design Manuals and stormwater permitinformation are available on Ecology's website.

8. **Application**. For projects or activities that will require Ecology WQC review, or anindividual WQC, project proponents must provide Ecology with a JARPA or the equivalent information, along with the documentation provided to the Corps, as described in national general condition 32, Pre-Construction Notification (PCN), including, where applicable:

a. A description of the project, including site plans, project purpose, direct and indirect adverse environmental effects the project discharge(s) would cause, best management practices (BMPs), and proposed means to monitor the discharge(s).

b. List of all federal, state or local agency authorizations required to be used for anypart of the proposed project or any related activity.

c. Drawings indicating the OHWM, delineation of special aquatic sites, and other waters of the state. Wetland delineations must be prepared in accordance with thecurrent method required by the Corps and shall include Ecology's Wetland Rating form. Wetland Rating forms are subject to review and verification by Ecology staff.

Guidance for determining the OHWM is available on Ecology's website.

d. A statement describing how the mitigation requirement will be satisfied. A conceptual or detailed mitigation or restoration plan may be submitted. See stategeneral condition 5.

e. Other applicable requirements of Corps NWP general condition 32, Corps regional conditions, or notification conditions of the applicable NWP.

Ecology **grants with conditions Water Quality Certification** (WQC) for this NWP provided that Ecology individual WQC review is not required per the state general conditions (see above) and the following conditions:

Ecology Section 401 Water Quality Certification – Granted with conditions.

1. Ecology WQC review is required if the project or activity is in a known contaminatedor cleanup site to determine if an individual WQC is required or the project meets the programmatic WQC for this NWP.

2. Ecology individual WQC is required for projects or activities authorized under thisNWP if:
    a. The project or activity directly impacts ½ acre or more of tidal waters; or
    b. The project or activity affects ½ acre or more of wetlands; or
    c. The project or activity is a mitigation bank or an advance mitigation site.

Environmental Protection Agency (EPA) (on Tribal Lands where Tribes Do Not Have Treatment in a Similar Manner as a State and Lands with Exclusive Federal Jurisdiction in Washington):

On behalf of the 28 tribes that do not have treatment in a similar manner as a state and for exclusive federal jurisdiction lands located within the state of Washington, EPA Region 10 has determined that CWA Section 401 WQC for the following proposed NWPs is granted with conditions. EPA Region 10 has determined that any discharge authorized under the following proposed NWPs will comply with water quality requirements, as defined at 40 C.F.R. § 121.1(n), subject to the following conditions pursuant to CWA Section 401(d).

General Conditions:

EPA General Condition 1 – Aquatic Resources of Special Concern

Activities resulting in a point source discharge in the following types of aquatic resources of special concern shall request an individual project-specific CWA Section 401 WQC: mature forested wetlands; bogs, fens and other peatlands; vernal pools; aspen-dominated wetlands; alkali wetlands; camas prairie wetlands; wetlands in dunal systems along the Oregon or Washington Coast; riffle-pool complexes of streams; marine or estuarine mud-flats; salt marshes; marine waters with native eelgrass or kelp beds; or marine nearshore forage fish habitat. To identify whether a project would occur in any of these aquatic resources of special concern, project proponents shall use existing and available information to identify the location and type of resources, including using the U.S. Fish and Wildlife Service's online digital National Wetland Inventory maps, identifying project location on topographical maps, and/or providing on-site determinations as required by the Corps. When a project requires a Pre-Construction Notification (PCN) to the Corps, project proponents shall work with the Corps to identify whether the project is in any of these specific aquatic resources of special concern.

EPA General Condition 2 – Soil Erosion and Sediment Controls

Turbidity shall not exceed background turbidity by more than 50 Nephelometric Turbidity Units (NTU) above background instantaneously or more than 25 NTU above background for more than ten consecutive days.[8] Projects or activities that are expected to exceed these levels require an individual project-specific CWA Section 401 WQC.

The turbidity standard shall be met at the following distances from the discharge:

Wetted Stream Width at Discharge Point	**Approximate Downstream Point to Sample to Determine Compliance**
Up to 30 feet	50 feet
>30 to 100 feet	100 feet
>100 feet to 200 feet	200 feet
>200 feet	300 feet
Lake, Pond, Reservoir	Lesser of 100 feet or maximum surface distance

For Marine Water	Point of Compliance for Temporary Area of Mixing
Estuaries or Marine Waters	Radius of 150 feet from the activity causing the turbidity exceedance

Measures to prevent and/or reduce turbidity shall be implemented and monitored prior to, during, and after construction. Turbidity monitoring shall be done at the point of compliance within 24 hours of a precipitation event of 0.25 inches or greater. During monitoring and maintenance, if turbidity limits are exceeded or if measures are identified as ineffective, then additional measures shall be taken to come into compliance and EPA shall be notified within 48 hours of the exceedance or measure failure.

EPA General Condition 3 - Compliance with Stormwater Pollution Prevention and the National Pollutant Discharge Elimination System Permit Provisions

For land disturbances during construction that 1) disturb one or more acres of land, or 2) will disturb less than one acre of land but are part of a common plan of development or sale that will ultimately disturb one or more acres of land, the permittee shall obtain and implement Construction Stormwater General Permit requirements,[9] including:

1. The permittee shall develop a Stormwater Pollution Prevention Plan (SWPPP)[10] and submit it to EPA Region 10 and appropriate Corps District; and
2. Following construction, prevention or treatment of ongoing stormwater runoff from impervious surfaces that includes soil infiltration shall be implemented.

EPA General Condition 4 – Projects or Activities Discharging to Impaired Waters

Projects or activities are not authorized under the NWPs if the project will involve point source discharges into an active channel (e.g., flowing or open waters) of a water of the U.S. listed as impaired under CWA Section 303(d) and/or if the waterbody has an approved Total Maximum Daily Load (TMDL) and the discharge may result in further exceedance of a specific parameter (e.g., total suspended solids, dissolved oxygen, temperature) for which the waterbody is listed or has an approved TMDL. The current lists of impaired waters of the U.S. under CWA Section 303(d) and waters of the U.S. for which a TMDL has been approved are available on EPA Region 10's web site at: https://www.epa.gov/tmdl/impaired-waters-and-tmdls-region-10.

EPA General Condition 5 – Notice to EPA

All project proponents shall provide notice to EPA Region 10 prior to commencing construction activities authorized by a NWP. This will provide EPA Region 10 with the opportunity to inspect the activity for the purposes of determining whether any discharge from the proposed project will violate this CWA Section 401 WQC. Where the Corps requires a PCN for an applicable NWP, the project proponent shall also provide the PCN to EPA Region 10. EPA Region 10 will provide written notification to the project proponent if the proposed project will violate the water quality certification of the NWP.

EPA General Condition 6 – Unsuitable Materials

The project proponent shall not use wood products treated with leachable chemical components (e.g., copper, arsenic, zinc, creosote, chromium, chloride, fluoride, pentachlorophenol), which result in a discharge to waters of the U.S., unless the wood products meet the following criteria:

1. Wood preservatives and their application shall be in compliance with EPA label requirements and criteria of approved EPA Registration Documents under the Federal Insecticide, Fungicide, and Rodenticide Act;
2. Use of chemically treated wood products shall follow the Western Wood Preservatives Institute (WWPI) guidelines and BMPs to minimize the preservative migrating from treated wood into the aquatic environment;
3. For new or replacement wood structures, the wood shall be sealed with non-toxic

products such as water-based silica or soy-based water repellants or sealers to prevent or limit leaching. Acceptable alternatives to chemically treated wood include untreated wood, steel (painted, unpainted or coated with epoxy petroleum compound or plastic), concrete and plastic lumber; and

4. All removal of chemically treated wood products (including pilings) shall follow the most recent "EPA Region 10 Best Management Practices for Piling Removal and Placement in Washington State."

EPA NWP Specific Conditions:
NWP 27 is conditionally certified, subject to the general conditions listed above, except that an individual project-specific WQC is required when the project:

1. Involves dam removal; or
2. Involves greater than 1 acre of impacts to waters of the U.S.; or
3. Would impact greater than 500 linear feet of waters of the U.S.; or
4. Involves greater than 1/2 acre of impacts to tidal wetlands or waters.

Specific Tribes with Certifying Authority (Projects in Specific Tribal Areas):
WQC was issued by the Swinomish Indian Tribal Community. WQC was waived by the Confederated Tribes of the Chehalis Reservation and Colville Indian Reservation, Kalispel Tribe of Indians, Port Gamble S'Klallam Tribe, Quinault Indian Nation, and the Spokane Tribe of Indians. WQC was denied by the Lummi Nation, Makah Tribe, Puyallup Tribe of Indians, and the Tulalip Tribes; therefore, individual WQC is required from these tribes.

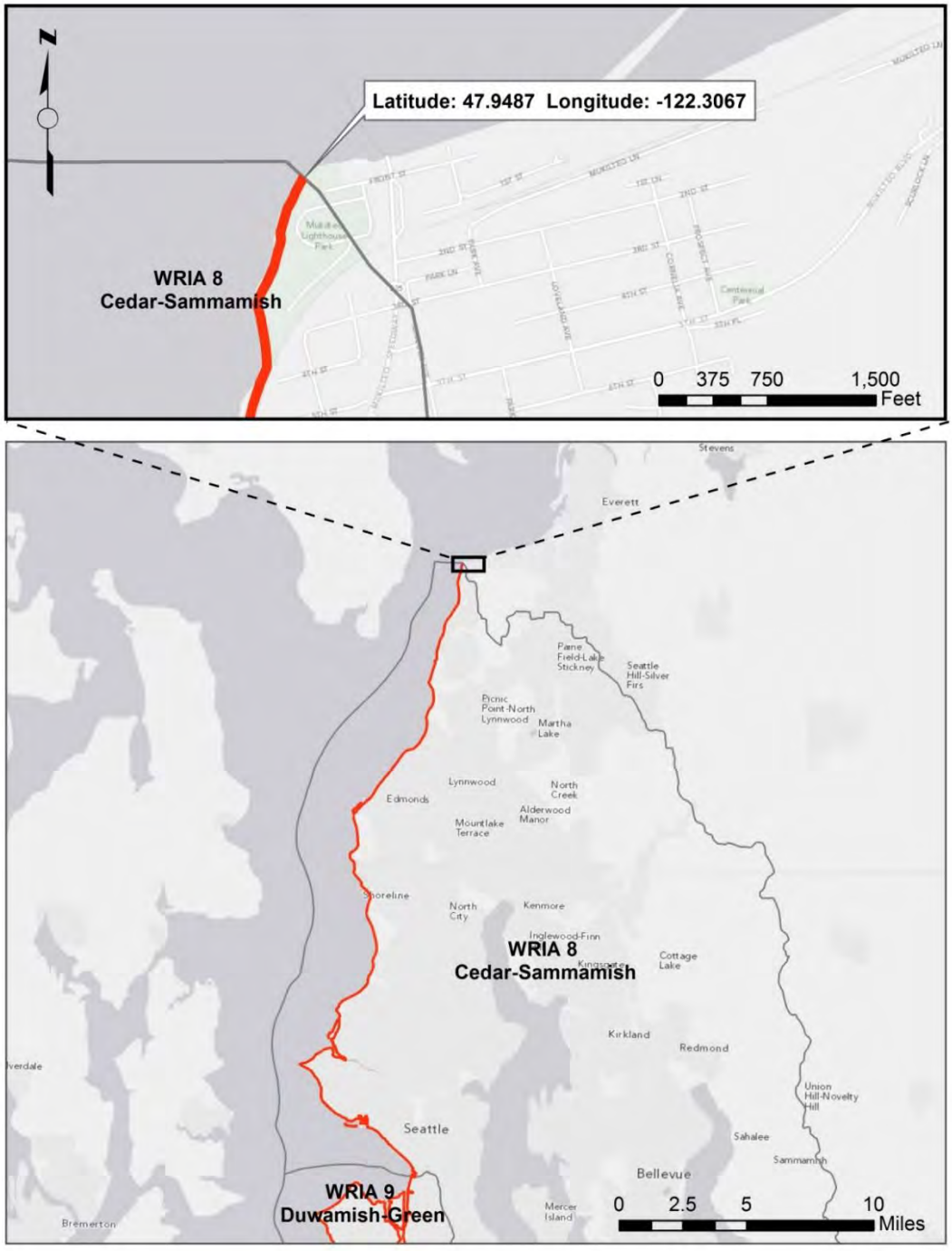
F. COASTAL ZONE MANAGEMENT ACT (CZMA) CONSISTENCY RESPONSE FOR THIS NWP:

Ecology's determination is that they concur with conditions that this NWP is consistent with CZMA.

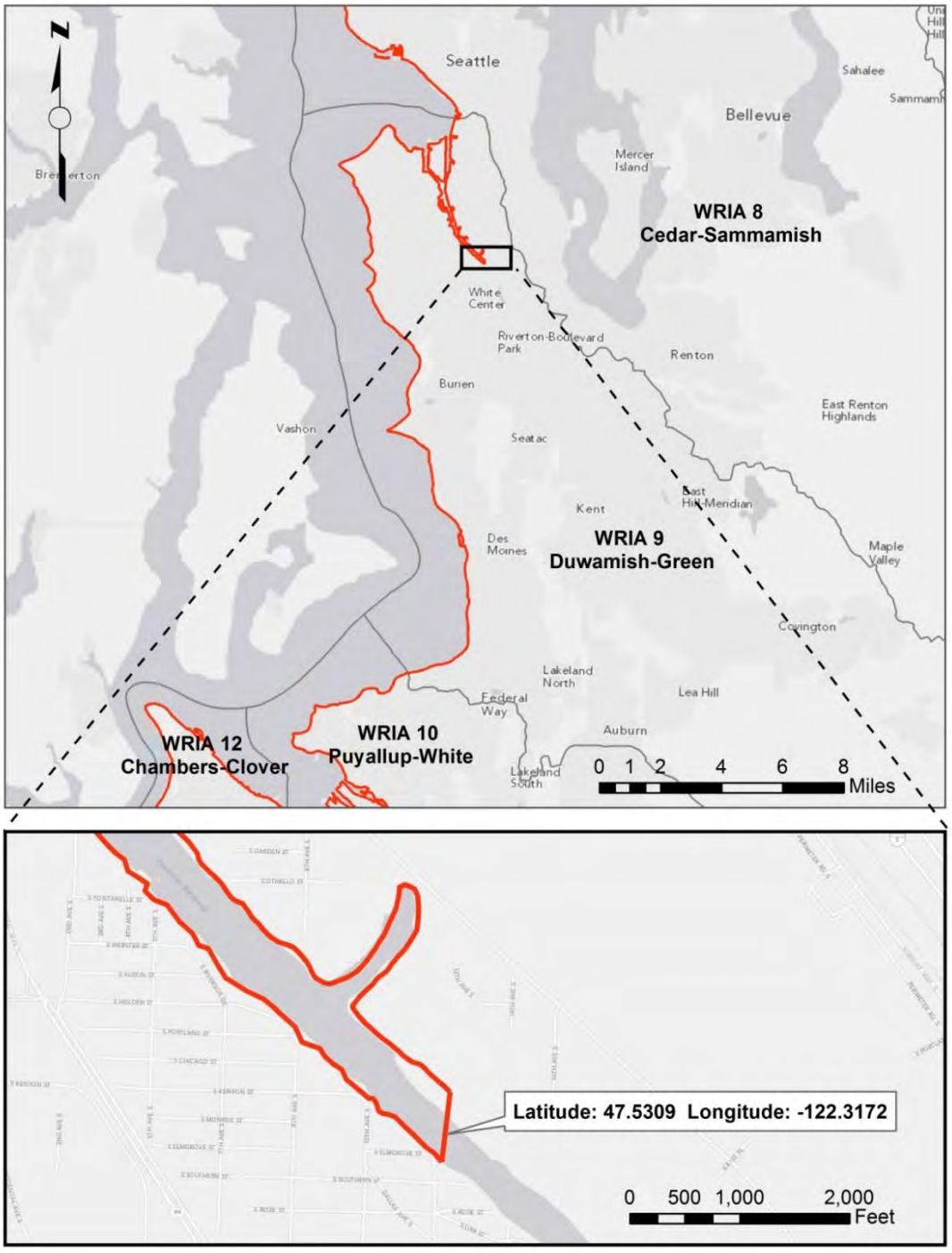
CZM Federal Consistency Response – Concur with Conditions.

1. A CZM Federal Consistency Decision is required for projects or activities under this NWP if a State 401 Water Quality Certification is required.

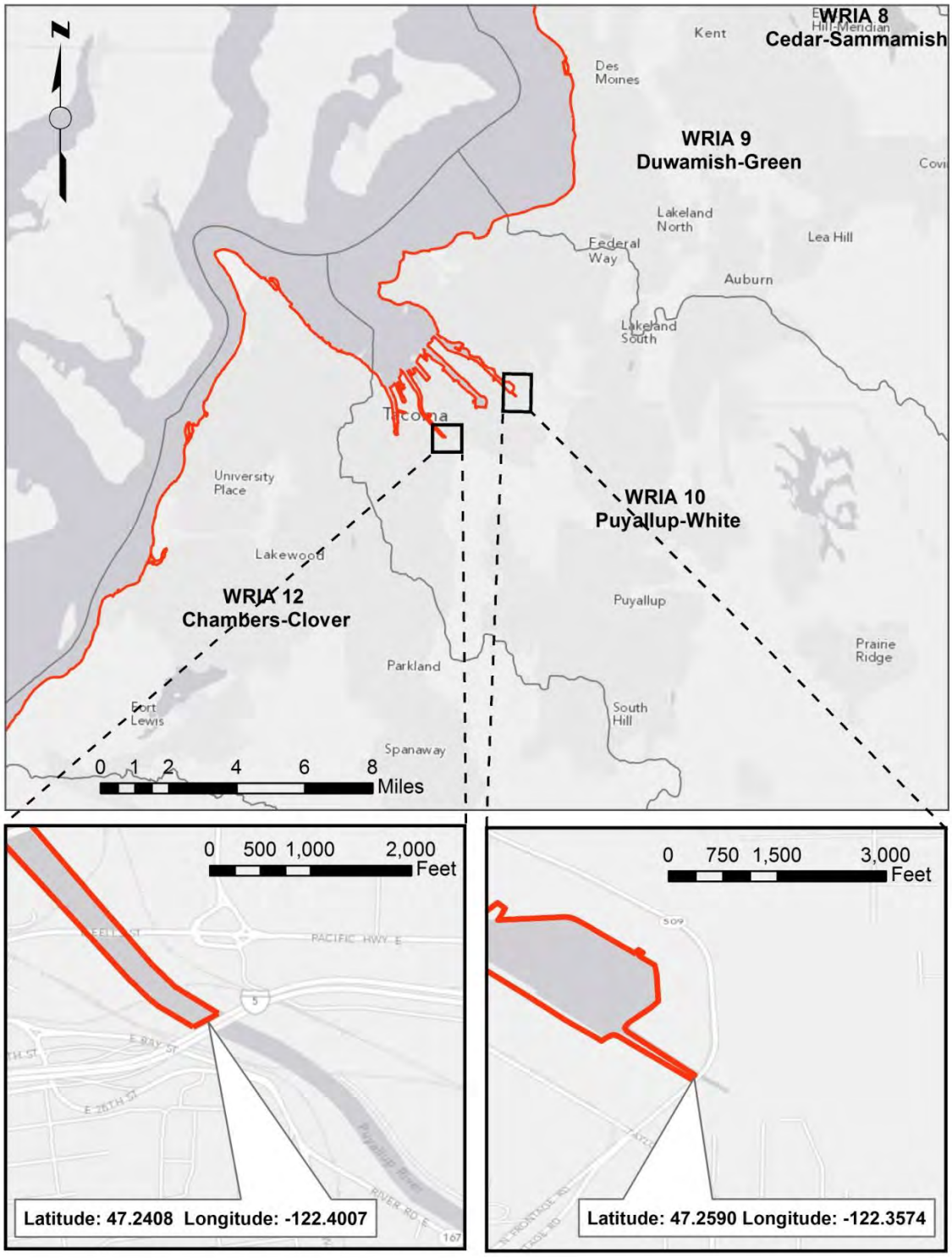
Seattle District Regional General Conditions - Figures
Figure 1: RGC 3 - WRIAs 8, 9, 10, 11, and 12
a. WRIA 8



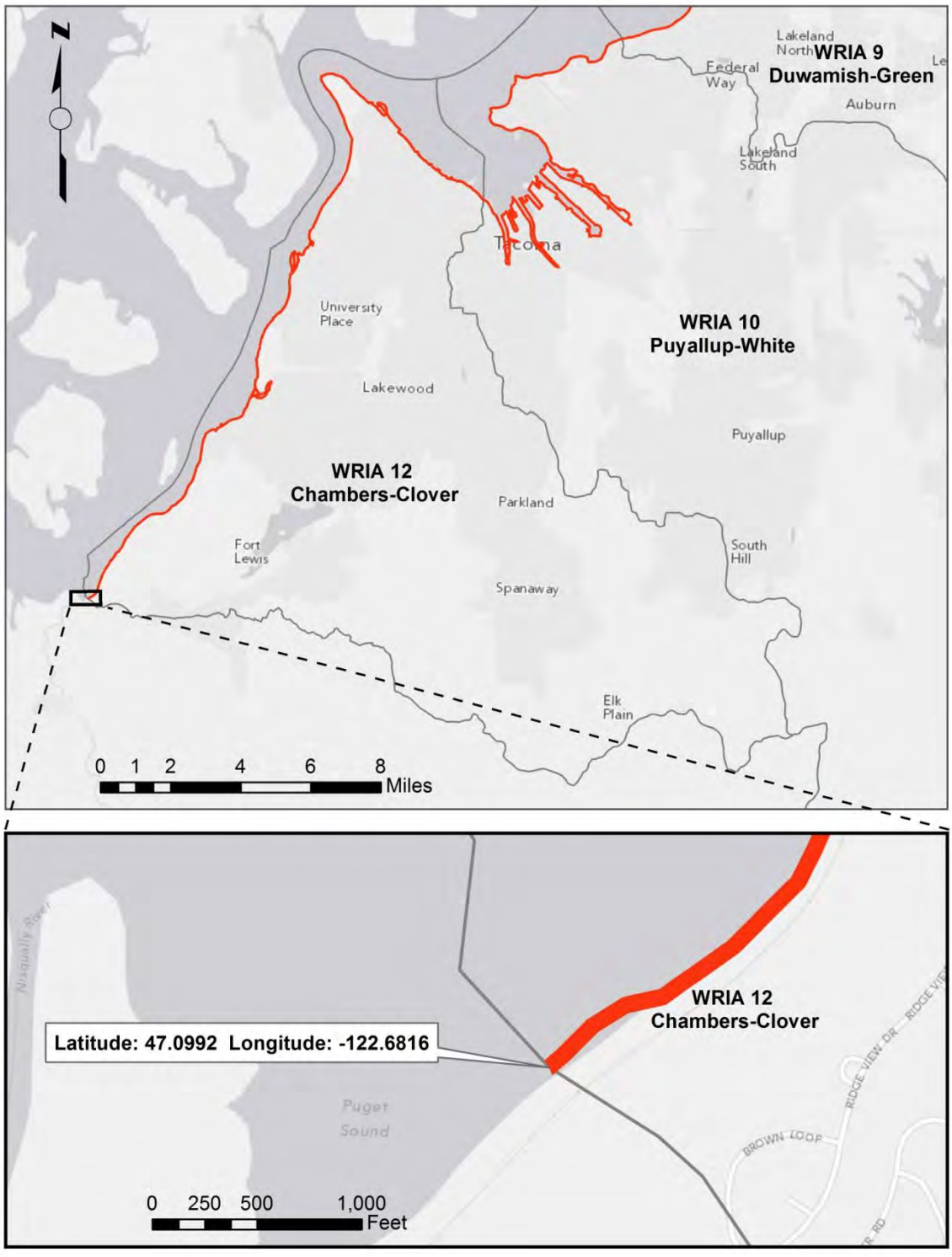
b. WRIA 9


N
Seattle
Bellevue
Sahalee
Mercer Island
WRIA 8
Cedar-Sammamish
White Center
Riverton-Boulevard Park
Renton
Burien
East Renton Highlands
Vashon
Seatac
Kent
Des Moines
WRIA 9
Duwamish-Green
Maple Valley
Covington
Lakeland North
Lea Hill
Federal Way
Auburn
WRIA 12
Chambers-Clover
WRIA 10
Puyallup-White
Lakeland South
0 1 2 4 6 8
Miles
Latitude: 47.5309 Longitude: -122.3172
0 500 1,000 2,000
Feet

c. WRIA 10


WRIA 8
Cedar-Sammamish
WRIA 9
Duwamish-Green
WRIA 10
Puyallup-White
WRIA 12
Chambers-Clover
Kent
Des Moines
Federal Way
Lakeland North
Lea Hill
Auburn
Lakeland South
Tacoma
University Place
Lakewood
Puyallup
Parkland
Prairie Ridge
South Hill
Fort Lewis
Spanaway
0 1 2 4 6 8 Miles
0 500 1,000 2,000 Feet
Latitude: 47.2408 Longitude: -122.4007
0 750 1,500 3,000 Feet
Latitude: 47.2590 Longitude: -122.3574

d. WRIA 12


N
Lakeland North
WRIA 9
Duwamish-Green
Federal Way
Auburn
Lakeland South
Tacoma
University Place
WRIA 10
Puyallup-White
Lakewood
Puyallup
WRIA 12
Chambers-Clover
Parkland
Fort Lewis
South Hill
Spanaway
Elk Plain
0 1 2 4 6 8
Miles
Nisqually River
WRIA 12
Chambers-Clover
Latitude: 47.0992 Longitude: -122.6816
Puget Sound
BROWN LOOP
RIDGE VIEW DR
0 250 500 1,000
Feet

e. WRIA 11

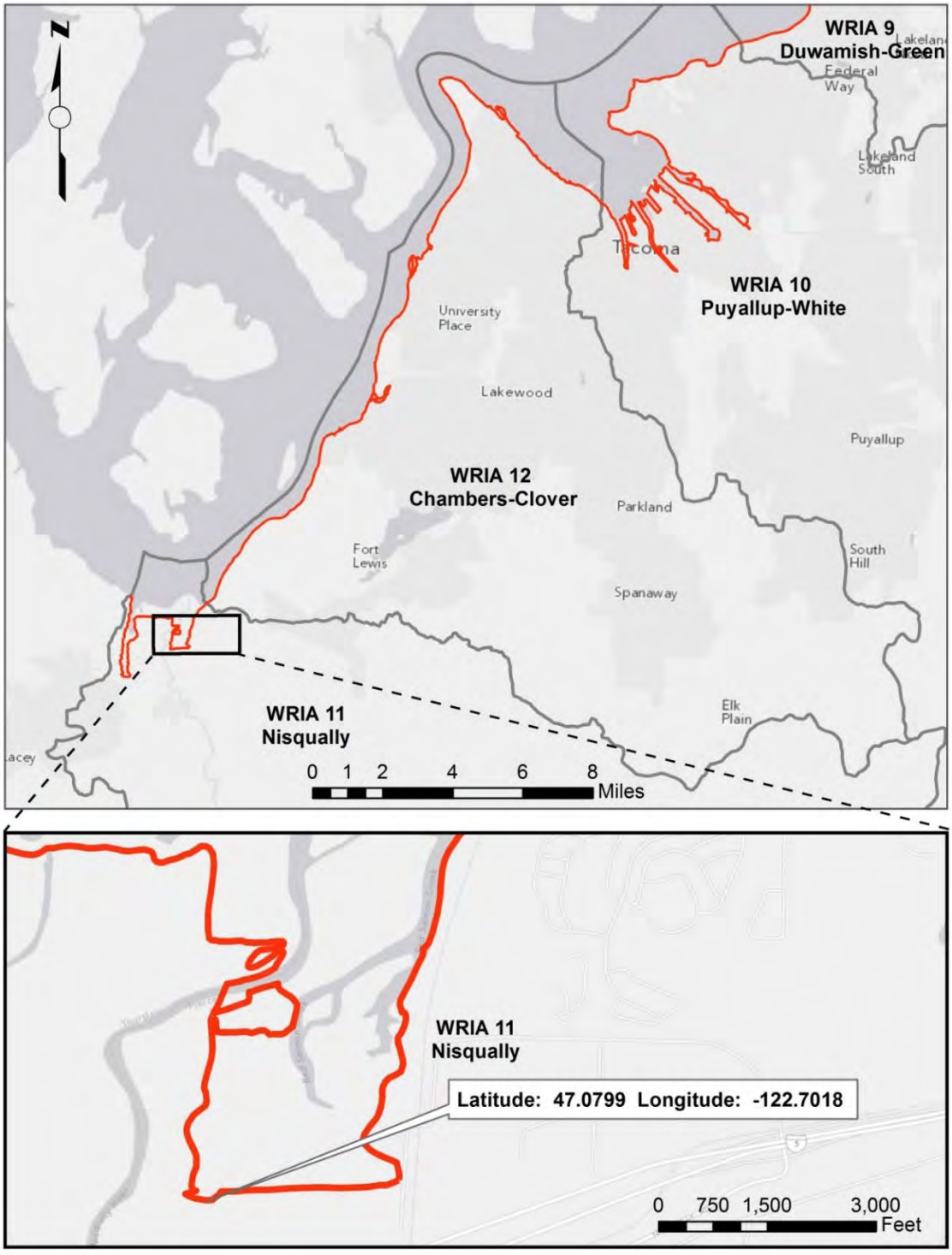
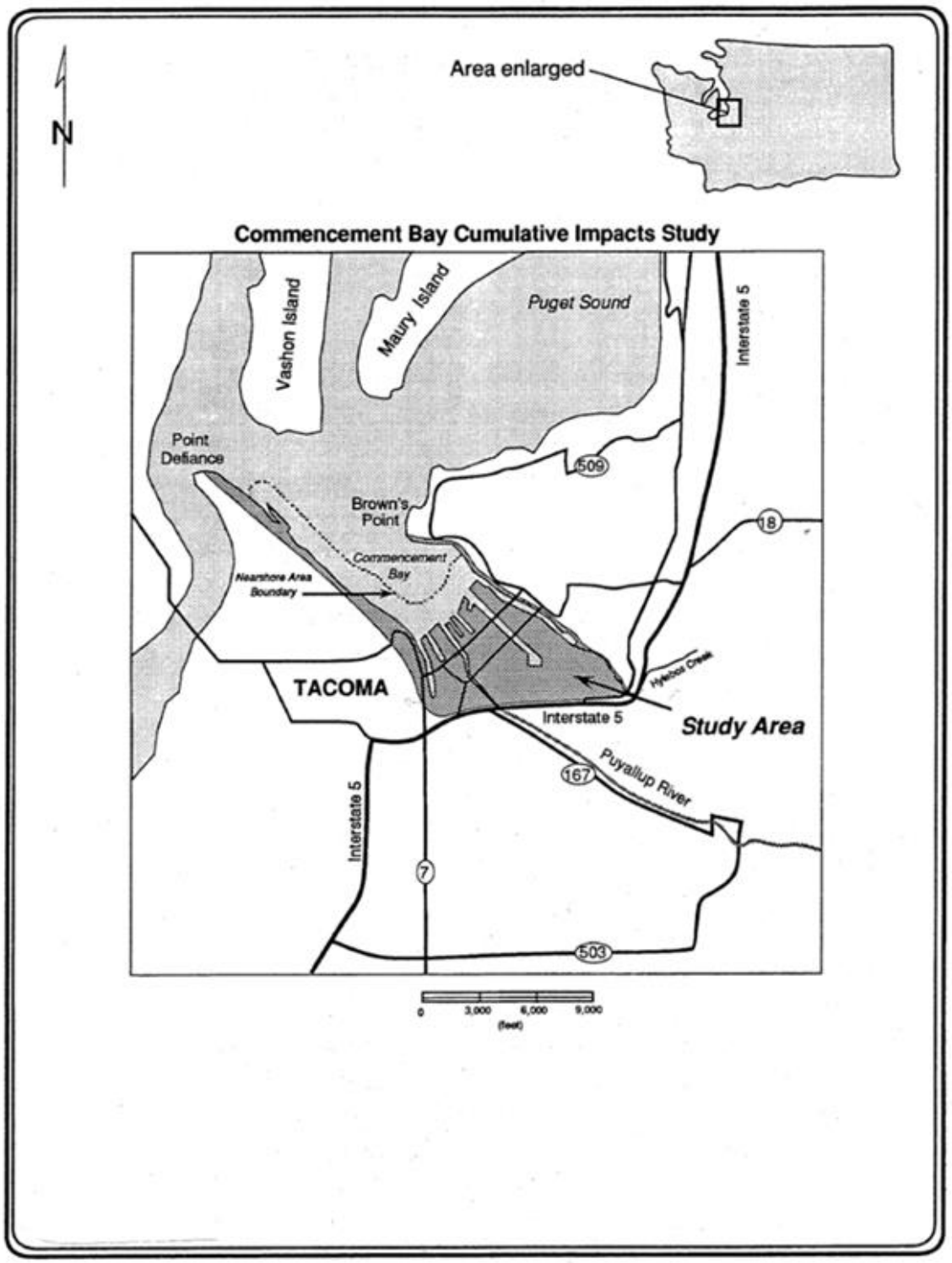

N
WRIA 9
Duwamish-Green
Federal Way
Lakeland South
Tacoma
WRIA 10
Puyallup-White
University Place
Lakewood
Puyallup
WRIA 12
Chambers-Clover
Parkland
Fort Lewis
South Hill
Spanaway
WRIA 11
Nisqually
Elk Plain
0 1 2 4 6 8
Miles
WRIA 11
Nisqually
Latitude: 47.0799 Longitude: -122.7018
0 750 1,500 3,000
Feet

Figure 2. RGC 4 - Commencement Bay Study Area



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, SEATTLE DISTRICT
4735 EAST MARGINAL WAY SOUTH, BLDG 1202
SEATTLE, WA 98134-2388

Regulatory Branch November 7, 2023

Ms. Jaime Northrup
OPG Port Gamble, LLC
1 Rayonier Way
Wildlight, Florida 32097

Reference: NWS-2022-717
OPG Port Gamble, LLC
(Shoreline Restoration)

Dear Ms. Northrup:

We have reviewed your application to place 27,300 cubic yards of fill on the shoreline and in the nearshore and plant 6.24 acres of eelgrass to restore nearshore conditions in Port Gamble Bay at Port Gamble, Kitsap County, Washington. Based on the information you provided to us, Nationwide Permit (NWP) 27, *Aquatic Habitat Restoration, Enhancement, and Establishment Activities* (Federal Register December 27, 2021 Vol. 86, No. 245), authorizes your proposal as depicted on the enclosed drawings dated September 2022.

In order for this authorization to be valid, you must ensure the work is performed in accordance with the enclosed *NWP 27, Terms and Conditions* and the following special conditions:

a. In order to meet the requirements of the Endangered Species Act you may conduct the authorized activities from June 1 through February 15 in any year this permit is valid. You shall not conduct work authorized by this permit from February 16 through May 31 in any year this permit is valid. Your work window is also subject to the forage fish restriction detailed in Special Condition "b" below.

b. Forage fish may be spawning in the project area during the allowed work window. If work is occurring between October 15 and February 15, in order to meet the requirements of the Endangered Species Act and for the protection of Pacific herring, sand lance, and surf smelt, prior to construction, you must have an approved biologist confirm, in writing, that no forage fish are spawning in the area. For information on approved biologists for conducting forage fish surveys, contact the Washington Department of Fish and Wildlife (WDFW). If a WDFW Habitat Biologist has volunteered to conduct a survey as part of the Hydraulic Project Approval, this survey may be

submitted to the U.S. Army Corps of Engineers (Corps). The letter or memorandum from the approved biologist or the WDFW Habitat Biologist must include the date of the inspection, the forage fish spawning findings, and must be provided to the Corps, Seattle District, Regulatory Branch via email to sarah.l.albright@usace.army.mil (with a copy sent to NWS.Compliance@usace.army.mil), prior to construction. Include reference number NWS-2022-717. If the approved biologist or WDFW Habitat Biologist confirms that no forage fish are spawning in the project area, you have two weeks from the date of the inspection to complete all work waterward of the High Tide Line.

c. In order to meet the requirements of the Endangered Species Act (ESA) and the Magnuson Stevens Fishery Conservation and Management Act (MSA), you must implement and abide by the applicable terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" and the applicable Essential Fish Habitat Conservation Recommendations as set forth in the Salish Sea Nearshore Programmatic (SSNP) Biological Opinion (BO) (National Marine Fisheries Service (NMFS) Reference Number WCRO-2019-04086) dated June 29, 2022, and U.S. Fish and Wildlife Service (USFWS) Reference Number FWS/R1/2022-0048454 dated July 29, 2022). The specific General Construction Measures, Project Design Criteria, Essential Fish Habitat Conservation Measures, and monitoring and/or reporting requirements applicable to this permit are identified in the enclosed Notification Summary Sheet dated May 17, 2023, (NMFS Reference Number WCRO-2019-04086-5708; USFWS Reference Number 2023-0072571). The BO is available on the U.S. Army Corps of Engineers (Corps) website (https://www.nws.usace.army.mil/Missions/Civil-Works/Regulatory/Permit-Guidebook/Endangered-Species/). You must provide the Corps and NMFS the information requested in the enclosed Notification Summary Sheet. All information must prominently display the reference number NWS-2022-717. Failure to comply with these requirements constitutes non-compliance with the ESA and your Corps permit. The NMFS and USFWS is the appropriate authority to determine compliance with the terms and conditions of their BO and with the ESA. If you cannot comply with the terms and conditions of this programmatic consultation, you must, prior to commencing construction, contact the Corps, Seattle District, Regulatory Branch for an individual consultation in accordance with the requirements of the ESA and/or the MSA.

d. Permittee shall comply with the conditions specified in the Washington State Department of Ecology Coastal Zone Management Consistency Determination dated October 6, 2023, and Water Quality Certification dated September 8, 2023.

We have reviewed your project pursuant to the requirements of the Endangered Species Act, the Magnuson-Stevens Fishery Conservation and Management Act and the National Historic Preservation Act. We have determined this project complies with

the requirements of these laws provided you comply with all of the permit general and special conditions.

Please be reminded that Special Condition "c" of your permit requires that you implement and abide by the Endangered Species Act (ESA) requirements set forth in the programmatic Biological Opinion (BO) for this project. In particular, note that the BO requires you submit the enclosed *Certificate of Compliance with Department of the Army Permit*. All documents must be submitted to the Corps at nws.compliance@usace.army.mil, NMFS at projectreports.wcr@noaa.gov, and USFWS at SSNP_WA@fws.gov. Failure to comply with the commitments above constitutes non-compliance with the ESA and with this authorization.

Please note that National General Condition 21, *Discovery of Previously Unknown Remains and Artifacts*, found in the *Nationwide Permit Terms and Conditions* enclosure, details procedures that must be followed should an inadvertent discovery occur. You must ensure that you comply with this condition during the construction of your project.

A conditioned Water Quality Certification (WQC) (Order Number: 21609, dated September 8, 2023) and Coastal Zone Management (CZM) consistency determination decision dated October 6, 2023, has been issued by the Washington State Department of Ecology for your project and is enclosed. You must comply with the conditions specified in the WQC and CZM decision for this NWP authorization to be valid.

You have not requested a jurisdictional determination for this proposed project. If you believe the U.S. Army Corps of Engineers does not have jurisdiction over all or portions of your project you may request a preliminary or approved jurisdictional determination (JD). If one is requested, please be aware that we may require the submittal of additional information to complete the JD and work authorized in this letter may not occur until the JD has been completed.

Our verification of this NWP authorization is valid until March 14, 2026, unless the NWP is modified, reissued, or revoked prior to that date. If the authorized work for the NWP authorization has not been completed by that date and you have commenced or are under contract to commence this activity before March 14, 2026, you will have until March 14, 2027, to complete the activity under the enclosed terms and conditions of this NWP. Failure to comply with all terms and conditions of this NWP verification invalidates this authorization and could result in a violation of Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act. You must also obtain all local, State, and other Federal permits that apply to this project.

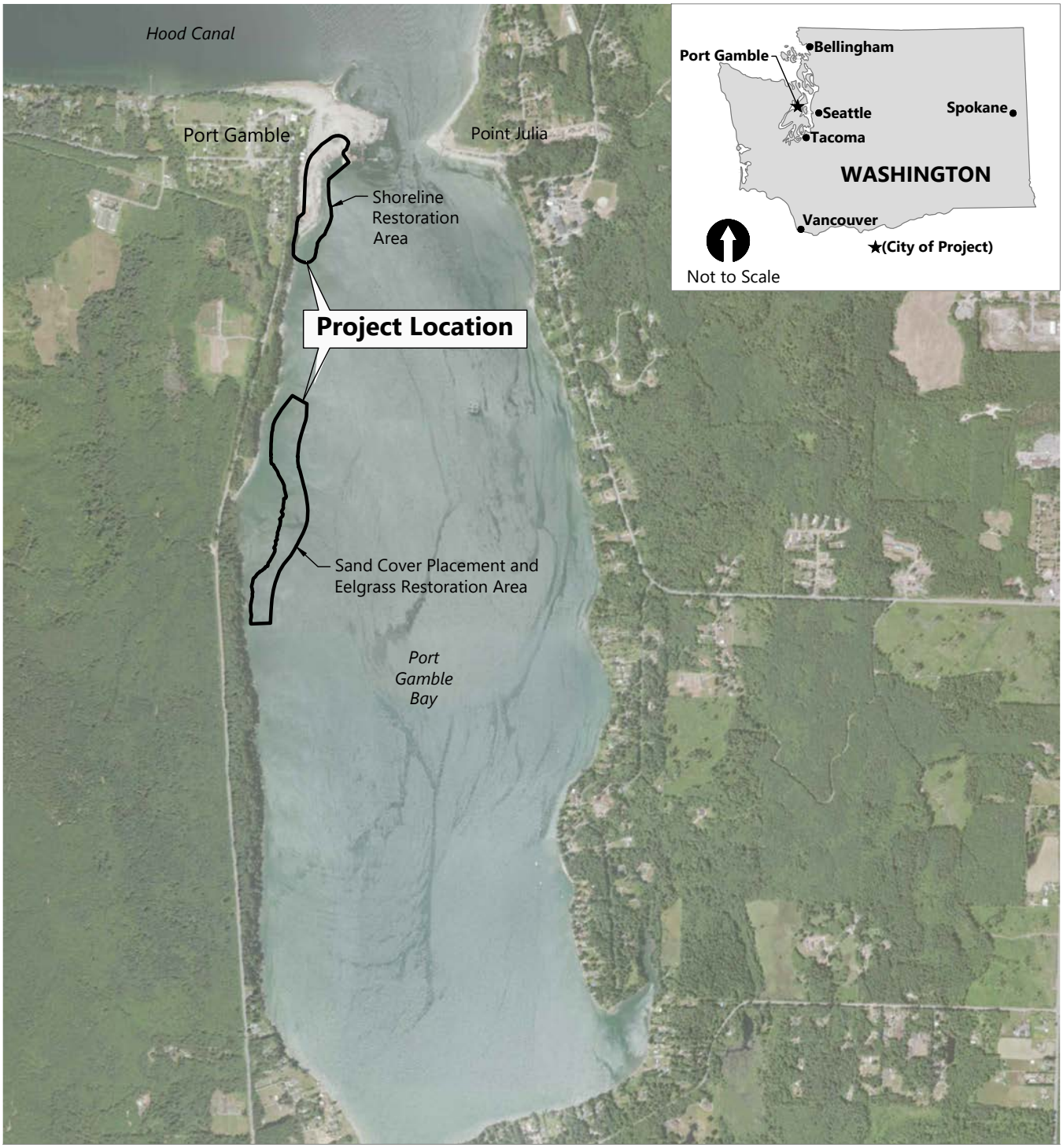
Upon completing the authorized work, you must fill out and return the enclosed *Certificate of Compliance with Department of the Army Permit*. All compliance reports should be submitted to the U.S. Army Corps of Engineers, Seattle District, Regulatory Branch electronically at nws.compliance@usace.army.mil. Thank you for your cooperation during the permitting process. We are interested in your experience with our Regulatory Program and encourage you to complete a customer service survey. Referenced documents and information about our program are available on our website at www.nws.usace.army.mil, select "Regulatory Permit Information". A copy of this letter with enclosures will be furnished to Mr. Clay Patmont at cpatmont@anchorqea.com. If you have any questions, please contact me at sarah.l.albright@usace.army.mil or (206) 764-6665.

Sincerely,

Sarah Albright-Garland, Project Manager
Regulatory Branch

Enclosures

cc:
Ecology (ecyrefedpermits@ecy.wa.gov)
EPA (r10-401-certs@epa.gov)
NMFS (consultationupdates.wcr@noaa.gov)
USFWS (SSNP_WA@fws.gov)



SOURCE: Aerial courtesy Esri et al.
HORIZONTAL DATUM: Washington State Plane North Zone, NAD83, U.S. Survey Feet

0 2000
Feet

VICINITY MAP

REFERENCE #: TBD

APPLICANT: OPG PORT GAMBLE, LLC

LOCATION: NEAR VIEW DRIVE NE
PORT GAMBLE, WASHINGTON 98364

ADJACENT PROPERTY OWNERS:
POPE RESOURCES C/O OPG PROPERTIES LLC, WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES, KITSAP COUNTY PARKS DEPARTMENT

NAME: PORT GAMBLE BAY HABITAT RESTORATION PROJECT

PROPOSED: HABITAT RESTORATION

PURPOSE: HABITAT RESTORATION

HORIZONTAL DATUM: WA NORTH, NAD83, US FEET
VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW)

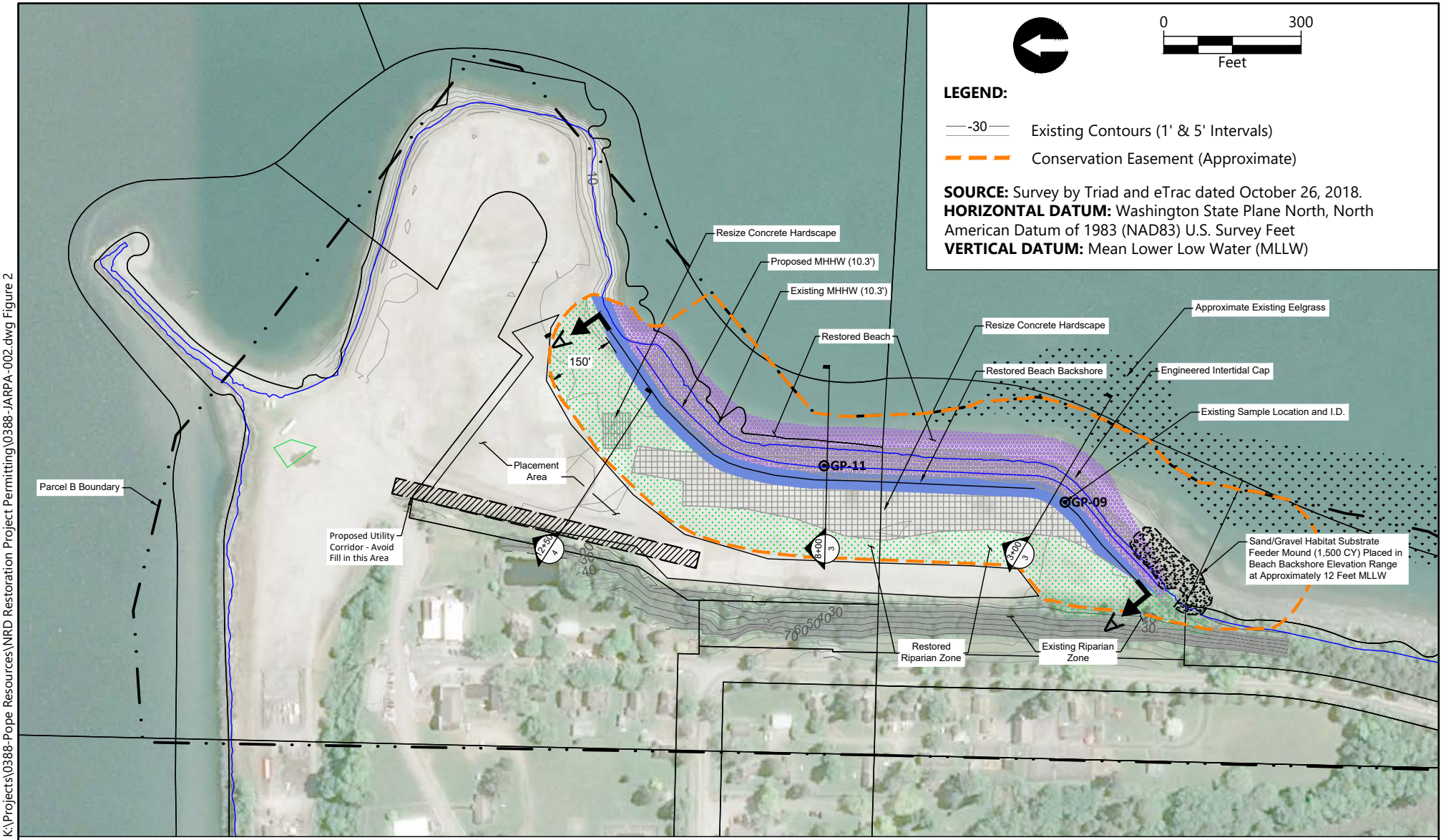
LATITUDE: 47.853925 N
LONGITUDE: 122.582112 W
S-T-R: 5-27N-2E & 8-27N-2E

IN: PORT GAMBLE BAY
NEAR/AT: PORT GAMBLE
COUNTY: KITSAP
STATE: WA

Corps Ref #: NWS-2022-717

DATE: SEPTEMBER 2022

ANCHOR QEA
1201 3rd Ave, Suite 2600
Seattle, WA 98101
206-287-9130



SOUTHERN MILL SITE SHORELINE RESTORATION PLAN VIEW

REFERENCE #: TBD

APPLICANT: OPG PORT GAMBLE, LLC

LOCATION: NEAR VIEW DRIVE NE
PORT GAMBLE, WASHINGTON 98364

ADJACENT PROPERTY OWNERS:
POPE RESOURCES C/O OPG PROPERTIES LLC, WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES, KITSAP COUNTY PARKS DEPARTMENT

NAME: PORT GAMBLE BAY HABITAT RESTORATION PROJECT

PROPOSED: HABITAT RESTORATION

PURPOSE: HABITAT RESTORATION

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VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW)

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S-T-R: 5-27N-2E & 8-27N-2E

IN: PORT GAMBLE BAY
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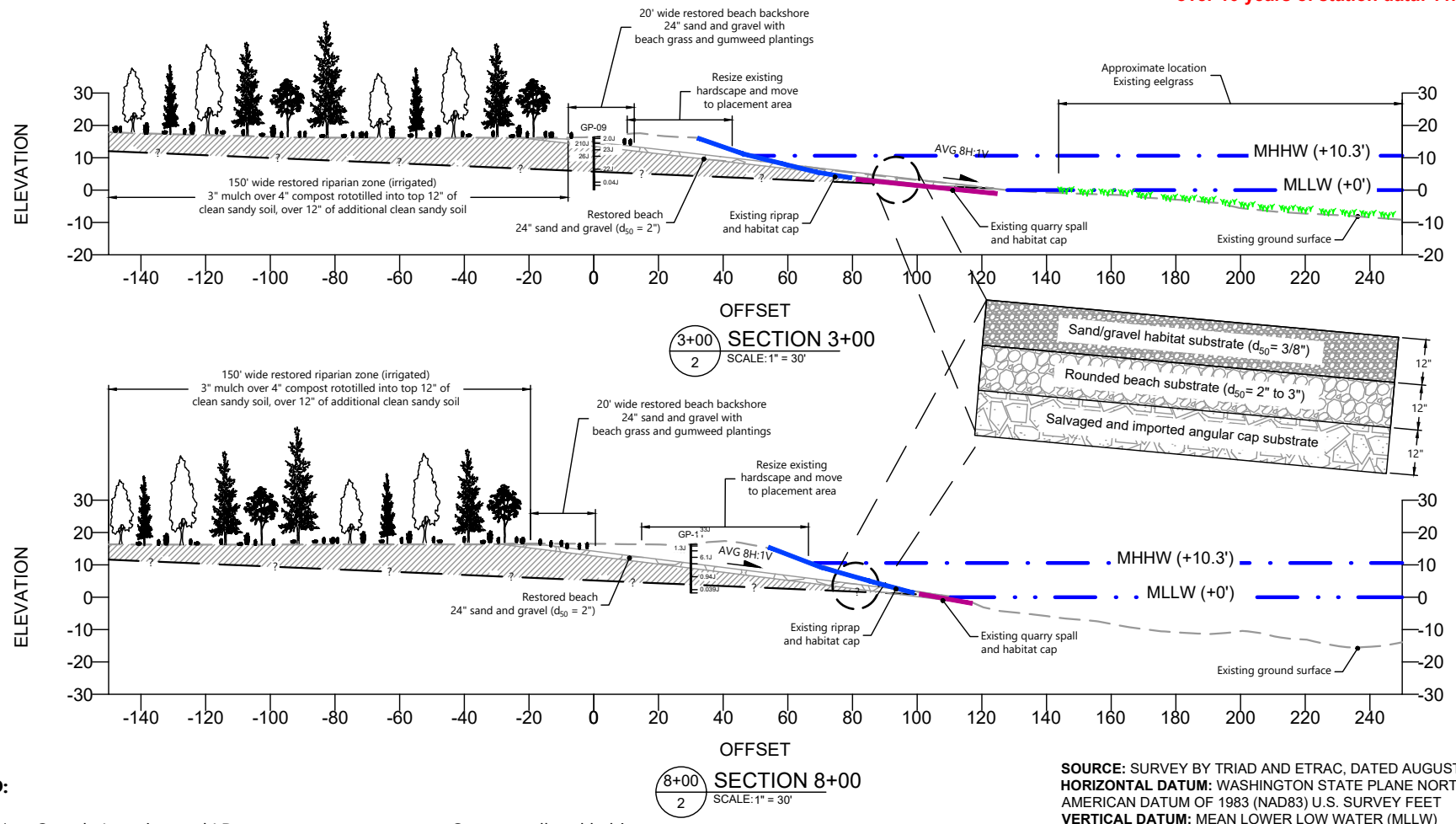
Corps Ref #: NWS-2022-717

DATE: SEPTEMBER 2022

ANCHOR QEA
1201 3rd Ave, Suite 2600
Seattle, WA 98101
206-287-9130

Tidal datum from NOAA Station 9445016 at Foulweather Bluff, located approximately 6 miles north of Port Gamble
MHW: 9.2 ft
estimated HTL based on mean HTL over 10 years of station data: 11.6 ft



LEGEND:

GP-11 Sample Location and I.D
110J / 33J / 6.1J / 1.3J / 0.94J / 0.039J - Dioxin/furan TEQ (ng/kg)

Quarry spall and habitat cap

Riprap and habitat cap

Approximate area of soils that exceed sediment cleanup levels

SOURCE: SURVEY BY TRIAD AND ETRAC, DATED AUGUST 27, 2014.
HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH, NORTH AMERICAN DATUM OF 1983 (NAD83) U.S. SURVEY FEET
VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW)

0 50
Feet

SOUTHERN MILL SITE SHORELINE RESTORATION CROSS-SECTIONS

150' wide restored riparian zone (irrigated)

REFERENCE #: TBD

APPLICANT: OPG PORT GAMBLE, LLC

LOCATION: NEAR VIEW DRIVE NE
PORT GAMBLE, WASHINGTON 98364

ADJACENT PROPERTY OWNERS:
POPE RESOURCES C/O OPG PROPERTIES LLC, WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES, KITSAP COUNTY PARKS DEPARTMENT

NAME: PORT GAMBLE BAY HABITAT RESTORATION PROJECT

PROPOSED: HABITAT RESTORATION

PURPOSE: HABITAT RESTORATION

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VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW)

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S-T-R: 5-27N-2E & 8-27N-2E

IN: PORT GAMBLE BAY
NEAR/AT: PORT GAMBLE
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STATE: WA

Corps Ref #: NWS-2022-717

DATE: SEPTEMBER 2022

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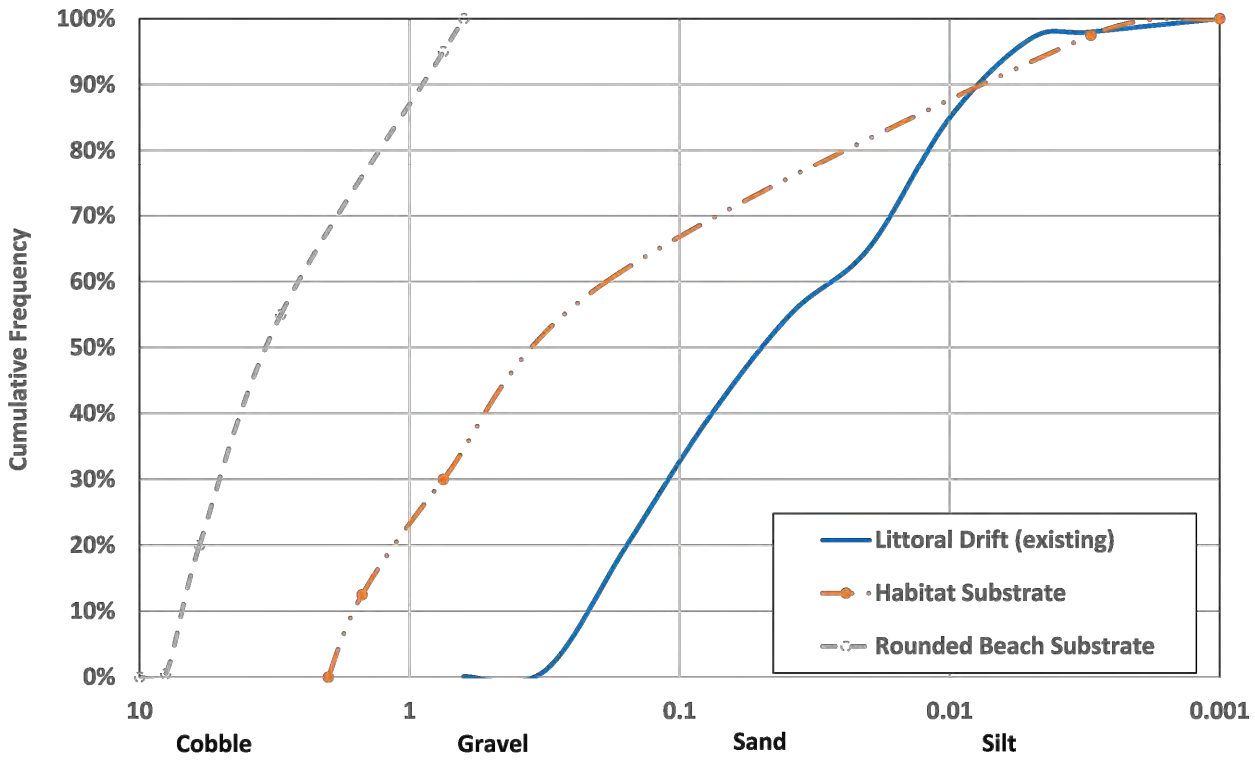
206-287-9130



HABITAT GRADATION SPECIFICATIONS: SOUTHERN MILL SITE BEACH

REFERENCE #: TBD

APPLICANT: OPG PORT GAMBLE, LLC

LOCATION: NEAR VIEW DRIVE NE
PORT GAMBLE, WASHINGTON 98364

ADJACENT PROPERTY OWNERS:
POPE RESOURCES C/O OPG PROPERTIES LLC, WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES, KITSAP COUNTY PARKS DEPARTMENT

NAME: PORT GAMBLE BAY HABITAT RESTORATION PROJECT

PROPOSED: HABITAT RESTORATION

PURPOSE: HABITAT RESTORATION

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VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW)

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S-T-R: 5-27N-2E & 8-27N-2E

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Corps Ref #: NWS-2022-717

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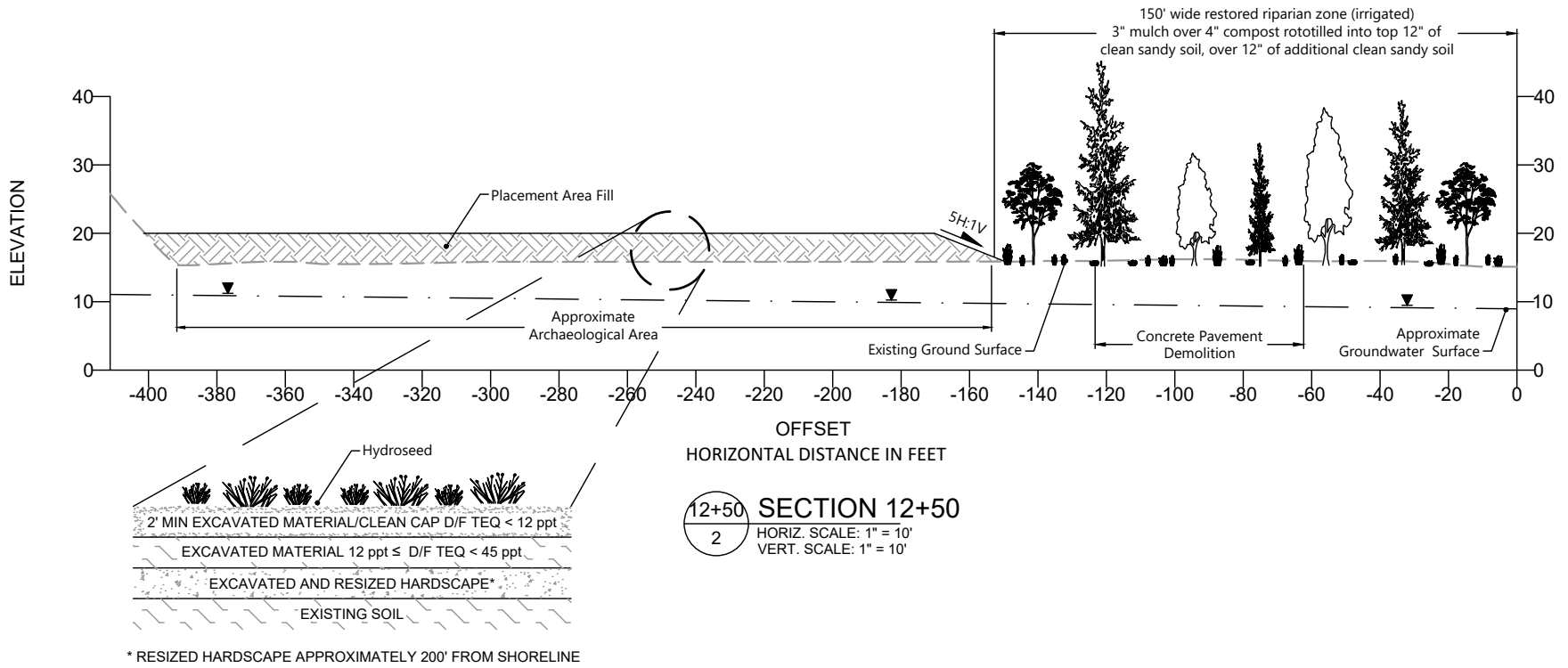

* RESIZED HARDSCAPE APPROXIMATELY 200' FROM SHORELINE

SOURCE: SURVEY BY TRIAD AND ETRAC, DATED AUGUST 27, 2014.
HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH, NORTH AMERICAN DATUM OF 1983 (NAD83) U.S. SURVEY FEET
VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW)

0 50
Feet

TYPICAL SECTION VIEW - UPLAND PLACEMENT AREA

REFERENCE #: TBD

APPLICANT: OPG PORT GAMBLE, LLC

LOCATION: NEAR VIEW DRIVE NE
PORT GAMBLE, WASHINGTON 98364

ADJACENT PROPERTY OWNERS:
POPE RESOURCES C/O OPG PROPERTIES LLC, WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES, KITSAP COUNTY PARKS DEPARTMENT

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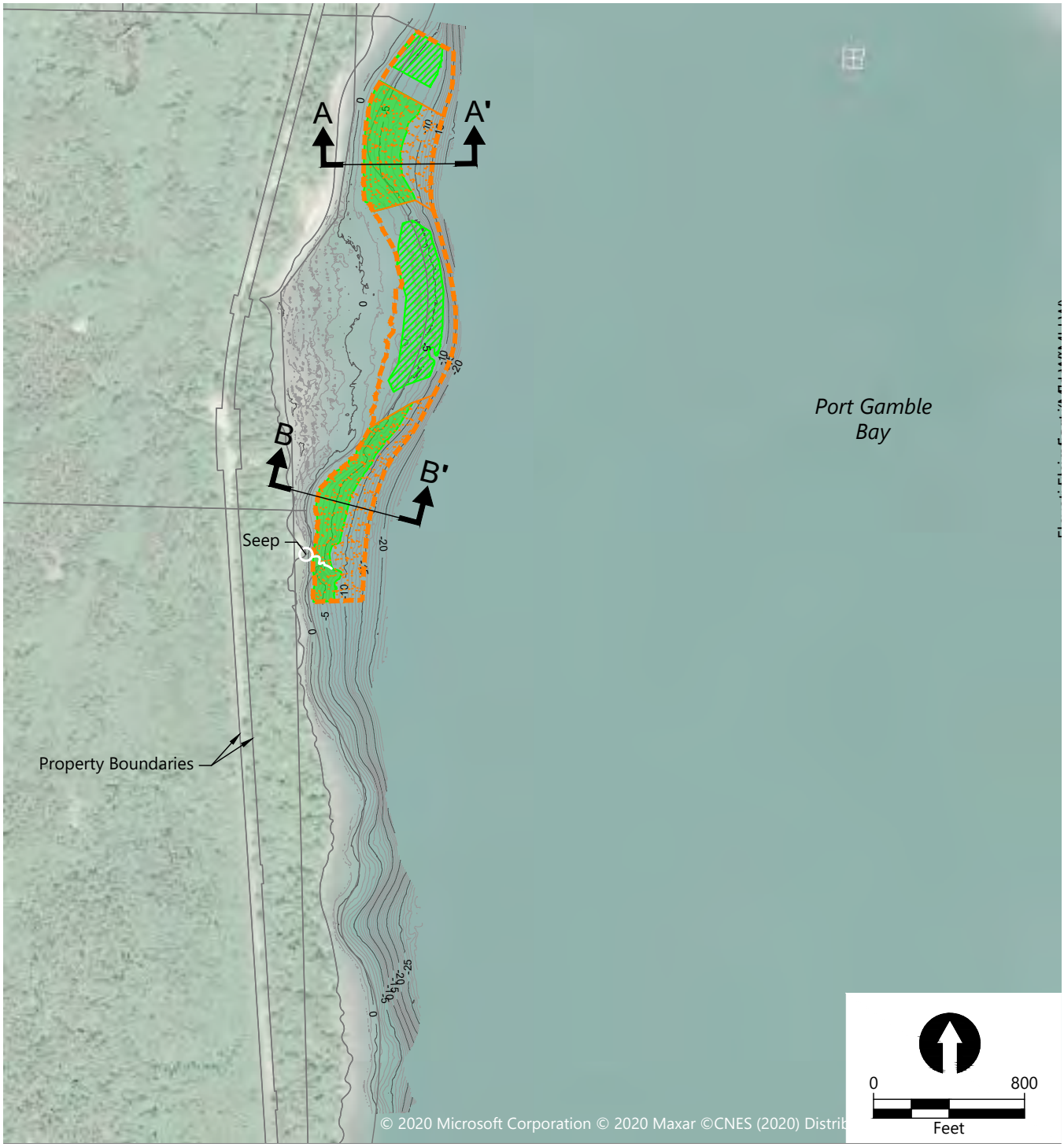
STATE: WA

Corps Ref #: NWS-2022-717

DATE: SEPTEMBER 2022

ANCHOR QEA
1201 3rd Ave, Suite 2600
Seattle, WA 98101
206-287-9130



SOURCE: Survey by eTrac dated June 30, 2020.
HORIZONTAL DATUM: Washington State Plane North, North American Datum (NAD83), U.S. Survey Feet
VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

- Eelgrass Beds (July 2021)
- Sand Cover Placement Area
- Prospective Eelgrass Restoration Area
- 5 — Existing Contours (1' & 5' Intervals)
- Conservation Easement (Approximate)

WESTERN PORT GAMBLE BAY RESTORATION PLAN

REFERENCE #: TBD

APPLICANT: OPG PORT GAMBLE, LLC

LOCATION: NEAR VIEW DRIVE NE
PORT GAMBLE, WASHINGTON 98364

ADJACENT PROPERTY OWNERS:
POPE RESOURCES C/O OPG PROPERTIES LLC, WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES, KITSAP COUNTY PARKS DEPARTMENT

NAME: PORT GAMBLE BAY HABITAT RESTORATION PROJECT

PROPOSED: HABITAT RESTORATION

PURPOSE: HABITAT RESTORATION

HORIZONTAL DATUM: WA NORTH, NAD83, US FEET
VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW)

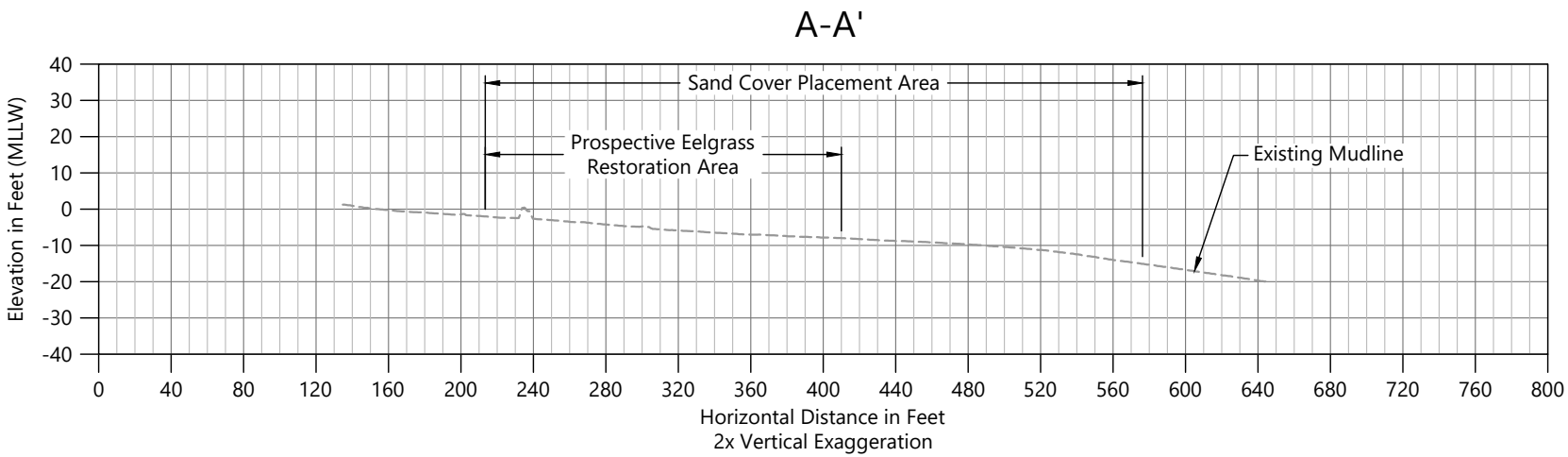
LATITUDE: 47.853925 N
LONGITUDE: 122.582112 W
S-T-R: 5-27N-2E & 8-27N-2E

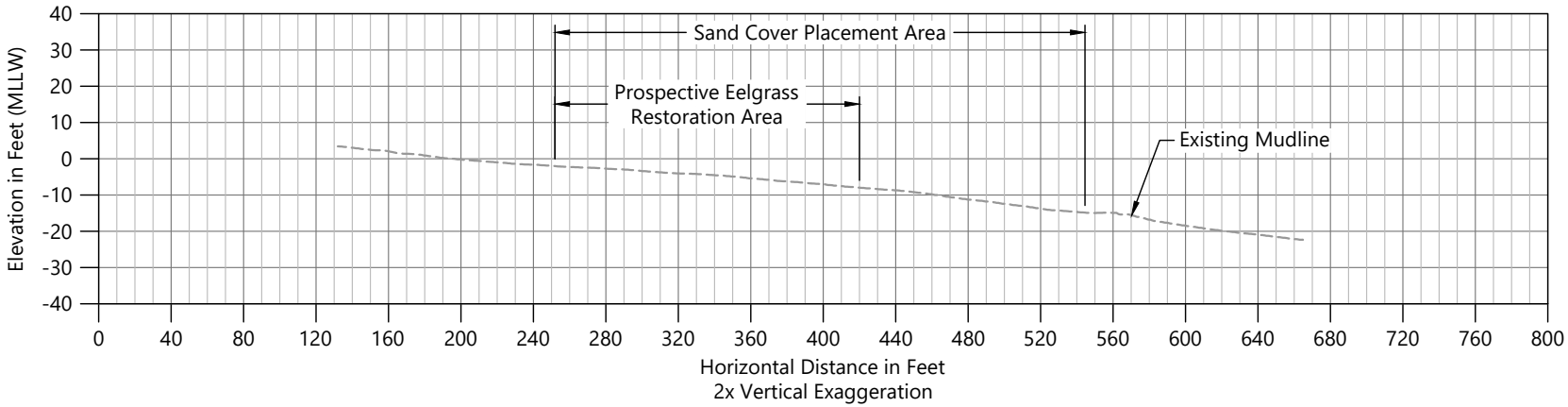
IN: PORT GAMBLE BAY
NEAR/AT: PORT GAMBLE
COUNTY: KITSAP
STATE: WA

Corps Ref #: NWS-2022-717

DATE: SEPTEMBER 2022

ANCHOR QEA
1201 3rd Ave, Suite 2600
Seattle, WA 98101
206-287-9130





WESTERN PORT GAMBLE BAY RESTORATION CROSS SECTIONS A-A' AND B-B'

REFERENCE #: TBD

APPLICANT: OPG PORT GAMBLE, LLC

LOCATION: NEAR VIEW DRIVE NE
PORT GAMBLE, WASHINGTON 98364

ADJACENT PROPERTY OWNERS:
POPE RESOURCES C/O OPG PROPERTIES LLC, WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES, KITSAP COUNTY PARKS DEPARTMENT

NAME: PORT GAMBLE BAY HABITAT RESTORATION PROJECT

PROPOSED: HABITAT RESTORATION

PURPOSE: HABITAT RESTORATION

HORIZONTAL DATUM: WASHINGTON NORTH, NAD83, US FEET
VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW)

LATITUDE: 47.853925 N
LONGITUDE: 122.582112 W
S-T-R: 5-27N-2E & 8-27N-2E

IN: PORT GAMBLE BAY
NEAR/AT: PORT GAMBLE
COUNTY: KITSAP
STATE: WA

Corps Ref #: NWS-2022-717

DATE: SEPTEMBER 2022

ANCHOR QEA
1201 3rd Ave, Suite 2600
Seattle, WA 98101
206-287-9130

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600, Olympia, WA 98504-7600 • 360-407-6000

September 8, 2023

OPG Port Gamble, LLC
ATTN: Jaime Northrup
Rayonier Inc.
1 Rayonier Way
Wildlight, Florida 32097

Re: Water Quality Certification Order No. **21609** (Corps No. **NWS-2022-0717**), Port Gamble Bay Habitat Restoration, Kitsap County, Washington

Dear Jaime Northrup:

On September 16, 2022, OPG Port Gamble, LLC submitted a request for a Section 401 Water Quality Certification (WQC) under the federal Clean Water Act for the Port Gamble Bay Habitat Restoration, Kitsap County, Washington.

On behalf of the state of Washington, the Department of Ecology certifies that the work described in the Water Quality Certification Request and supplemental documents complies with applicable provisions of Sections 301, 302, 303, 306, and 307 of the Clean Water Act, as amended, and applicable state laws. **This certification is subject to the enclosed Water Quality Certification Order (WQC Order).**

Please ensure that anyone doing work under this WQC Order has read, is familiar with, and is able to follow all of the provisions within the attached WQC Order.

If you have any questions about this decision, please contact Laura Inouye at (360) 515-8213. The enclosed WQC Order may be appealed by following the procedures described within.

Sincerely,

Loree' Randall

Loree' Randall, Section Manager
Federal Permitting Section
Shorelands and Environmental Assistance Program

Enclosure (2)

By certified mail: 9489 0090 0027 6383 6853 59

Sent via e-mail: jaime.northrup@rayonier.com

E-cc: Sarah Albright, U.S. Army Corps of Engineers
Laura Inouye, Ecology
ECYREFEDPERMITS@ecy.wa.gov

In The Matter of Granting a Water Quality Certification to OPG Port Gamble LLC pursuant to 33 U.S.C. 1341 (FWPCA § 401), RCW 90.48.120, RCW 90.48.260 and Chapter 173-201A WAC

OPG Port Gamble, LLC
ATTN: Jaime Northrup
Rayonier Inc.
1 Rayonier Way
Wildlight, Florida 32097

WQC Order No.	21609
Corps Reference No.	NWS-2022-0717
Site Location	Port Gamble Bay Habitat Restoration, located within Port Gamble Bay, Port Gamble, Kitsap County, Washington.

OPG Port Gamble, LLC submitted a request for a Section 401 Water Quality Certification (WQC) under the federal Clean Water Act to the Department of Ecology (Ecology) for the Port Gamble Bay Habitat Restoration, Kitsap County, Washington. The following processing dates are listed below:

- On August 8, 2022, OPG Port Gamble, LLC submitted a pre-filing meeting request.
- On September 16, 2022, Ecology received a request for Clean Water Section 401 Water Quality Certification.
- On January 27, 2023, the U.S. Army Corps of Engineers (Corps) sent a permit notification to Ecology that indicated that they are processing the project under Nationwide Permit (NWP) No.27 and Ecology determine an individual Section 401 is required.
- On February 1, 2023, Ecology issued a public notice for the project.

The project proposes to conduct restoration work in Port Gamble as described below:

Southern Mill Site Shoreline Restoration: This 9-acre project includes laying back intertidal slopes of the southern portion of the former sawmill facility shoreline to restore near-natural beach grades. Restored intertidal caps will include a lower layer of angular cobble-sized armor, a middle layer of rounded cobble/gravel beach substrate, and an upper layer of sand/gravel habitat substrate to optimize habitat functions and concurrently remain protective. Near-surface hardscape will be removed within a 150-foot shoreline buffer, followed by placement of imported topsoil and mulch and native plantings. Material for the intertidal cap and habitat layers (14,800 cy), and feeder berm (1,500 cy) will be clean and sourced from an approved off-site vendor. Materials will be placed using standard upland construction equipment.

Western Bay Nearshore Thin Layer Sand Cover: This project includes placing a sand cover layer over a minimum of 11 acres of lower intertidal to shallow subtidal zones (approximately -2 to -15 feet mean lower low water [MLLW]) within former log rafting areas in the western bay to restore benthic habitat functions and concurrently provide suitable substrate in areas where eelgrass is absent or growing at very sparse densities. As practicable, the sand cover will be placed using clean navigation channel maintenance dredge material from the nearby Driftwood Key, or other similar marine source, which is expected to contain eelgrass seed and maximize restoration potential. (Maintenance dredging activities at Driftwood Key are addressed under a separate application.)

Western Bay Nearshore Eelgrass Transplanting: Eelgrass will be transplanted into western bay areas where there is currently little or no eelgrass, including on and adjacent to the thin layer sand cover. Eelgrass transplanting will be performed following placement and consolidation of the cover, informed by monitoring and adaptive management methods patterned after those used successfully at other western Washington sites.

The project site is located within Port Gamble Bay, Kitsap County, Washington, Section 5 and 8, Township 27 N., Range 2 E., within Water Resource Inventory Area (WRIA) 15 (Kitsap).

Authorities

In exercising authority under 33 U.S.C. §1341, RCW 90.48.120, and RCW 90.48.260, Ecology has reviewed this WQC request pursuant to the following:

1. Conformance with applicable water quality-based, technology-based, and toxic or pretreatment effluent limitations as provided under 33 U.S.C. §§1311, 1312, 1313, 1316, and 1317.
2. Conformance with the state water quality standards contained in Chapter 173-201A WAC and authorized by 33 U.S.C. §1313 and by Chapter 90.48 RCW, and with other applicable state laws; and
3. Conformance with the provision of using all known, available and reasonable methods to prevent and control pollution of state waters as required by RCW 90.48.010.
4. Conformance with Washington's prohibition on discharges that cause or tend to cause pollution of waters of the state of Washington. RCW 90.48.080.
5. The Project Proponent of the project authorized is responsible for obtaining all other permits, licenses, and certifications that may be required by federal, state, local or tribal authorities.

With this Water Quality Certification Order (WQC Order), Ecology is granting with conditions OPG Port Gamble, LLC's request for a Section 401 Water Quality Certification for the Port Gamble Bay Habitat Restoration project, located in Kitsap County. Ecology has determined that the proposed discharges will comply with all applicable state water quality and other appropriate requirements of State law,

provided the project is conducted in accordance with the WQC request that Ecology received on September 16, 2022, the supporting documents referenced in Table 1 below, **and the conditions of this WQC Order.**

Table 1 Supporting Documents

Date Received	Document Type	Title and Date	Author
9/16/2022	Joint Aquatic Resources Permit Application(JARPA) Form	JARPA 9/12/2022	Jaime Northrup, OPG Port Gamble, LLC
9/16/2022	Biological Assessment	Port Gamble Bay Habitat Restoration Project Biological Assessment, dated September 2022	Anchor QEA, LLC
10/17/2022	Cleanup Engineering Design Report, Construction Quality Assurance Plan	Port Gamble Integrated Cleanup and Habitat Restoration Design, Appendix F, Construction Quality Assurance Plan, dated October 2022	Anchor QEA, LLC
3/17/2023	Letter	Request for Extended Area of Mixing for Placement of Clean Sand Cover, dated March 17, 2023	Elizabeth Greene, Anchor QEA, LLC
3/27/2023	Water Quality Monitoring Plan	Port Gamble Bay Habitat Restoration Project Water Quality Monitoring Plan, dated March 2023	Anchor QEA, LLC
8/28/2023	State Environmental Policy Act	Determination of Nonsignificance, signed August 28, 2023	Steve Heacock, Kitsap County

Issuance of this Section 401 Water Quality Certification for this proposal does not authorize OPG Port Gamble, LLC to exceed applicable state water quality standards (Chapter 173-201A WAC), ground

water quality standards (Chapter 173-200 WAC) or sediment quality standards (Chapter 173-204 WAC) or other appropriate requirements of State law. Furthermore, nothing in this Section 401 Water Quality Certification absolves the OPG Port Gamble, LLC from liability for contamination and any subsequent cleanup of surface waters, ground waters, or sediments resulting from project construction or operations.

Water Quality Certification Conditions

The following conditions will be incorporated into the Corps permit and strictly adhered to by the OPG Port Gamble, LLC. Specific condition justifications and citations are provided below.

A. General Conditions

1. In this WQC Order, the term "Project Proponent" shall mean the OPG Port Gamble, LLC and its agents, assignees, and contractors.

    - Justification - Ecology needs to identify that conditions of this WQC Order apply to anyone conducting work on behalf of the Project Proponent to ensure compliance with the water quality standards and other applicable state laws.

    - Citation - 40 CFR 121.1(j), Chapter 90.48 RCW, RCW 90.48.080, RCW 90.48.120, RCW 90.48.260, Chapter 173-200 WAC, Chapter 173-201A WAC, and WAC 173-225-010.

2. All submittals required by this WQC Order shall be sent to Ecology's Headquarters Office, Attn: Federal Permit Manager, via e-mail to fednotification@ecy.wa.gov and cc to Laura.Inouye@ecy.wa.gov. The submittals shall be identified with WQC Order No. 21609 and include the Project Proponent's name, Corps permit number, project name, project contact, and the contact phone number.

    - Justification - Ecology needs to identify where information and submittals are to be submitted to be in compliance with the requirements of this WQC Order.

    - Citation - Chapter 90.48 RCW, RCW 90.48.120, RCW 90.48.260, Chapter 173-201A WAC, and WAC 173-225-010.

3. Work authorized by this WQC Order is limited to the work described in the WQC request package received by Ecology on September 16, 2022 and the supporting documentation identified in Table 1.

- Justification - Ecology has the authority to prevent and control pollution of state waters. By authorizing a discharge into a water of the state, through a WQC, Ecology is certifying the project as proposed will not negatively impact water quality. Therefore, it is imperative the project is conducted as it was presented during the review process. Any deviations from information within the WQC Request package and this WQC Order must be disclosed prior to the initiation of the planned work, and may require a new WQC request.

- Citation - 40 CFR 121.5, 40 CFR 121.10, 40 CFR 121.11, Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.120, RCW 90.48.260, Chapter 173-200 WAC, Chapter 173-201A WAC, Chapter 173-204 WAC, and WAC 173-225-010.

4. The Project Proponent shall keep copies of this WQC Order on the job site and readily available for reference by Ecology personnel, the construction superintendent, construction managers and lead workers, and state and local government inspectors.

    - Justification - All parties (including on-site contractors) must be aware of and comply with the WQC Order for the protection of water quality.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, Chapter 173-201A WAC, and WAC 173-225-010.

5. The Project Proponent shall provide access to the project site and all mitigation sites upon request by Ecology personnel for site inspections, monitoring, and/or necessary data collection, to ensure that conditions of this WQC Order are being met.

    - Justification - Ecology must be able to investigate and inspect construction sites and facilities for compliance with all state rules and laws.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.090, RCW 90.48.120, Chapter 173-201A WAC, and WAC 173-225-010.

6. The Project Proponent shall ensure that all project engineers, contractors, and other workers at the project site with authority to direct work have read and understand relevant conditions of this WQC Order and all permits, approvals, and documents referenced in this WQC Order. The Project Proponent shall provide Ecology a signed statement (see Attachment A for an example) before construction begins.

    - Justification - Ecology needs to ensure that anyone conducting work at the project, on behalf of the Project Proponent, are aware of and understand the required conditions of this WQC Order to ensure compliance with the water quality standards and other applicable state laws.

- Citation - Chapter 90.48 RCW, RCW 90.48.030, Chapter 173-201A WAC, and WAC 173-225-010.

7. This WQC Order does not authorize direct, indirect, permanent, or temporary impacts to waters of the state or related aquatic resources, except as specifically provided for in conditions of this WQC Order.

    - Justification - Ecology has the authority to prevent and control pollution of state waters, and to protect designated uses. By authorizing a discharge into a water of the state, through a water quality certification, Ecology is certifying the project as proposed will not negatively impact state water quality and will comply with the state's water quality requirements. Therefore, it is imperative the project is conducted as it was presented during the review process, and as conditioned herein.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.120, Chapter 173-200 WAC, Chapter 173-201A WAC, WAC 173-201A-300(2)(e)(i), WAC 173-201A-310, WAC 173-204-120, and WAC 173-225-010.

8. Failure of any person or entity to comply with the WQC Order may result in the issuance of civil penalties or other actions, whether administrative or judicial, to enforce the state's water quality standards and the conditions of this WQC Order.

    - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses. Ecology has independent state authority to ensure protection of state water quality. Civil penalties and other enforcement actions are the primary means of securing compliance with water quality requirements.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.037, RCW 90.48.080, RCW 90.48.120, RCW 90.48.140, RCW 90.48.142, RCW 90.48.144, and WAC 173-225-010.

9. The Project Proponent shall provide Ecology documentation for review before undertaking any major changes to the proposed project that could significantly and adversely affect water quality, other than those project changes required by this WQC Order.

    - Justification - Ecology has independent authority to enforce our 401 certification conditions issued through this WQC Order pursuant to RCW 90.48, and has independent state authority to ensure protection of state water quality. In order to ensure the project will comply with water quality standards in the event of any major changes, Ecology must be able to review the scope of work involved in the construction and operation of the project, otherwise all work must stop and a new 401 certification pre-filing meeting, followed by a new WQC request (after requisite 30-days) is required.

- Citation - 40 CFR 121.1(k) and (n), 40 CFR 121.3, 40 CFR 121.5, 40 CFR 121.11, Chapter 90.48 RCW, and Chapter 173-201 WAC.

10. The Project Proponent shall send (per A.2.) a copy of the final Federal permit to Ecology's Federal Permit Manager within two weeks of receiving it.

    - Justification - This condition is needed to ensure that all the conditions of the WQC Order have been incorporated into the federal permit.

    - Citation - 40 CFR 121.10, 40 CFR 121.11, and Chapter 90.48 RCW.

11. This WQC Order will transfer to a new owner or operator if:

    a. A Request for Transfer of Order form is completed between the Project Proponent and new owner or operator with the specific transfer date of the WQC Order's obligations, coverage, and liability and submitted to Ecology per condition A.2. Link to form: https://apps.ecology.wa.gov/publications/SummaryPages/ECY070695.html;

    b. A copy of this WQC Order is provided to the new owner or operator; and

    c. Ecology does not notify the new Project Proponent that a new WQC Order is required to complete the transfer.

        - Justification – Ecology has independent state authority to ensure protection of state water quality. Ecology needs to ensure that anyone conducting work at the project, including any new owners or operators, are aware of and understand the required conditions of this WQC Order to ensure compliance with the water quality standards and other applicable state laws.

        - Citation – 40 CFR 121.5, Chapter 90.48 RCW, RCW 90.48.030, Chapter 173-201A WAC, and WAC 173-225-010.

B. Notification Requirements

1. The following notifications shall be made via phone or e-mail (e-mail is preferred) to Ecology's Federal Permit Manager via e-mail to fednotification@ecy.wa.gov and cc to Laura.Inouye@ecy.wa.gov. Notifications shall be identified with WQC Order No. 21609, Corps Reference No. NWS-2022-0717, and include the Project Proponent name, project name, project location, project contact and the phone number.

    a. Immediately following a violation of state water quality standards or when the project is out of compliance with any conditions of this WQC Order;

b. At least ten (10) days prior to all pre-construction meetings;

c. At least ten (10) days prior to conducting initial in-water work activities; and

d. Within seven (7) days of completion of each in-water work activities.

- Justification - Ecology has independent state authority to ensure protection of state water quality. Ecology must be aware of when a project starts and ends and whether there are any issues. This allows Ecology to evaluate compliance with the state water quality requirements.

- Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.120, Chapter 173-201A WAC, WAC 173-201A-300 - 330, Chapter 173-204 WAC, and WAC 173-225-010.

2. In addition to the phone or e-mail notification required under B.1.a. above, the Project Proponent shall submit a detailed written report to Ecology within five (5) days that describes the nature of the event, corrective action taken and/or planned, steps to be taken to prevent a recurrence, results of any samples taken, and any other pertinent information.

- Justification - Ecology has independent state authority to ensure protection of state water quality. This condition is intended to assure the Project Proponent remains in full compliance with state water quality requirements for the duration of the project.

- Citation - Chapter 90.48 RCW, RCW 90.48.120, Chapter 173-201A WAC, and WAC 173-225-010.

3. If the project construction is not completed within 13 months of issuance of this WQC Order, the Project Proponent shall submit per Condition A2 a written construction status report and submit status reports every 12 months until construction and mitigation are completed.

- Justification - Ecology has independent state authority to ensure protection of state water quality. Ecology must be aware of when a project starts and ends and whether there are any issues. This allows Ecology to evaluate compliance with the state water quality requirements.

- Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.120, Chapter 173-201A WAC, WAC 173-201A-300 - 330, Chapter 173-204 WAC, and WAC 173-225-010.

C. Timing

1. This WQC Order is effective upon issuance of the U.S. Corps of Engineers (Corps) permit for this project and will remain valid until the Project Proponent meets all its requirements and conditions, including the 10-year eelgrass monitoring required in the Biological Assessment dated September 2022.

    - Justification – Certifications are required for any license or permit that authorizes an activity that may result in a discharge or fill material into waters. This WQC Order is not valid until the Federal agency issues a permit. Additionally, Ecology needs to be able to specify how long the WQC Order will be in effect.

    - Citation – Chapter 90.48 RCW, Chapter 173-201A WAC, and WAC 173-225-010.

2. The following in-water work windows apply to the project:

    a. All activities within the wetted perimeter of Port Gamble Bay may be conducted between July 15 through January 15 of any year.

        - Justification - This condition is reaffirming the project will take place during a time period that will not harm fish or other aquatic species.

        - Citation - Chapter 77.55 RCW, Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 173-201A WAC, WAC 173-201A-300, WAC 173-201A-330, WAC 173-225-010, and Chapter 220-660 WAC.

3. The Project Proponent shall send Ecology a copy of the Hydraulic Project Approval (HPA) from the Department of Fish and Wildlife within two week of issuance. Any project change that requires a new or revised HPA from the Department of Fish and Wildlife should be sent to Ecology for review before the change is implemented.

    - Justification - This condition is reaffirming the project will take place during a time period that will not harm fish or other aquatic species.

    - Citation - Chapter 77.55 RCW, Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 173-201A WAC, WAC 173-201A-300, WAC 173-201A-330, WAC 173-225-010, and Chapter 220-660 WAC.

D. Water Quality Monitoring and Criteria

1. This WQC Order does not authorize the Project Proponent to exceed applicable water quality standards beyond the limits established in Chapter 173-201A WAC, except as authorized by this WQC Order.

- Justification - This condition ensures compliance with water quality standards to protect surface waters of the state. Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

- Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

2. For in-water activities within marine waters turbidity shall not exceed 5 NTU over background when the background is 50 NTU or less; or a 10 percent increase in turbidity when the background turbidity is more than 50 NTU.

   - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution and prevent exceedances of the water quality standards that protect aquatic life and beneficial uses.

   - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

3. This WQC Order does not authorize the Project Proponent to exceed applicable turbidity standards beyond the limits established in Chapter 173-201A WAC as set forth below, unless otherwise authorized in this WQC Order:

   a. Temporary area of mixing for turbidity established within the state water quality standards for marine waters (WAC 173-201A-210) is as follows:

      01. For estuaries or marine waters, the point of compliance for a temporary area of mixing shall be at a radius of one hundred fifty feet from the activity causing the turbidity exceedance.

          - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution and prevent exceedances of the water quality standards that protect aquatic life and beneficial uses.

          - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

4. For the activities identified below in Table 2, the Project Proponent is granted a larger area of mixing for turbidity and shall comply with the point of compliance.

Table 2: Area of Mixing

Activity	Waterbody	Point of Compliance
Clean sand placement	Port Gamble	300 ft

- Justification - This condition is necessary to ensure that the monitoring as proposed by the Project Proponent and authorized by Ecology is conducted to protect water quality. Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

- Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

5. The Project Proponent shall conduct water quality monitoring as described in the approved Water Quality Monitoring Plan identified in Table 1 (hereafter referred to as the WQMP).

    - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution and prevent exceedances of the water quality standards that protect aquatic life and beneficial uses.

    - Citation - RCW 90.48, RCW 90.48.030, Chapter 173-201A WAC, 173-201A-300-330 WAC.

6. If water quality exceedances for turbidity are observed outside the point of compliance, work shall cease immediately and the Project Proponent or the contractor shall assess the cause of the water quality problem and take immediate action to stop, contain, and correct the problem and prevent further water quality turbidity exceedances.

    - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution and prevent exceedances of the water quality standards that protect aquatic life and beneficial uses.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

7. Visible turbidity anywhere beyond the temporary area of mixing (point of compliance) from the activity, shall be considered an exceedance of the standard.

    - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution and prevent exceedances of the water quality standards that protect aquatic life and beneficial uses.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

8. Monitoring results shall be submitted monthly to Ecology's Federal Permit Manager, per condition A.2.

    - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution and prevent exceedances of the water quality standards that protect aquatic life and beneficial uses.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

9. Ecology may ask or could use its discretionary authority to require the Project Proponent to provide mitigation and/or additional monitoring if the monitoring results indicate that the water quality standards have not been met.

    - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution and ensure that aquatic life and beneficial uses are protected.

    - Citation - RCW 90.48, RCW 90.48.010, RCW 90.48.030, RCW 90.48.080, RCW 90.48.120, Chapter 173-201A WAC, 173-201A-300-330 WAC, and Chapter 173-204 WAC.

E. Construction

General Conditions

1. All work in and near waters of the state shall be conducted to minimize turbidity, erosion, and other water quality impacts. Construction stormwater, sediment, and erosion control Best Management Practices (BMPs) suitable to prevent exceedances of state water quality standards shall be in place before starting maintenance and shall be maintained throughout the duration of the activity.

    - Justification - Disturbed areas without appropriate BMPs and construction methods can discharge excess sediment to waters of the state and degrade water quality. Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

    - Citation - Chapter 90.48 RCW, Chapter 90.48.030 RCW, Chapter 90.48.080 RCW, Chapter 173-201A WAC, Chapter 173-201A-300-330 WAC, Chapter 173-204-120 WAC, and Chapter 173-225-010 WAC.

2. No stockpiling or staging of materials shall occur at or below the OHWM of any waterbody.

- Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

- Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

3. The Project Proponent shall comply with the conditions of the Construction Stormwater General Permit (National Pollutant Discharge Elimination System - NPDES) issued for this project.

   - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

   - Citation – 40 [CFR 122] {delete CFR if NPDES is not EPA}, Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, RCW 90.48.260, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

4. No petroleum products, fresh concrete, lime or concrete, chemicals, or other toxic or deleterious materials shall be allowed to enter waters of the state.

   - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

   - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

5. All construction debris, excess sediment, and other solid waste material shall be properly managed and disposed of in an upland disposal site approved by the appropriate regulatory authority.

   - Justification - Ecology must be assured that the Project Proponent is managing and disposing of material to protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

   - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

6. All equipment being used below the ordinary high water mark shall utilize biodegradable hydraulic fluid.

- Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

- Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

7. Applicant shall ensure that fill (soil, gravel, or other material) placed for the proposed project does not contain toxic materials in toxic amounts.

    - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 173-201A WAC, WAC 173-201A-300-330, WAC 173-204-120, and WAC 173-225-010.

8. Work within waters of the state shall be conducted in the dry or during periods of low flow to the extent practicable.

    - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 173-201A WAC, WAC 173-201A-300-330, WAC 173-204-120, and WAC 173-225-010.

Equipment and Maintenance

9. Staging areas will be located a minimum of 50 feet and, where practical, 200 feet, from waters of the state, including wetlands, unless otherwise requested by the project proponent and authorized by Ecology.

    - Justification - Requiring a minimum setback ensures that material will not end up in waters of the state. Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

10. Equipment used for this project shall be free of external petroleum-based products while used around the waters of the state, including wetlands. Accumulation of soils or debris shall be removed from the drive mechanisms (wheels, tires, tracks, etc.) and the undercarriage of equipment prior to its use around waters of the state, including wetlands.

    - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 90.56 RCW, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

11. No equipment shall enter, operate, be stored or parked within any sensitive area except as specifically provided for in this WQC Order.

    - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

12. Fuel hoses, oil drums, oil or fuel transfer valves and fittings, etc., shall be checked regularly for drips or leaks, and shall be maintained and stored properly to prevent spills into state waters.

    - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 90.56 RCW, Chapter 173-200, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

13. Wash water containing oils, grease, or other hazardous materials resulting from washing of equipment or working areas shall not be discharged into state waters. The Project Proponent shall set up a designated area for washing down equipment.

    - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 90.56 RCW, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

14. Barges shall not be allowed to ground-out during in-water construction.

    - Justification - This condition is necessary to protect shallow water habitat and prevent suspension of sediment. Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, Chapter 173-201A WAC, 173-201A-300 - 330 WAC, and Chapter 173-204 WAC.

15. Barges shall be kept free of material that could be blown into water.

    - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

16. No return water is allowed to discharge from the barge(s) into waters of the state.

    - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

17. The Project Proponent shall follow the approved Construction work plan identified in Table 1.

    - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 90.56 RCW, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

18. A pre-construction meeting is required to be convened prior to the start of construction.

    - Justification - Ecology needs to meet with the Project Proponent and contractor to go over the work plan prior start of work to ensure that the plan reflects the project that has been authorized by this WQC Order. This condition is intended to assure the Project Proponent remains in full compliance with state water quality requirements for the duration of the project.

- Citation - Chapter 70A-200 RCW, Chapter 77.55 RCW, RCW 79.02.300, Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, RCW 90.52-040, RCW 90.54.020(2)(b), Chapter 173-201A WAC, WAC 173-201A-240(5)(b), WAC 173-201A-300, WAC 173-201A-330, WAC 173-204-400(2), WAC 173-225-010, and Chapter 220-660 WAC.

Dredging

19. All dredging is to be done using a mechanical (clamshell) dredge. Ecology must approve any other dredging method prior to its use.

    - Justification - Ecology has reviewed the project and the BMPs for a specific type of dredging. Changes to the dredging method would require different BMPs. If new dredging methods are proposed, a new WQC pre-filing meeting request, followed by a new WQC request (after requisite 30-days) is required.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 90.52-040 RCW, Chapter 90.54.020(2)(b) RCW, Chapter 173-201A WAC, Chapter 173-201A-240(5)(b) WAC, and Chapter 173-204-400(2) WAC, and WAC 173-225-010.

20. Dredging operations shall be conducted in a manner that minimizes the disturbance and siltation of adjacent waters and prevents the accidental discharge of petroleum products, chemicals or other toxic or deleterious substances into state waters.

    - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 90.56 RCW, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

21. Dredged material shall not be temporarily or permanently stockpiled below the OHWM.

    - Justification - Stockpiles below the OHWM can discharge excess sediment to waters of the state and degrade water quality. Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

    - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, and WAC 173-225-010.

22. Soil/sediment contamination is known to be present within the project site. Contaminated soil/sediment shall be managed as outlined in the approved Cleanup Engineering Design Report, Construction Quality Assurance Plan identified in Table 1.

- Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

- Citation – Chapter 70.105D RCW, Chapter 90.48 RCW, RCW 90.48.030, Chapter 173-200 WAC, Chapter 173-201A WAC, WAC 173-201A-300 - 330, Chapter 173-204 WAC, and WAC 173-225-010.

23. If further contamination is discovered on site, it must be reported to Ecology (per Condition A.2.). Protective measures shall be implemented to isolate and remove the contaminated media and avoid escaping dust, soil erosion, and water pollution during construction activities.

- Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

- Citation - Chapter 70.105D RCW, RCW 90.48, 90.48, RCW 90.48.030, Chapter 173-200 WAC, Chapter 173-201A WAC, WAC 173-201A-300-330, Chapter 173-204 WAC, and WAC 173-225-010.

F. Emergency/Contingency Measures

1. The Project Proponent shall develop and implement a spill prevention and containment plan for all aspects of this project.

- Justification - Ecology must ensure that the Project Proponent has a plan to prevent pollution from entering waterways. Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

- Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 90.56 RCW, Chapter 90.56.280 RCW, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, WAC 173-225-010, and WAC 173-303-145.

2. The Project Proponent shall have adequate and appropriate spill response and cleanup materials available on site to respond to any release of petroleum products or any other material into waters of the state.

- Justification - Ecology must have assurance that the Project Proponent has the material readily available in WQC Order to address any spills that might occur to protect waters of the state. Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

- Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 90.56 RCW, RCW 90.56.280, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, WAC 173-225-010, and WAC 173-303-145.

3. Fuel hoses, oil drums, oil or fuel transfer valves and fittings, etc., shall be checked regularly for drips or leaks, and shall be maintained and stored properly to prevent spills into state waters.

   - Justification - Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

   - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 90.56 RCW, RCW 90.56.280, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, WAC 173-225-010, and WAC 173-303-145.

4. Work causing distressed or dying fish and discharges of oil, fuel, or chemicals into state waters or onto land with a potential for entry into state waters is prohibited. If such work, conditions, or discharges occur, the Project Proponent shall notify Ecology's Federal Permit Manager, per condition A2, and immediately take the following actions:

   a. Cease operations at the location of the non-compliance.

   b. Assess the cause of the water quality problem and take appropriate measures to correct the problem and prevent further environmental damage.

   c. In the event of a discharge of oil, fuel, or chemicals into state waters, or onto land with a potential for entry into state waters, containment and cleanup efforts shall begin immediately and be completed as soon as possible, taking precedence over normal work. Cleanup shall include proper disposal of any spilled material and used cleanup materials.

   d. Immediately notify Ecology's Regional Spill Response Office and the Washington State Department of Fish and Wildlife with the nature and details of the problem, any actions taken to correct the problem, and any proposed changes in operation to prevent further problems.

   e. Immediately notify the National Response Center at 1-800-424-8802, for actual spills to water only.

      - Justification - This condition is necessary to prevent oil and hazardous materials spills from causing environmental damage and to ensure compliance with water quality requirements. The sooner a spill is reported, the quicker it can be addressed, resulting in less harm. Ecology must protect waters of the state from all discharges and potential

discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

- Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 90.56 RCW, RCW 90.56.280, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, WAC 173-225-010, and WAC 173-303-145.

5. Notify Ecology's Regional Spill Response Office immediately if chemical containers (e.g. drums) are discovered on-site or any conditions present indicating disposal or burial of chemicals on-site that may impact surface water or ground water.

   - Justification - Oil and hazardous materials spills cause environmental damage. The sooner a spill is reported, the quicker it can be addressed, resulting in less harm. Ecology must protect waters of the state from all discharges and potential discharges of pollution that can affect water quality to protect aquatic life and beneficial uses.

   - Citation - Chapter 90.48 RCW, RCW 90.48.030, RCW 90.48.080, Chapter 90.56 RCW, RCW 90.56.280, Chapter 173-201A WAC, WAC 173-201A-300 - 330, WAC 173-204-120, WAC 173-225-010, and WAC 173-303-145.

Your right to appeal

You have a right to appeal this Order to the Pollution Control Hearings Board (PCHB) within 30 days of the date of receipt. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal, you must do all of the following within 30 days of the date of receipt of Order:

- File your notice of appeal and a copy of this Order with the PCHB (see filing information below). "Filing" means actual receipt by the PCHB during regular business hours as defined in WAC 371-08-305 and -335. "Notice of appeal" is defined in WAC 371-08-340.

- Serve a copy of your notice of appeal and this Order on the Department of Ecology mail, in person, or by email (see addresses below).

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

Filing an appeal

Filing with the PCHB

For the most current information regarding filing with the PCHB, visit: https://eluho.wa.gov/ or call: 360-664-9160.

Service on Ecology

Street Addresses:

Department of Ecology
Attn: Appeals Processing Desk
300 Desmond Drive SE
Lacey, WA 98503

Mailing Addresses:

Department of Ecology
Attn: Appeals Processing Desk
PO Box 47608
Olympia, WA 98504-7608

E-Mail Address:

ecologyappeals@ecy.wa.gov

Americans with Disabilities Act Information

Accommodation Requests

To request ADA accommodation including materials in a format for the visually impaired, call Ecology at 360-407-7668 or visit https://ecology.wa.gov/accessibility. People with impaired hearing may call Washington Relay Service at 711. People with speech disability may call TTY at 877-833-6341.

Contact Information

Please direct all questions about this WQC Order to:

Laura Inouye
Department of Ecology
(360) 515-8213
Laura.Inouye@ecy.wa.gov

More Information

- **Pollution Control Hearings Board Website**
  https://eluho.wa.gov

- **Chapter 43.21B RCW - Environmental and Land Use Hearings Office – Pollution Control Hearings Board**
  http://app.leg.wa.gov/RCW/default.aspx?cite=43.21B

- **Chapter 371-08 WAC – Practice and Procedure**
  http://app.leg.wa.gov/WAC/default.aspx?cite=371-08

- **Chapter 34.05 RCW – Administrative Procedure Act**
  http://app.leg.wa.gov/RCW/default.aspx?cite=34.05

- **Chapter 90.48 RCW – Water Pollution Control**
  http://app.leg.wa.gov/RCW/default.aspx?cite=90.48

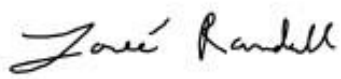
- **Chapter 173.204 WAC – Sediment Management Standards**
  http://apps.leg.wa.gov/WAC/default.aspx?cite=173-204

- **Chapter 173-200 WAC – Water Quality Standards for Ground Waters of the State of Washington**
  http://apps.leg.wa.gov/WAC/default.aspx?cite=173-200

- **Chapter 173-201A WAC – Water Quality Standards for Surface Waters of the State of Washington**
  http://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A

Signature

Dated this 8th day of September 2023 at the Department of Ecology, Lacey, Washington.



Loree' Randall, Section Manager
Federal Permitting Section
Shorelands and Environmental Assistance Program

Attachment A

Statement of Understanding
Water Quality Certification Conditions

Port Gamble Bay Habitat Restoration

Water Quality Certification WQC Order No. 21609

As the Project Proponent for Port Gamble Bay Habitat Restoration project, I have read and understand the conditions of Washington State Department of Ecology WQC Order No. 21609, and any permits, plans, documents, and approvals referenced in the WQC Order. I have and will continue to ensure that all project engineers, contractors, and other workers at the project site with authority to direct work have read and understand the conditions of this WQC Order and any permits, plans, documents, and approvals referenced in the WQC Order.

_____ _____
Signature Date

_____ _____
Title Phone

_____
Company

HYDRAULIC PROJECT APPROVAL

Washington Department of
Fish & Wildlife
PO Box 43234
Olympia, WA 98504-3234
(360) 902-2200

Issued Date: October 12, 2023
Project End Date: February 28, 2025

Permit Number: 2023-6-447+01
FPA/Public Notice Number: N/A
Application ID: 32783

PERMITTEE	AUTHORIZED AGENT OR CONTRACTOR
OPG Port Gamble, LLC	Anchor QEA
ATTENTION: Jaime Northrup	ATTENTION: Jacquie Ptacek
1 Rayonier Way	1201 3rd Ave
Wildlight, FL 32097	Seattle, WA 98101-3027

Project Name: Port Gamble Bay Habitat Restoration Project

Project Description: The activities associated with the Project include the following:
• Southern Mill Site Shoreline Restoration. This 9-acre project includes laying back intertidal slopes of the southern portion of the former sawmill facility shoreline to restore near-natural beach grades. Restored intertidal caps will include a lower layer of angular cobble-sized armor, a middle layer of rounded cobble/gravel beach substrate, and an upper layer of sand/gravel habitat substrate to optimize habitat functions and concurrently remain protective. Near-surface hardscape will be removed within a 150-foot shoreline buffer, followed by placement of imported topsoil and mulch and native plantings.
• Western Bay Nearshore Thin Layer Sand Cover. This project includes placing a sand cover layer over a minimum of 11 acres of lower intertidal to shallow subtidal zones (approximately -2 to -15 feet mean lower low water [MLLW]) within former log rafting areas in the western bay to restore benthic habitat functions and concurrently provide suitable substrate in areas where eelgrass is absent or growing at very sparse densities. As practicable, the sand cover will be placed using clean navigation channel maintenance dredge material from the nearby Driftwood Key, or other similar marine source, which is expected to contain eelgrass seed and maximize restoration potential. (Maintenance dredging activities at Driftwood Key are addressed under a separate JARPA.)

PROVISIONS

AUTHORIZED WORK TIMES

1. TIMING LIMITATION AT THE SOUTHERN MILL RESTORATION SITE: To protect fish and shellfish habitats at the job site, work below the ordinary high water line must occur through July 15 and December 31 and January 1 and January 15 of any year.

2. TIMING LIMITATION AT THE WESTERN BAY NOURISHMENT SITE: To protect fish, shellfish, and sand lance spawning habitats at the job site, work below the ordinary high water line must occur between July 15 and October 15 of any year.

3. APPROVED PLANS: Work must be accomplished per plans and specifications submitted with the application and approved by the Washington Department of Fish and Wildlife, entitled "Port Gamble Integrated Cleanup and Habitat Restoration Design (20231011).pdf", uploaded into APPS on 10/11/2023, and attached E-mail entitled, "email regarding planting density and project length.txt", uploaded into APPS on 10/04/2023, except as modified by this Hydraulic Project Approval. You must have a copy of these plans available on site during all phases of the project construction.

NOTIFICATION

Washington Department of
Fish & Wildlife
PO Box 43234
Olympia, WA 98504-3234
(360) 902-2200

Issued Date: October 12, 2023
Project End Date: February 28, 2025
Permit Number: 2023-6-447+01
FPA/Public Notice Number: N/A
Application ID: 32783

4. PRE- AND POST-CONSTRUCTION NOTIFICATION: You, your agent, or contractor must contact the Washington Department of Fish and Wildlife by e-mail at HPAapplications@dfw.wa.gov; mail to Post Office Box 43234, Olympia, Washington 98504-3234; or fax to (360) 902-2946 at least three business days before starting work, and again within seven days after completing the work. The notification must include the permittee's name, project location, starting date for work or date the work was completed, and the permit number. The Washington Department of Fish and Wildlife may conduct inspections during and after construction; however, the Washington Department of Fish and Wildlife will notify you or your agent before conducting the inspection.

5. PHOTOGRAPHS: You, your agent, or contractor must take photographs of the job site before the work begins and after the work is completed. You must upload the photographs to the post-permit requirement page in the Aquatic Protection Permitting System (APPS) or mail them to Washington Department of Fish and Wildlife at Post Office Box 43234, Olympia, Washington 98504-3234 within 30-days after the work is completed.

6. FISH KILL/ WATER QUALITY PROBLEM NOTIFICATION: If a fish kill occurs or fish are observed in distress at the job site, immediately stop all activities causing harm. Immediately notify the Washington Department of Fish and Wildlife of the problem. If the likely cause of the fish kill or fish distress is related to water quality, also notify the Washington Military Department Emergency Management Division at 1-800-258-5990. Activities related to the fish kill or fish distress must not resume until the Washington Department of Fish and Wildlife gives approval. The Washington Department of Fish and Wildlife may require additional measures to mitigate impacts.

STAGING, JOB SITE ACCESS AND EQUIPMENT

7. Establish the staging area (used for activities such as equipment storage, vehicle storage, fueling, servicing, and hazardous material storage) in a location and manner that will prevent contaminants like petroleum products, hydraulic fluid, fresh concrete, sediments, sediment-laden water, chemicals, or any other toxic or harmful materials from entering waters of the state.

8. Clearly mark boundaries to establish the limit of work associated with site access and construction.

9. Retain all natural habitat features on the beach larger than twelve inches in diameter including trees, stumps, logs, and large rocks. These natural habitat features may be moved during construction but they must be placed near the preproject location before leaving the job site.

10. Confine the use of equipment to specific access and work corridor shown in the approved plans.

11. Check equipment daily for leaks and complete any required repairs before using the equipment in or near the water.

12. Clearly mark the edge of the seagrass and/or kelp habitat adjacent to the project during construction activities. Remove markers upon project completion.

13. Lubricants composed of biodegradable base oils such as vegetable oils, synthetic esters, and polyalkylene glycols are recommended for use in equipment operated in or near water.

14. Operate vessels with minimal propulsion power and in adequate water depth to prevent impacts from grounding and propeller wash to seagrass, kelp, and forage fish spawning beds.

15. Do not deploy anchors or spuds in seagrass or kelp.

16. Maintain anchor cable tension, set and retrieve anchors vertically, and prevent mooring cables from dragging to avoid impacts to seagrass and kelp.

17. Relocate vessels moored over seagrass between March 21 and September 21 every 4th day to minimize shading of seagrass.

18. Project activities must not adversely impact seagrass and kelp (e.g., barge must not ground, anchor or spud down, equipment must not operate, and other project activities must not occur in seagrass and kelp).

CONSTRUCTION-RELATED SEDIMENT, EROSION AND POLLUTION CONTAINMENT

19. Prevent contaminants from the project, such as petroleum products, hydraulic fluid, fresh concrete, sediments,

sediment-laden water, chemicals, or any other toxic or harmful materials, from entering or leaching into waters of the state.

20. Use tarps or other methods to prevent treated wood, sawdust, trimmings, drill shavings and other debris from contacting the bed or waters of the state.

INTERTIDAL CAP AND BEACH NOURISHMENT

21. As shown in the approved plans, the length of the intertidal cap must not exceed 1450 linear feet.

22. Establish the waterward distance of the rock bulkhead from a permanent benchmark(s) (fixed objects) before starting work on the project. The benchmarks must be located and shown on the approved plans, marked in the field, and protected to serve as a post-project reference for ten years.

23. Remove the existing rock bulkhead from the beach and deposit the bulkhead in an upland area above the limits of extreme high tidal water.

24. The waterward face of the rock bulkhead must be located no further waterward than the face of the existing functioning bulkhead as shown in the approved plans.

25. As specified in the application, a new intertidal cap will be placed to contain existing contamination. The intertidal cap (up to 1450 linear feet and 14,800 cy) will consist of approximately 12" feet of gravel layer, a 12" cobble layer and a 12" armoring layer.

26. The surface layer of sand and gravel placed on the beach should be appropriately sized to provide forage fish spawning substrate following the provisions below:

a. For surf smelt spawning beaches, material placed must be in compliance with the following specifications:

Sieve Size	Percent passing by weight
5/8-inch	100
3/8-inch	90-100
1/16-inch	40-50
1/100-inch (.25mm)	0-5

b. Spread the material along the entire length of the Southern Mill restoration site waterward for a distance of 1450 lineal feet to a uniform depth of at least 12 inches.

c. Use clean, round gravel, not crushed or angular rock.

d. The mix must not contain fine silt or clay type soils.

e. The sand and gravel mix must be the surface layer.

27. Keep the use of equipment on the beach to a minimum, confined to a single access point, and limited to the MLLW. Construction material must not touch the beach outside beach outside this work corridor.

28. Do not stockpile excavated materials waterward of the ordinary high water line.

29. Prior to tidal inundation, backfill all trenches, depressions, or holes created during construction waterward of the ordinary high water line.

30. Reshape beach area depressions created during project activities to preproject beach level upon project completion.

WESTERN BAY NOURISHMENT

31. Place suitable substrate between target elevations of -2 feet MLLW and -15 feet MLLW.

32. Eleven acres of nourishment substrate for eelgrass restoration is authorized. Do not spread nourishment substrate beyond the approved area shown in plans.

33. Place sand and gravel following the provisions below:

a. Spread the material along the approved areas to a uniform depth of 6 inches.

c. Use clean, round gravel and sand, not crushed or angular rock.

d. The mix must not contain fine silt or clay type soils.

Issued Date: October 12, 2023
Project End Date: February 28, 2025

Permit Number: 2023-6-447+01
FPA/Public Notice Number: N/A
Application ID: 32783

DEMOBILIZATION/CLEANUP

34. Remove all trash and unauthorized fill in the project area, including concrete blocks or pieces, bricks, asphalt, metal, treated wood, glass, floating debris, and paper, that is waterward of the ordinary high water line and deposit upland.

35. Reshape beach area depressions created during project activities to preproject beach level upon project completion.

36. Complete replanting of riparian vegetation during the first dormant season (late fall through late winter) after project completion per the approved plan. Maintain plantings for at least three years to ensure at least eighty percent of the plantings survive. Failure to achieve the eighty percent survival in year three will require you to submit a plan with follow-up measures to achieve requirements or reasons to modify requirements.

37. Remove any riprap (including quarry spalls) scattered, or abandoned outside the original design footprint from the bed and deposit it an upland area above the limits of extreme high tidal water.

38. Remove all debris or deleterious material resulting from construction from the beach area or bed and prevent from entering waters of the state.

LOCATION #1:	, Port Gamble, WA 99364					
WORK START:	January 1, 2024			WORK END:	January 31, 2025	
WRIA		Waterbody:			Tributary to:	
15 - Kitsap		Wria 15 Marine			9231	
1/4 SEC:	Section:	Township:	Range:	Latitude:	Longitude:	County:
SW 1/4	05	27 N	02 E	47.853925	-122.582112	Kitsap
Location #1 Driving Directions						
From Kingston, Washington (location of the Kingston Ferry Terminal), take NE 1st Street/SR 104 westbound for approximately 4.1 miles. Turn right (continue) onto SR 104 W and continue for 3.8 miles. Turn right onto Rainier Avenue NE. Turn right on NE View Drive and follow the road until reaching an industrial yard located adjacent to the Project site.						

APPLY TO ALL HYDRAULIC PROJECT APPROVALS

This Hydraulic Project Approval pertains only to those requirements of the Washington State Hydraulic Code, specifically Chapter 77.55 RCW. Additional authorization from other public agencies may be necessary for this project. The person(s) to whom this Hydraulic Project Approval is issued is responsible for applying for and obtaining any additional authorization from other public agencies (local, state and/or federal) that may be necessary for this project.

This Hydraulic Project Approval shall be available on the job site at all times and all its provisions followed by the person (s) to whom this Hydraulic Project Approval is issued and operator(s) performing the work.

This Hydraulic Project Approval does not authorize trespass.

HYDRAULIC PROJECT APPROVAL

Issued Date: October 12, 2023
Project End Date: February 28, 2025

Permit Number: 2023-6-447+01
FPA/Public Notice Number: N/A
Application ID: 32783

The person(s) to whom this Hydraulic Project Approval is issued and operator(s) performing the work may be held liable for any loss or damage to fish life or fish habitat that results from failure to comply with the provisions of this Hydraulic Project Approval.

Failure to comply with the provisions of this Hydraulic Project Approval could result in civil action against you, including, but not limited to, a stop work order or notice to comply, and/or a gross misdemeanor criminal charge, possibly punishable by fine and/or imprisonment.

All Hydraulic Project Approvals issued under RCW 77.55.021 are subject to additional restrictions, conditions, or revocation if the Department of Fish and Wildlife determines that changed conditions require such action. The person(s) to whom this Hydraulic Project Approval is issued has the right to appeal those decisions. Procedures for filing appeals are listed below.

MINOR MODIFICATIONS TO THIS HPA: You may request approval of minor modifications to the required work timing or to the plans and specifications approved in this HPA unless this is a General HPA. If this is a General HPA you must use the Major Modification process described below. Any approved minor modification will require issuance of a letter documenting the approval. A minor modification to the required work timing means any change to the work start or end dates of the current work season to enable project or work phase completion. Minor modifications will be approved only if spawning or incubating fish are not present within the vicinity of the project. You may request subsequent minor modifications to the required work timing. A minor modification of the plans and specifications means any changes in the materials, characteristics or construction of your project that does not alter the project's impact to fish life or habitat and does not require a change in the provisions of the HPA to mitigate the impacts of the modification. If you originally applied for your HPA through the online Aquatic Protection Permitting System (APPS), you may request a minor modification through APPS. A link to APPS is at http://wdfw.wa.gov/licensing/hpa/. If you did not use APPS you must submit a written request that clearly indicates you are seeking a minor modification to an existing HPA. Written requests must include the name of the applicant, the name of the authorized agent if one is acting for the applicant, the APP ID number of the HPA, the date issued, the permitting biologist, the requested changes to the HPA, the reason for the requested change, the date of the request, and the requestor's signature. Send by mail to: Washington Department of Fish and Wildlife, PO Box 43234, Olympia, Washington 98504-3234, or by email to HPAapplications@dfw.wa.gov. You should allow up to 45 days for the department to process your request.

MAJOR MODIFICATIONS TO THIS HPA: You may request approval of major modifications to any aspect of your HPA. Any approved change other than a minor modification to your HPA will require issuance of a new HPA. If you originally applied for your HPA through the online Aquatic Protection Permitting System (APPS), you may request a major modification through APPS. A link to APPS is at http://wdfw.wa.gov/licensing/hpa/. If you did not use APPS you must submit a written request that clearly indicates you are requesting a major modification to an existing HPA. Written requests must include the name of the applicant, the name of the authorized agent if one is acting for the applicant, the APP ID number of the HPA, the date issued, the permitting biologist, the requested changes to the HPA, the reason for the requested change, the date of the request, and the requestor's signature. Send your written request by mail to: Washington Department of Fish and Wildlife, PO Box 43234, Olympia, Washington 98504-3234. You may email your request for a major modification to HPAapplications@dfw.wa.gov. You should allow up to 45 days for the department to process your request.

APPEALS INFORMATION

Washington Department of
Fish & Wildlife
PO Box 43234
Olympia, WA 98504-3234
(360) 902-2200

Issued Date: October 12, 2023
Project End Date: February 28, 2025

Permit Number: 2023-6-447+01
FPA/Public Notice Number: N/A
Application ID: 32783

If you wish to appeal the issuance, denial, conditioning, or modification of a Hydraulic Project Approval (HPA), Washington Department of Fish and Wildlife (WDFW) recommends that you first contact the department employee who issued or denied the HPA to discuss your concerns. Such a discussion may resolve your concerns without the need for further appeal action. If you proceed with an appeal, you may request an informal or formal appeal. WDFW encourages you to take advantage of the informal appeal process before initiating a formal appeal. The informal appeal process includes a review by department management of the HPA or denial and often resolves issues faster and with less legal complexity than the formal appeal process. If the informal appeal process does not resolve your concerns, you may advance your appeal to the formal process. You may contact the HPA Appeals Coordinator at (360) 902-2534 for more information.

A. INFORMAL APPEALS: WAC 220-660-460 is the rule describing how to request an informal appeal of WDFW actions taken under Chapter 77.55 RCW. Please refer to that rule for complete informal appeal procedures. The following information summarizes that rule.

A person who is aggrieved by the issuance, denial, conditioning, or modification of an HPA may request an informal appeal of that action. You must send your request to WDFW by mail to the HPA Appeals Coordinator, Department of Fish and Wildlife, Habitat Program, PO Box 43234, Olympia, Washington 98504-3234; e-mail to HPAapplications@dfw.wa.gov; fax to (360) 902-2946; or hand-delivery to the Natural Resources Building, 1111 Washington St SE, Habitat Program, Fifth floor. WDFW must receive your request within 30 days from the date you receive notice of the decision. If you agree, and you applied for the HPA, resolution of the appeal may be facilitated through an informal conference with the WDFW employee responsible for the decision and a supervisor. If a resolution is not reached through the informal conference, or you are not the person who applied for the HPA, the HPA Appeals Coordinator or designee may conduct an informal hearing or review and recommend a decision to the Director or designee. If you are not satisfied with the results of the informal appeal, you may file a request for a formal appeal.

B. FORMAL APPEALS: WAC 220-660-470 is the rule describing how to request a formal appeal of WDFW actions taken under Chapter 77.55 RCW. Please refer to that rule for complete formal appeal procedures. The following information summarizes that rule.

A person who is aggrieved by the issuance, denial, conditioning, or modification of an HPA may request a formal appeal of that action. You must send your request for a formal appeal to the clerk of the Pollution Control Hearings Boards and serve a copy on WDFW within 30 days from the date you receive notice of the decision. You may serve WDFW by mail to the HPA Appeals Coordinator, Department of Fish and Wildlife, Habitat Program, PO Box 43234, Olympia, Washington 98504-3234; e-mail to HPAapplications@dfw.wa.gov; fax to (360) 902-2946; or hand-delivery to the Natural Resources Building, 1111 Washington St SE, Habitat Program, Fifth floor. The time period for requesting a formal appeal is suspended during consideration of a timely informal appeal. If there has been an informal appeal, you may request a formal appeal within 30 days from the date you receive the Director's or designee's written decision in response to the informal appeal.

C. FAILURE TO APPEAL WITHIN THE REQUIRED TIME PERIODS: If there is no timely request for an appeal, the WDFW action shall be final and unappealable.

HYDRAULIC PROJECT APPROVAL

Washington Department of
Fish & Wildlife
PO Box 43234
Olympia, WA 98504-3234
(360) 902-2200

Issued Date: October 12, 2023
Project End Date: February 28, 2025

Permit Number: 2023-6-447+01
FPA/Public Notice Number: N/A
Application ID: 32783

Habitat Biologist	Alexia.Henderson@dfw.wa.gov		for Director
Alexia Henderson	360-620-3601		WDFW

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Region Office
PO Box 330316, Shoreline, WA 98133-9716 • 206-594-0000

October 17, 2023

OPG Port Gamble LLC
19950 7th Ave NE Ste 200
Poulsbo, WA 98370

Re: Kitsap County Substantial Development Permit No. 22-04842
Ecology Permit No. 2023-NWRO-7297

Dear OPG Port Gamble LLC:

On October 4, 2023, the Department of Ecology (Ecology) received notice that Kitsap County (County) has approved with conditions your application for a Substantial Development Permit (SDP) for shoreline restoration along a portion of the Port Gamble Bay and former upland sawmill area (Mill Site), located in Port Gamble, Washington. The project is located at 5205 NE View Drive within Urban Conservancy and Natural shoreline environment designations along Port Gamble.

By law, local governments must review all SDPs for compliance with:

- The Shoreline Management Act (Chapter 90.58 RCW),
- The SDP approval criteria (WAC 173-27-150), and
- The Kitsap County Shoreline Master Program.

Local governments, after reviewing SDPs for compliance, are required to submit them to Ecology. We have received your SDP.

What Happens Next?

Before you begin activities authorized by this permit, the law requires you to wait at least 21 days from October 4, 2023, the "date of filing." This appeal period allows anyone (including you) who disagrees with any aspect of this permit to appeal the decision to the state Shorelines Hearings Board (SHB). You must wait for the conclusion of an appeal before you can begin the activities authorized by this permit.

The SHB will notify you if they receive an appeal. We recommend that you contact the SHB before you begin permit activities to ensure they have not received an appeal. You may reach them at 360-664-9160, eluho@eluho.wa.gov, or Shorelines Hearings Board.

If you want to appeal this decision, you can find appeal instructions at How to File a Petition for Review or on the website of the Washington State Legislature at Chapter 461-08 WAC.

Please note, other federal, state, and local permits may be required in addition to this shoreline permit.

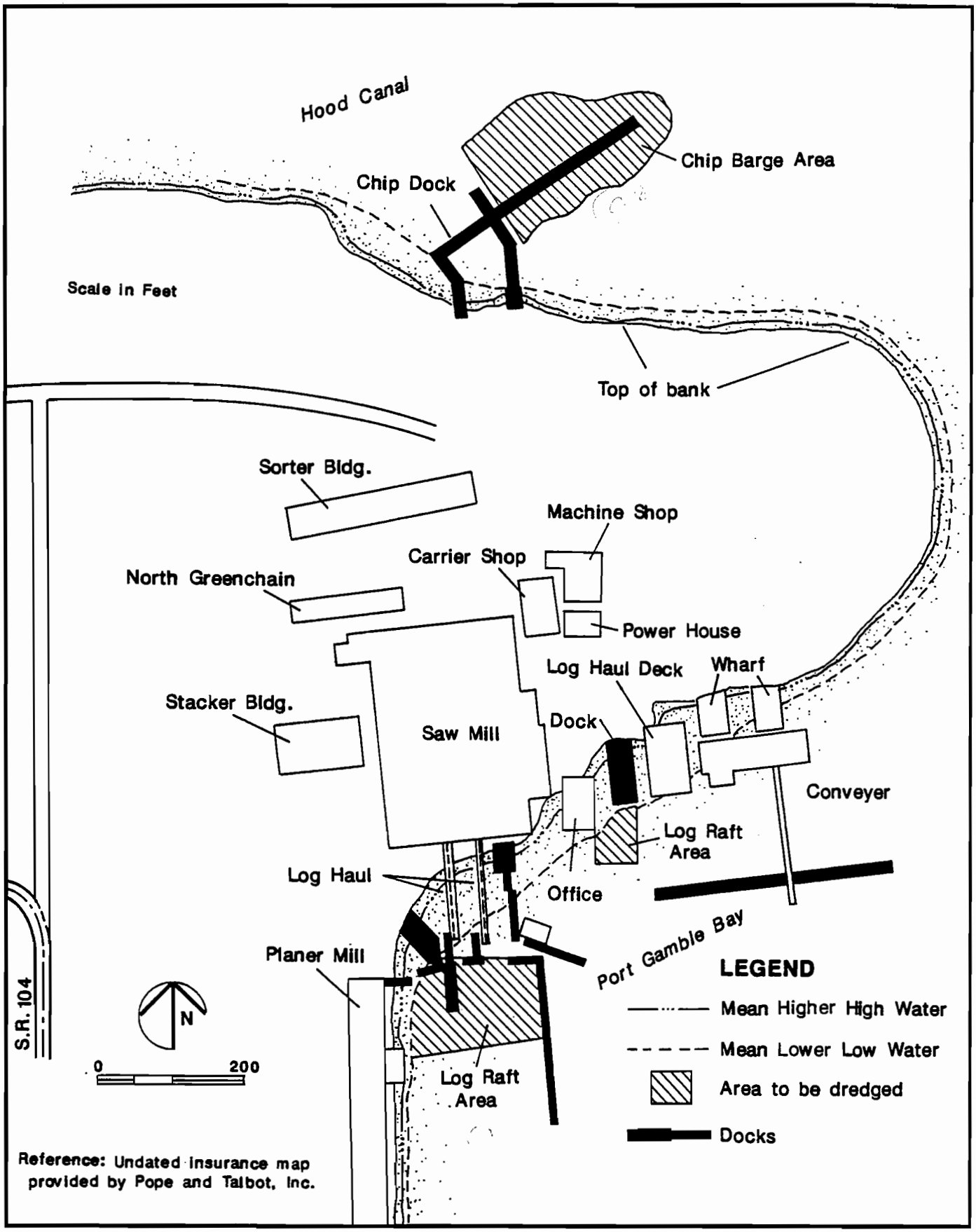
If you have any questions about this letter, please contact Rebekah Padgett at 206-366-7801 or Rebekah.Padgett@ecy.wa.gov.

Sincerely,

Katie Hitchcock
Administrative Assistant
Shorelands and Environmental Assistance Program

ec: Jacquie Ptacek, Anchor QEA
Kathlene Barnhart, Kitsap County
Rebekah Padgett, Department of Ecology

Appendix B
Geotechnical Information



Reference: Undated insurance map provided by Pope and Talbot, Inc.

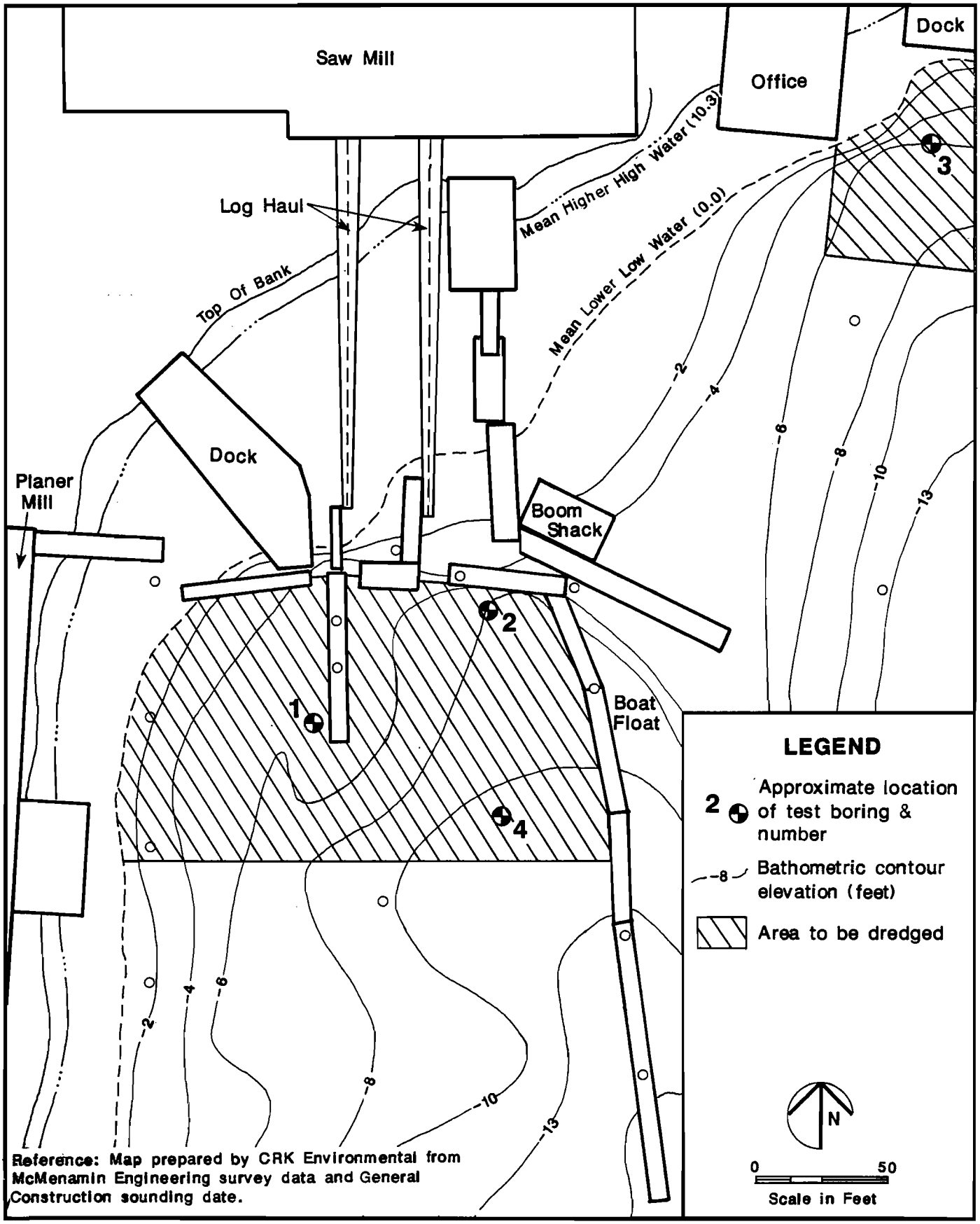
Applied Geotechnology Inc.
Geological Engineering
Geology & Hydrogeology

Sawmill Site Plan

Pope & Talbot, Inc.
Port Gamble, Washington

FIGURE 2

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,434.001	DFF	RAR	25 Jan. 90		



Reference: Map prepared by CRK Environmental from McMenamin Engineering survey data and General Construction sounding date.

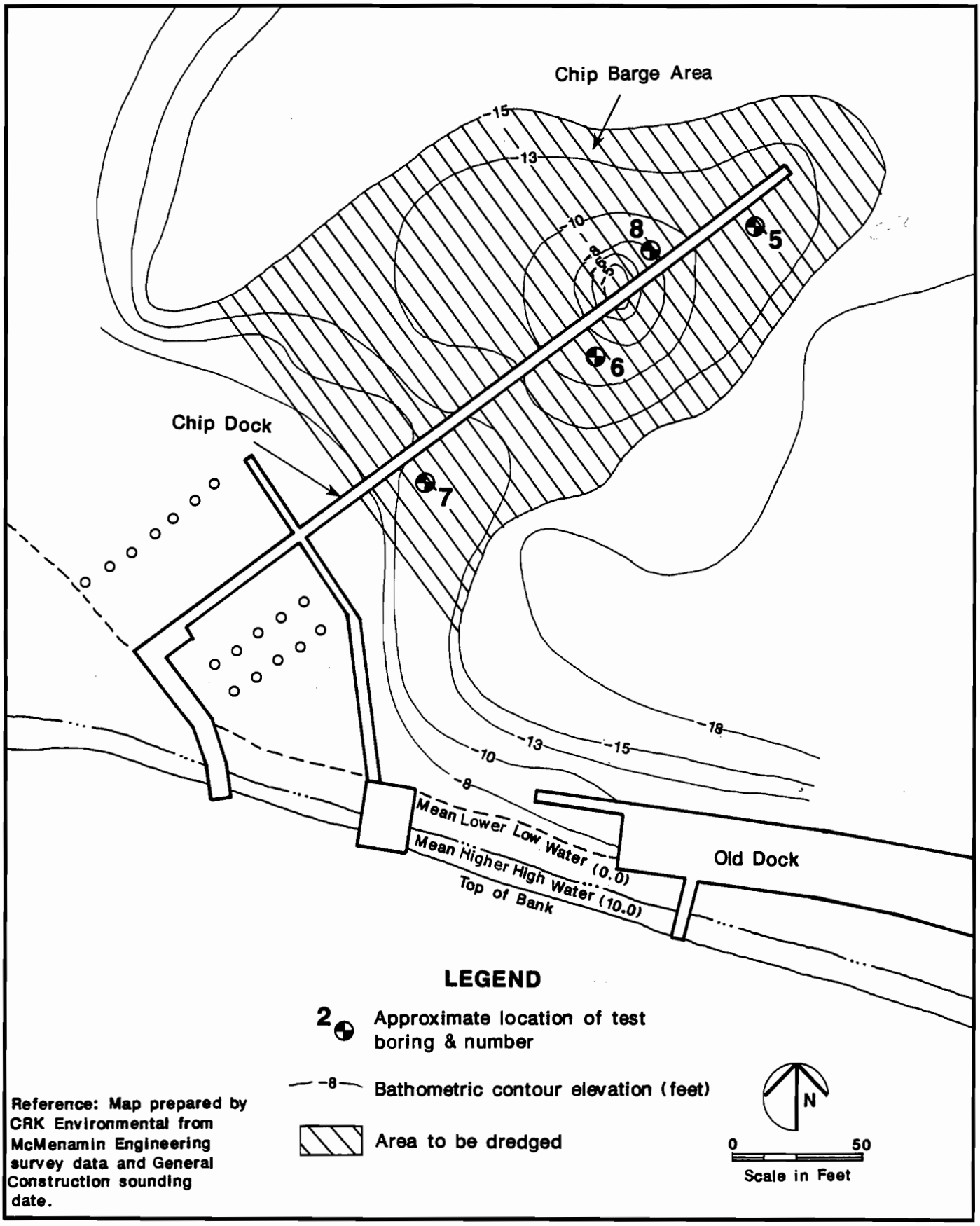
Applied Geotechnology Inc.
Geological Engineering
Geology & Hydrogeology

Log Raft Area Boring Locations

Pope & Talbot, Inc.
Port Gamble, Washington

FIGURE 3

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,434.001	DFF	RAR	25 Jan. 90		



Reference: Map prepared by CRK Environmental from McMenamin Engineering survey data and General Construction sounding date.

Applied Geotechnology Inc.
Geological Engineering
Geology & Hydrogeology

Chip Barge Area Boring Locations

Pope & Talbot, Inc.
Port Gamble, Washington

FIGURE **4**

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,434.001	DFF	RPR	25 Jan. 90		

Equipment B-61

Mud Line Elevation −7.5± feet Date 12/18/89

H_2S ODOR	Blows per Foot	Sample	Depth (feet)	
–	1		0	DARK BROWN SILTY SAND (SM) medium dense, saturated; very fine to medium grained, with some organics, shell fragments and wood bark chips.
S	7		2	
			4	
N	20		6	
N	16		8	Becomes gray, very dense, with some gravel.
N	60		10	
			12	Boring terminated at approximately 11.5-foot depth on 12/28/89.
			14	
			16	Datum: Mean Lower Low Water 0.0 feet.
			18	
			20	

Applied Geotechnology Inc.
Geological Engineering
Geology & Hydrogeology

Log of Boring B-1

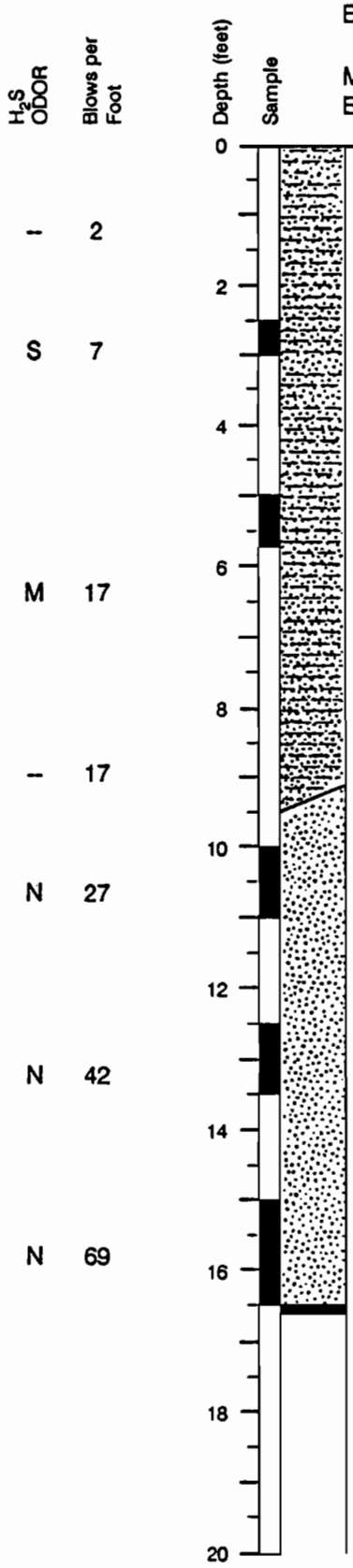
Pope & Talbot/Dredging
Port Gamble, Washington

PLATE 3

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,434.001	SES	RAR	5 January 90		

Equipment B-61

Mud Line Elevation −8.0± feet Date 12/28/89



DARK BROWN SILTY SAND (SM) medium dense, saturated; very fine to medium grained, with some organics, bark chips, and shell fragments.

Becomes gray, dense.

GRAY SAND (SP) dense, saturated; medium grained with some silt, organics, and shell fragments.

More shell fragments.

Boring terminated at approximately 16.5-foot depth 12/28/89.

Applied Geotechnology Inc.
Geological Engineering
Geology & Hydrogeology

Log of Boring B-2

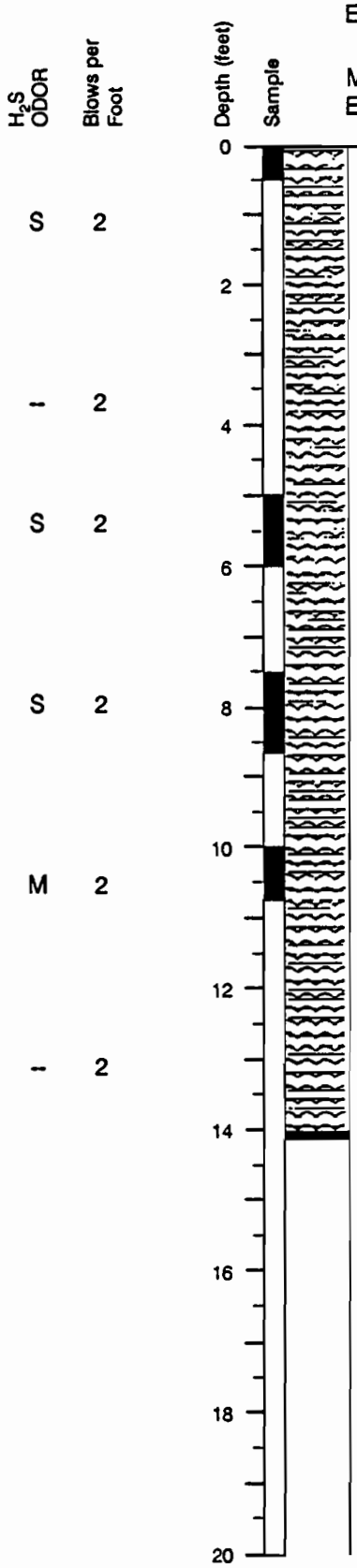
Pope & Talbot/Dredging
Port Gamble, Washington

PLATE 4

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,434.001	SES	RPR	5 January 90		

Equipment B-61

Mud Line Elevation −7.0± feet Date 12/28/89



DARK BROWN ORGANIC SILT (OL) soft, saturated; with wood chips.

Increasing shell fragments.

Boring terminated at approximately 14.0-foot depth on 12/28/89.

Applied Geotechnology Inc.
Geological Engineering
Geology & Hydrogeology

Log of Boring B-3

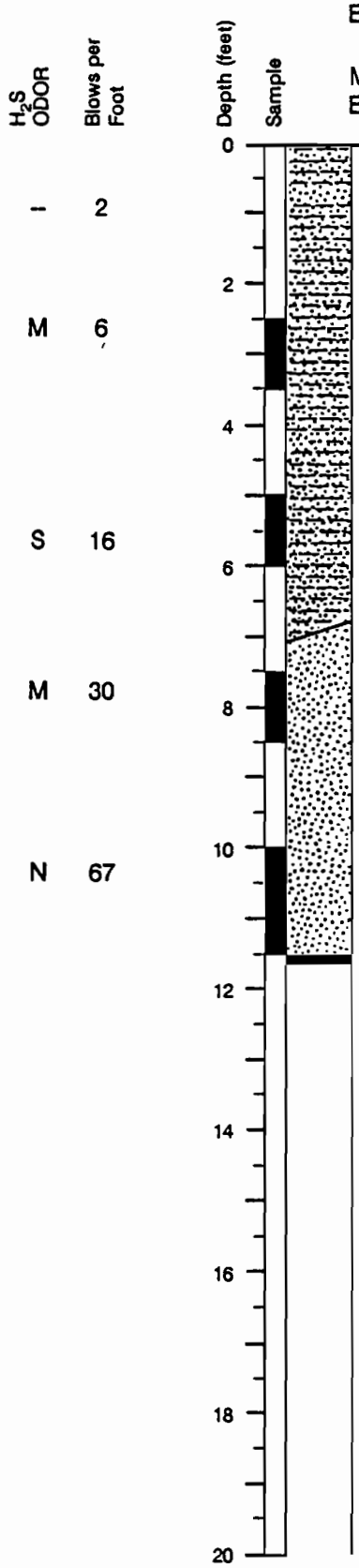
Pope & Talbot/Dredging
Port Gamble, Washington

PLATE 5

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,434.001	SES	RAR	5 January 90		

Equipment B-61

Mud Line Elevation −10.0± feet Date 12/28/89



DARK BROWN SILTY SAND (SM) medium dense, saturated; fine to medium grained, with organics, bark chips and shell fragments.

Becomes gray.

GRAY SAND (SP) very dense, saturated; with some silt and shell fragements.

Increasing gravel.

Boring terminated at approximately 11.5-foot depth on 12/28/89.

Applied Geotechnology Inc.
Geological Engineering
Geology & Hydrogeology

Log of Boring B-4

Pope & Talbot/Dredging
Port Gamble, Washington

PLATE 6

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,434.001	SES	RAR	5 January 90		

Equipment B-61

Mud Line Elevation −9.5± feet Date 12/29/89

H_2S ODOR	Blows per Foot	Depth (feet)	Sample	
		0		DARK BROWN WOOD CHIPS (OL) soft, saturated.
–	0	2		
		4		BROWN AND GRAY SAND (SP) medium dense, saturated; fine to medium grained, with shell fragments.
S	11	6		Becomes dense.
		8		Increasing in silt.
M	22	10		
N	45	12		Boring terminated at approximately 11.5-foot depth 12/29/89.
		14		
		16		
		18		
		20		

Applied Geotechnology Inc.
Geological Engineering
Geology & Hydrogeology

Log of Boring B-5

Pope & Talbot/Dredging
Port Gamble, Washington

PLATE 7

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,434.001	SES	RPR	5 January 90		

Equipment B-61

Mud Line Elevation −8.0± feet Date 12/29/89

H_2S ODOR	Blows per Foot	Sample	Depth (feet)
–	1		0
			2
S	1		
			4
–	1		
			6
S	1		
			8
			10
N	32		
			12
			14
			16
			18
			20

DARK BROWN WOOD CHIPS (OL) soft, saturated.

DARK GRAY SAND (SP) very dense, saturated; fine to medium grained, with shell fragments.

Boring terminated at approximately 11.5-foot depth on 12/29/89.

Applied Geotechnology Inc.
Geological Engineering
Geology & Hydrogeology

Log of Boring B-6

Pope & Talbot/Dredging
Port Gamble, Washington

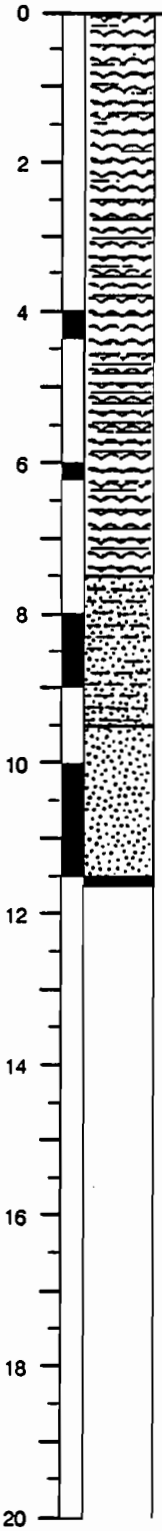
PLATE 8

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,434.001	SES	RPR	5 January 90		

Equipment B-61

Mud Line Elevation -7.7+ feet Date 12/29/89

H_2S ODOR	Blows per Foot	Depth (feet)	Sample
–	0	0	
S	1	2	
S	0	4	
M	20	6	
N	40	8	
		10	
		12	
		14	
		16	
		18	
		20	



DARK BROWN WOOD CHIPS (OL) soft, saturated.

DARK BROWN SILTY SAND (SM) medium dense, saturated; fine to medium grained, with organics and shell fragments.

DARK GRAY SAND (SP) very dense, saturated; with some organics and shell fragments.

Boring terminated at approximately 11.5-foot depth on 12/29/89.

Applied Geotechnology Inc.
Geological Engineering
Geology & Hydrogeology

Log of Boring B-7

Pope & Talbot/Dredging
Port Gamble, Washington

PLATE 9

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,434.001	SES	RAR	5 January 90		

Equipment B-61

Mud Line Elevation −5.5± feet Date 12/29/89

H_2S ODOR	Blows per Foot	Depth (feet)	Sample
		0	
N	3	2	
–	3	4	
M	4	6	
–	3	8	
S	3	10	
		12	
		14	
		16	
		18	
		20	

DARK BROWN WOOD CHIPS (OL) soft, saturated.

DARK GRAY SAND (SP) loose, saturated; with organics, shell fragments and wood chips.

Boring terminated at approximately 11.5-foot depth on 12/29/89.

Applied Geotechnology Inc.
Geological Engineering
Geology & Hydrogeology

Log of Boring B-8

Pope & Talbot/Dredging
Port Gamble, Washington

PLATE **10**

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,434.001	SES	RPR	5 January 90		

AMTEST

AmTest Inc.

Professional
Analytical
Services

14603 N.E. 87th St.
Redmond, WA
98052

Fax: 206 883 3495

Tel: 206 885 1664

ANALYSIS REPORT

CLIENT: Applied Geotechnology, Inc. DATE RECEIVED: 1/2/90

REPORT TO: Ray Sadowski
P.O. Box 3885
Bellevue, WA 98009

DATE REPORTED: 1/31/90

FINAL REPORT - PSDDA CHEMICALS OF CONCERN

Laboratory Sample Nos.	000013	000014	000015
Client Identification	C-1	C-2-1	C-2-2
CONVENTIONALS			
Total Solids (%)	79.2	71.9	73.4
Total Volatile Solids (%)	4.50	6.10	7.10
Total Organic Carbon (%)	2.89	0.81	0.36
Ammonia (ug/g)	36.	17.	19.
Total Sulfides (ug/g)	280.	18.	23.
GRAIN SIZE DISTRIBUTION			
Phi / Opening (mm)	Distribution (%)		
	4.75	17.9	4.38	1.76
-2	4.00	5.98	1.23	3.10
-1	2.00	1.37	1.97	0.93
0	1.00	6.37	6.89	7.44
+1	0.50	2.90	10.9	5.17
+2	0.25	12.9	17.9	26.1
+3	0.125	28.8	33.4	28.5
+4	0.063	10.9	9.50	15.1
+5	0.032	7.62	7.16	8.44
+6	0.016	3.26	4.00	4.40
+7	0.008	0.95	2.52	<0.50
+8	0.004	<0.50	<0.50	<0.50
+9	0.002	<0.50	<0.50	<0.50
+10	0.001	<0.50	<0.50	<0.50

AMTEST

CLIENT: Applied Geotechnology, Inc. DATE RECEIVED: 1/2/90

REPORT TO: Ray Sadowski DATE REPORTED: 1/31/90

Laboratory Sample Nos.	000122
Client Identification	C-3

CONVENTIONALS

Total Solids (%)	53.7
Total Volatile Solids (%)	36.3
Total Organic Carbon (%)	14.0
Ammonia (ug/g)	150.
Total Sulfides (ug/g)	2.8

GRAIN SIZE DISTRIBUTION

Phi	Opening (mm)	Distribution (%)
	4.75	37.5
-2	4.00	3.38
-1	2.00	2.99
0	1.00	5.60
+1	0.50	6.29
+2	0.25	6.61
+3	0.125	12.1
+4	0.063	5.86
+5	0.032	6.00
+6	0.016	8.21
+7	0.008	5.45
+8	0.004	<0.50
+9	0.002	<0.50
+10	0.001	<0.50

AMTEST

CLIENT: Applied Geotechnology, Inc. DATE RECEIVED: 1/2/90

REPORT TO: Ray Sadowski DATE REPORTED: 1/31/90

QUALITY CONTROL - METALS - BLANK

Laboratory Sample No.	BLANK
Client Identification	-----
Antimony	<0.0055
Arsenic	<0.0051
Cadmium	<0.0052
Copper	<0.0052
Lead	0.001
Mercury	<0.00502
Nickel	<0.010
Silver	<0.010
Zinc	<0.002

All values are reported in mg/l.

QUALITY CONTROL - STANDARD REFERENCE MATERIAL (MESS)

Element	Analytical Value (mg/kg)	Certified Value (mg/kg)	Recovery (%)
Antimony	<5.0	0.73	-
Arsenic	10.1	10.6	95.
Cadmium	0.74	0.59	125.
Copper	19.9	25.1	79.
Lead	27.7	34.0	81.
Nickel	21.8	29.5	74.
Silver	NC	-	-
Zinc	151.	191.	79.

NC = Not Certified for this analysis.

Q:\Jobs\080388-01_Port_Gamble_OPG\Maps\AttA_PorewaterData\Bank_Intertidal_DF_TEQ.mxd nkochie 12/2/2014 1:44:37 PM

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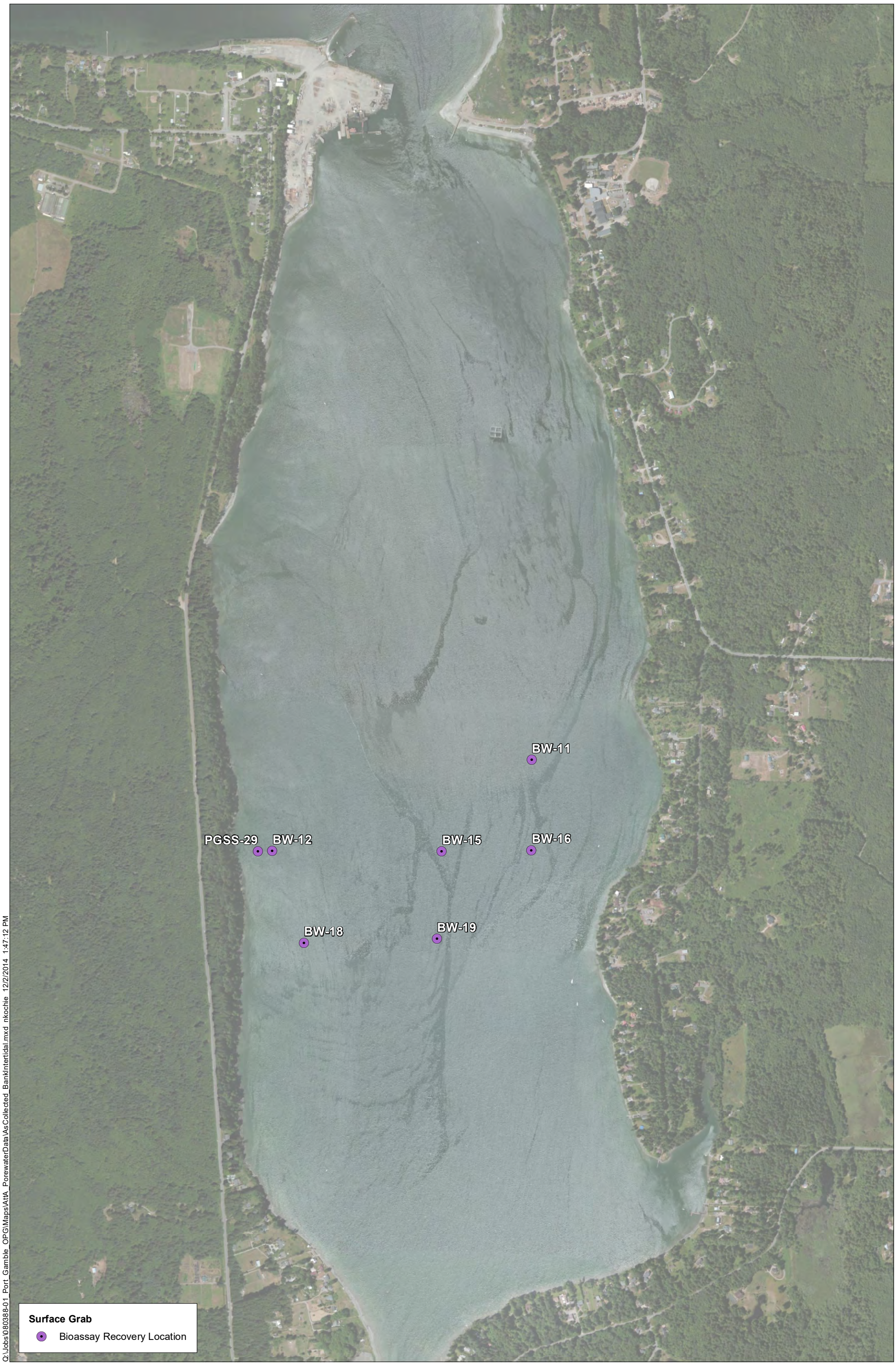
Feet
0 125 250

Figure A-3-1
As-collected Bank and Intertidal Locations
Attachment A-3: Soil and Sediment Data Report
Port Gamble Bay Cleanup Site

Figure A-3-2
As-collected Sediment Core Locations
Attachment A-3: Soil and Sediment Data Report
Port Gamble Bay Cleanup Site



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Feet
0 500 1,000 1,500 2,000

Figure A-3-3
As-collected Bioassay Recovery Locations
Attachment A-3: Soil and Sediment Data Report
Port Gamble Bay Cleanup Site

ATTACHMENT A-3-1
DIRECT PUSH LOGS

Geoprobe Soil Boring Log

SMU1-B1

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 130388-01.02	Northing: 317323.6388 Easting: 1211219.498	Total Depth (ft): 10
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/9/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
0		Samples and descriptions are in recovered depths. Classification scheme based on USCS		0
1		Dry, loose, brown, sandy bark, layer of dead grass on top		1
2		Dry, loose, gray, gravelly SAND		2
3		Dry, loose, light brown, sandy and gravelly SILT		3
4		Dry, loose, gray, slightly gravelly vf-c SAND		4
5		@1.2': Grades to brown		5
6		@1.6': Grades to damp		6
7		@3.6': Grades to dry		7
8		Dry, loose, brown, slightly gravelly vf-c SAND		8
9		@5.6': Grades to light brown, slightly gravelly, silty vf-c SAND		9
10		@6.1': Grades to dark brown		10
11		@6.8': Grades to damp, medium-dense, gray to dark gray, slightly gravelly, vf-c SAND		11
12		@7.1': Grades to damp, medium-stiff, gray SAND		12
13		@8-8.5': Shell debrid interbeds		13
14		@8.5': Grades to moist, dark gray, very woody, vf-f SAND		14
15		@9.5': Grades to moise, medium-dense, dark gray, slightly shelly f-SAND		15
16				16
17				17
18				18
19				19
20				20
21				21
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Geoprobe Soil Boring Log

SMU1-B2

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 130388-01.02	Northing: 317271.0998 Easting: 1211292.66	Total Depth (ft): 10
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/9/201		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
0		Samples and descriptions are in recovered depths. Classification scheme based on USCS		0
1		Dry, soft, brown, gravelly SILT		1
2		Damp, loose, light brown, f-SAND		2
3		Damp, medium-dense, black, f-c SAND, slight creosote-like odor		3
4		Damp, gray to black, loose f-c SAND		4
5		Dry, light brown, f-c sandy SILT		5
6		Damp, loose, dark gray, f-m SAND		6
7		@6.5': Grades to m-c SAND		7
8		@7.1': Grades to c-SAND		8
9		Moist, medium-dense, slightly sandy rounded GRAVEL		9
10		@7.9': Layer of decomposing wood		10
11		Moist, dense, gray, subangular GRAVEL, trace silt and clay		11
12				12
13				13
14				14
15				15
16				16
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Geoprobe Soil Boring Log

SMU1-I1

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 130388-01.02	Northing: 317610.2812 Easting: 1211465.813	Total Depth (ft): 4
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/11/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
0		Samples and descriptions are in recovered depths. Classification scheme based on USCS		0
1		Wet, loose, dark gray, f-c SAND, trace shells		1
2		@1.6-1.7': Pocket of f-gravelly f-c SAND		2
3				3
4				4
5				5
6				6
7				7
8				8
9				9
10				10
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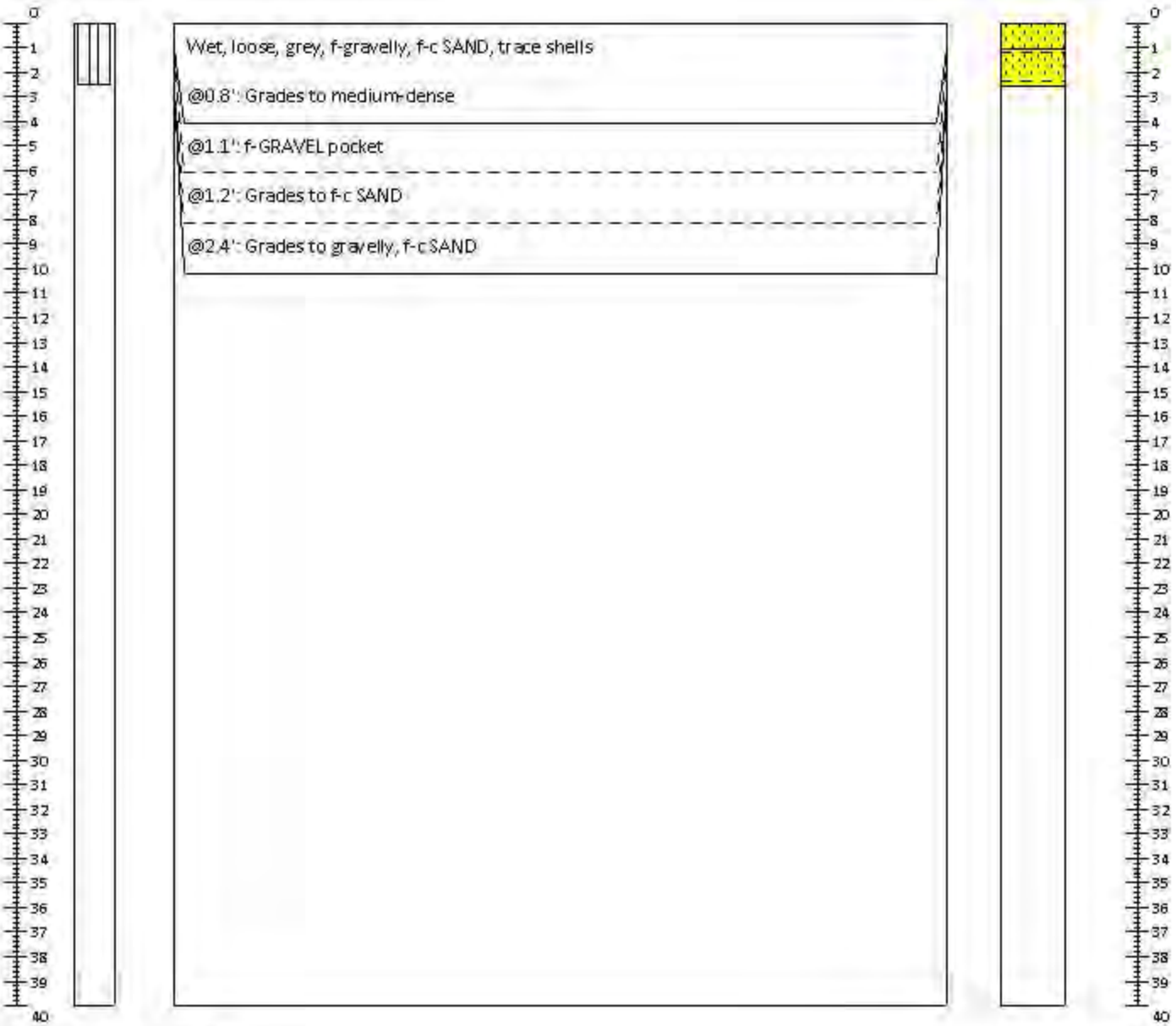
Geoprobe Soil Boring Log

SMU1-I2

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 130388-01.02	Northing: 317494.8973 Easting: 1211338.806	Total Depth (ft): 4
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/11/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
		Samples and descriptions are in recovered depths. Classification scheme based on USCS		



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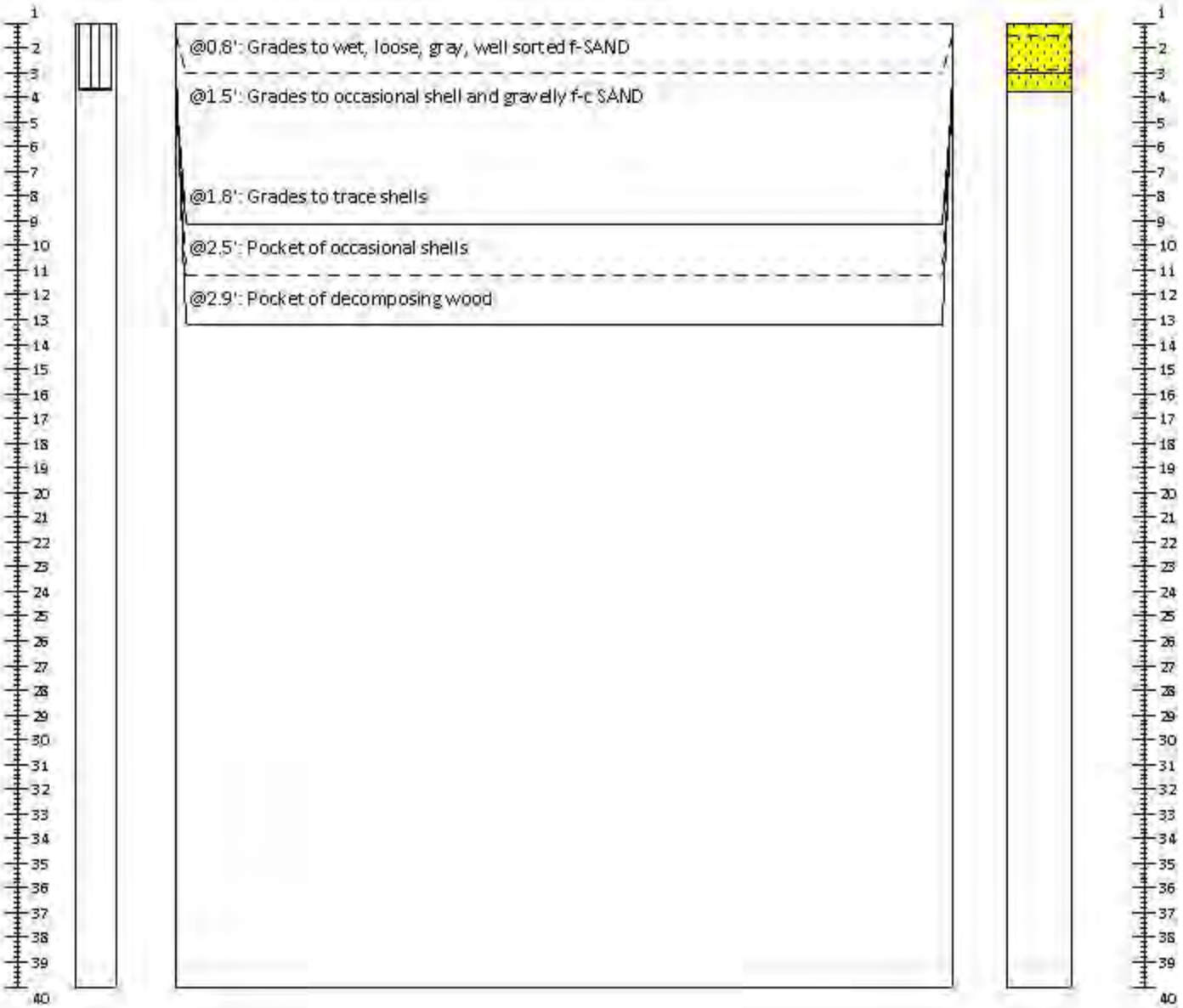
Geoprobe Soil Boring Log

SMU1-I3

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 1303BB-01.02	Northing: 3174075474 Easting: 1211331803	Total Depth (ft): 4
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/11/201		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
		Samples and descriptions are in recovered depths. Classification scheme based on USCS		



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Geoprobe Soil Boring Log

SMU2-B1

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 130388-01.02	Northing: 317177.1148 Easting: 1211497.1184	Total Depth (ft): 10
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/9/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
		Samples and descriptions are in recovered depths. Classification scheme based on USCS		
0–10		Dry, loose, gray, angular GRAVEL		
		Dry, medium-dense, gray to brown, slightly gravelly vf-vc SAND		
		Dry, medium-dense, brown, f-SAND		
		Dry, medium-dense, brown and gray, sandy GRAVEL		
		Damp, light brown, loose, f-SAND		
		@5.5': Grades to f-c SAND		
		Damp, loose, gray to dark gray, f-c SAND		
		@6.9': Layer of fine, rounded GRAVEL		
		Damp, loose, gray to dark gray, f-c SAND		
		@7.4-9.9': Moderate shell hash		

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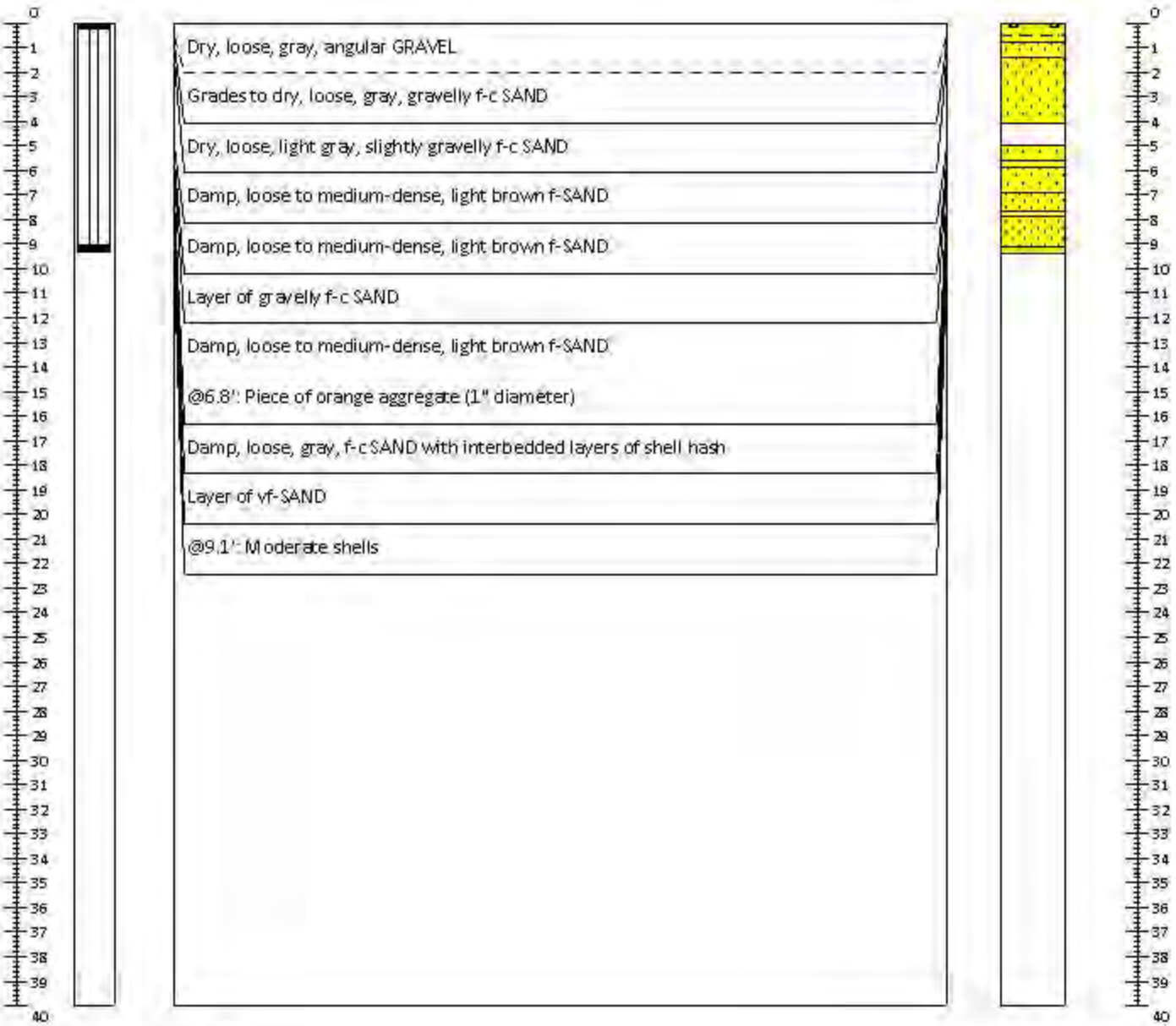
Geoprobe Soil Boring Log

Sheet 1 of 1

SMU2-B2

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 130388-01.02	Northing: 317057.6012 Easting: 1211785.097	Total Depth (ft): 10
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/9/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
		Samples and descriptions are in recovered depths. Classification scheme based on USCS		



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Geoprobe Soil Boring Log

SMU3-B1

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 130388-01.02	Northing: 316770.0533 Easting: 1211708.156	Total Depth (ft): 10
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/9/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
0–40		Samples and descriptions are in recovered depths. Classification scheme based on USCS		0–40
		Dry, loose, gray, angular GRAVEL		
		Grades to dry, loose, gray, gravelly f-c SAND		
		Dry, dense, dark to light gray, gravelly, silty f-c SAND		
		@1.3': Grades to light brown		
		Slightly damp, loose to medium-dense, brown f-SAND		
		Slightly damp, loose to medium-dense, brown f-SAND		
		Dry, loose, gray and brown, f-c SAND, trace gravel		
		@6.4': Layer of angular GRAVEL		
		Damp, medium-dense, brown, slightly clayey, c-sandy GRAVEL		
		@7': Layer of angular GRAVEL		
		Damp, medium-dense, brown, slightly clayey, c-sandy GRAVEL @7.8 Grades to moist and brown		

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Geoprobe Soil Boring Log

SMU3-B2

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 130388-01.02	Northing: 316707.6275 Easting: 1211534.537	Total Depth (ft): 10
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/9/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
0		Samples and descriptions are in recovered depths. Classification scheme based on USCS		0
1		Dry, loose, gray GRAVEL		1
2		Dry, loose, gray and brown, slightly gravelly, sandy SILT		2
3				3
4				4
5		Grades to gravelly, silty, SAND		5
6				6
7		Slightly damp, medium-dense, brown, f-SAND		7
8				8
9		Slightly damp, medium-dense, brown and gray, slightly gravelly, f-c SAND		9
10				10
11		Dry, soft, light brown, f-sandy SILT		11
12				12
13		@5.9': 1" layer of reddish-brown ad black wood		13
14				14
15		Damp, loose, brown, gravelly, f-SAND		15
16		@6.5: Damp, dark to light brown wood		16
17				17
18		Damp, gray, f-SAND		18
19		@7.4': Layer of reddish-brown wood		19
20		@8.1': Layer of damp, light brown wood		20
21				21
22				22
23				23
24				24
25				25
26				26
27				27
28				28
29				29
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Geoprobe Soil Boring Log

SMU3-B3

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 1303BB-01.02	Northing: 316627.5493 Easting: 1211394.793	Total Depth (ft): 10
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/9/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
0		Samples and descriptions are in recovered depths. Classification scheme based on USCS		0
1		Dry, loose, light brown, gravelly f-SAND		1
2		@0.9': Grades to medium-dense		2
3		@1.2': Grades to gray		3
4				4
5		Dry, dense, gray, slightly f-sandy angular GRAVEL		5
6				6
7		Damp, loose, brown, f-SAND		7
8				8
9		Dry, gray, loose, gravelly f-c SAND		9
10				10
11		Dry, loose, light brown, f-SAND, trace gravel		11
12				12
13		@7.2': Grades to damp and medium-dense		13
14				14
15		@8.5': Grades to gravelly f-c SAND		15
16				16
17		Damp, loose, grayish-brown, f-SAND		17
18				18
19				19
20				20
21				21
22				22
23				23
24				24
25				25
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Geoprobe Soil Boring Log

SMU3-B4

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 130388-01.02	Northing: 316522.4317 Easting: 1211236.714	Total Depth (ft): 10
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/9/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
0		Samples and descriptions are in recovered depths. Classification scheme based on USCS		0
1–10		Dry, loose, light brown, gravelly silty SAND		1–10
3–4		Dry, medium-dense, light gray, silty, sandy GRAVEL (concrete slab)		3–4
5–10		Dry, loose, light brown, gravelly f-c SAND		5–10
7–10		Degraded		7–10
9–10		Damp, loose, gray, f-SAND		9–10
10–11		@3.1': Grades to slightly shelly		10–11
12–13		Dry, medium-dense, brown and gray, f-c sandy GRAVEL		12–13
13–40		Damp, medium-dense, brownish-gray, f-SAND @6.2': Thick piece of shell @7.1': Grades to gray @8.2': Grades to wet @8.4': Small bit of porcelain with markings ("Dublin")		13–40

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Geoprobe Soil Boring Log

SMU3-B5

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 130388-01.02	Northing: 316348.7979 Easting: 1211126.695	Total Depth (ft): 10
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/9/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
0		Samples and descriptions are in recovered depths. Classification scheme based on USCS		0
1		Dry, loose, brown twigs and organic debris		1
2		Dry, loose, gray to brown, silty angular GRAVEL		2
3		@1': Grades to gravelly, silty SAND		3
4		Dry, medium-dense, light gray, sandy angular GRAVEL (concrete)		4
5		Layer of damp, loose, brown and gray f-SAND		5
6		Dry, medium-dense, light gray, sandy angular GRAVEL (concrete)		6
7		@2.6': Pocket of brown, silty, clayey f-SAND		7
8		Damp, gray and black, f-c SAND, trace shell fragments		8
9		Dry, soft, brown, gravelly SILT, slight wood debris		9
10		Dry, loose, gray, gravelly, silty f-SAND		10
11		@5.6': Grades to gray, silty SAND		11
12		Damp, loose, grayish brown, f-c SAND		12
13		@5.9': Pocket of dark gray CLAY		13
14		Damp, medium-dense, gray, gravelly m-c SAND		14
15		Dry, loose, light gray, gravelly f-c SAND		15
16		Light brown and red-brown wood		16
17				17
18				18
19				19
20				20
21				21
22				22
23				23
24				24
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Geoprobe Soil Boring Log

SMU3-I1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 130388-01.02	Northing: 317610.2812 Easting: 1211465.813	Total Depth (ft): 4
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/11/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
0		Samples and descriptions are in recovered depths. Classification scheme based on USCS		0
1		Damp, loose, gray, sandy f-c GRAVEL		1
2		Damp, loose, gray, f-c SAND, moderate shells		2
3				3
4		@1': Grades to f-m SAND, brick fragments		4
5		@1.8': Grades to f-SAND, no shells		5
6		Damp, dense, brown C-gravelly, silty SAND		6
7				7
8				8
9				9
10				10
11				11
12				12
13				13
14				14
15				15
16				16
17				17
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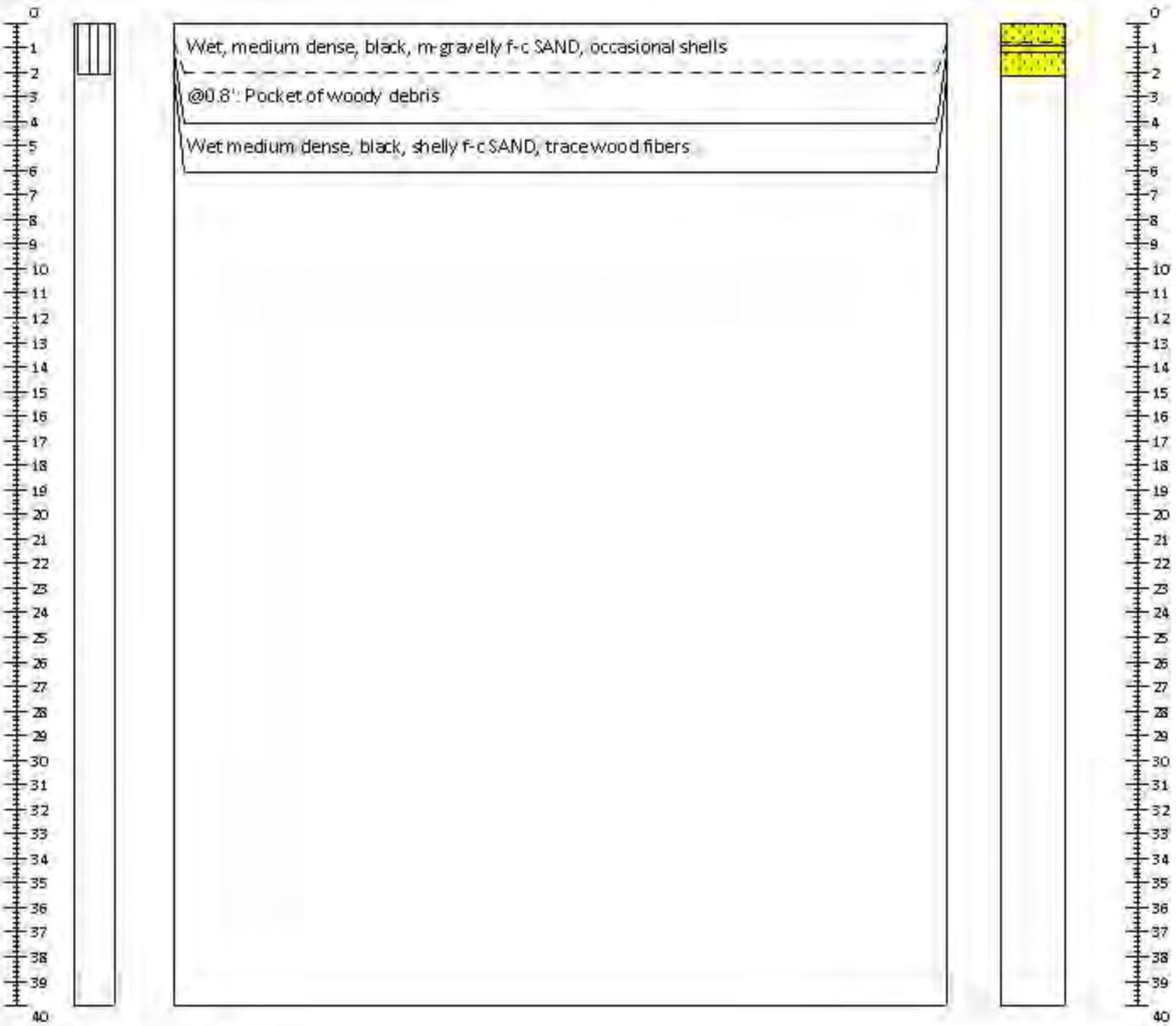
Geoprobe Soil Boring Log

SMU3-I2

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 130388-01.02	Northing: 316639.5089 Easting: 1211575.054	Total Depth (ft): 4
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/11/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
		Samples and descriptions are in recovered depths. Classification scheme based on USCS		



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Geoprobe Soil Boring Log

SMU3-I3

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 130388-01.02	Northing: 316574.2846 Easting: 1211445.395	Total Depth (ft): 4
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/11/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
0		Samples and descriptions are in recovered depths. Classification scheme based on USCS		0
1		Wet, loose, black, f-c SAND, occasional shells		1
2		@0.6': Grades to very wet		2
3		@0.9': Grades to wet, gravelly SAND		3
4		Wet, medium-dense, black, woody, sandy SILT		4
5		Wet, dense, black, silty CLAY		5
6		@2.5': Layer of wood		6
7		Wet, medium-dense, black, silty f-c SAND, trace clay		7
8				8
9				9
10				10
11				11
12				12
13				13
14				14
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Geoprobe Soil Boring Log

SMU3-I4

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 130388-01.02	Northing: 316465.8682 Easting: 1211284.844	Total Depth (ft): 4
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/11/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
0		Samples and descriptions are in recovered depths. Classification scheme based on USCS		0
1		Wet, medium-dense, black, f-c SAND, occasional shells		1
2		@1.1-1.3': Wood chunks		2
3		Wet, medium-stiff, very woody, black, f-sandy SILT, strong H2S-like odor		3
4		@2.5': Grades to slightly f-sandy, silty WOOD, sawdust		4
5				5
6				6
7				7
8				8
9				9
10				10
11				11
12				12
13				13
14				14
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19				19
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21				21
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36				36
37				37
38				38
39				39
40				40

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Geoprobe Soil Boring Log

SMU3-I5

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 130388-01.02	Northing: 316354.1243 Easting: 1211181.735	Total Depth (ft): 4
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/11/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
0–40		Samples and descriptions are in recovered depths. Classification scheme based on USCS		0–40

Moist, medium-dense, black f-c SAND, trace gravel, occasional shells

@1.5': Grades to f-m SAND, moderate chells, trace brick debris

@2.1': Grades to f-sand, trace shells, no brick

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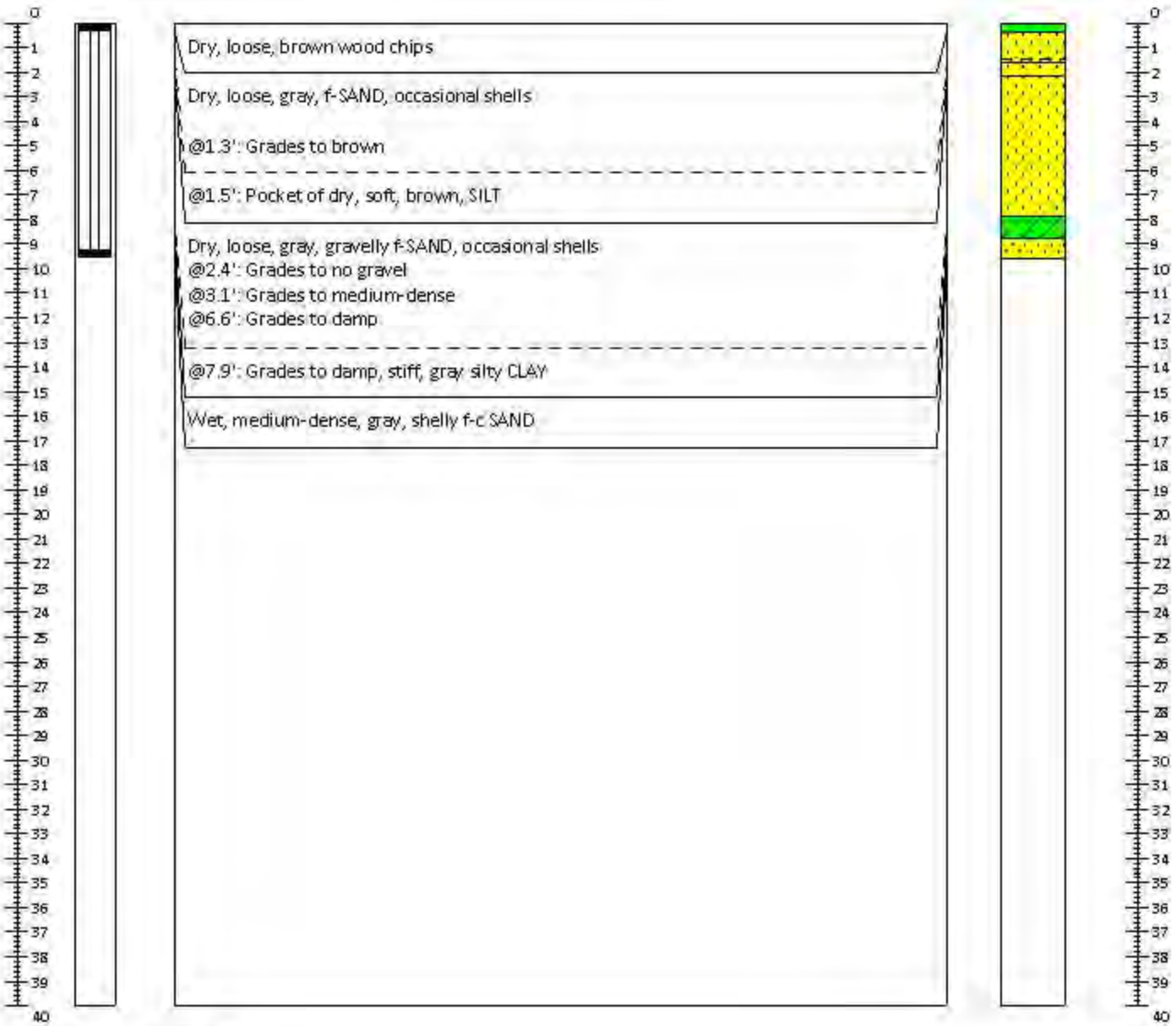
Geoprobe Soil Boring Log

SMU4-B1

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 1303BB-01.02	Northing: 316202.0295 Easting: 1211086.77	Total Depth (ft): 10
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/10/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
		Samples and descriptions are in recovered depths. Classification scheme based on USCS		



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Geoprobe Soil Boring Log

SMU4-B2

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 130388-01.02	Northing: 315859.77 Easting: 1211036.837	Total Depth (ft): 10
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/10/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
0–1		Dry, loose, brown, woody debris		
1–3		Dry, loose, gray f-SAND, occasional shells		
3–5		@1.5': Grades to shelly sand		
5–7		Damp, loose, gray f-SAND		
7–9		Dry, dense, light gray, gravelly f-c SAND (concrete)		
9–13		Damp, medium-dense, dark gray, f-SAND @3.8': Grades to dry, loose, light gray @5-5.7': Slight woody debris @5.8': Occasional shells		
13–16		Dry, medium-dense, light gray, gravelly f-SAND		
16–18		Damp, loose, gray, f-SAND		
18–20		Interbedded layers of damp, medium-stiff, dark gray, silty CLAY		

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Geoprobe Soil Boring Log

SMU4-I1

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 1303BB-01.02	Northing: 316200.1243 Easting: 1211172.862	Total Depth (ft): 4
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/10/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
0–40		Samples and descriptions are in recovered depths. Classification scheme based on USCS		0–40

Damp, loose, gray and black f-c SAND, occasional shells, trace brick debris

@0.8': Grades to f-m SAND

@1.2': Grades to silty, f-m SAND

@1.5': Grades to woody, silty SAND

@1.9': Grades to moist, medium-stiff, black, shelly, woody, sandy SILT

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Geoprobe Soil Boring Log

SMU4-I2

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 130388-01.02	Northing: 315853.353 Easting: 1211200.179	Total Depth (ft): 4
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/10/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
0–40		Samples and descriptions are in recovered depths. Classification scheme based on USCS		0–40
		Wet, loose, dark gray, slightly silty f-SAND, occasional shells, trace gravel, moderate H2S-like odor		
		@1.4': Grades to silty SAND		
		@2': Grades to slightly silty SAND		
		@3.2': 1/2" limpet shell		

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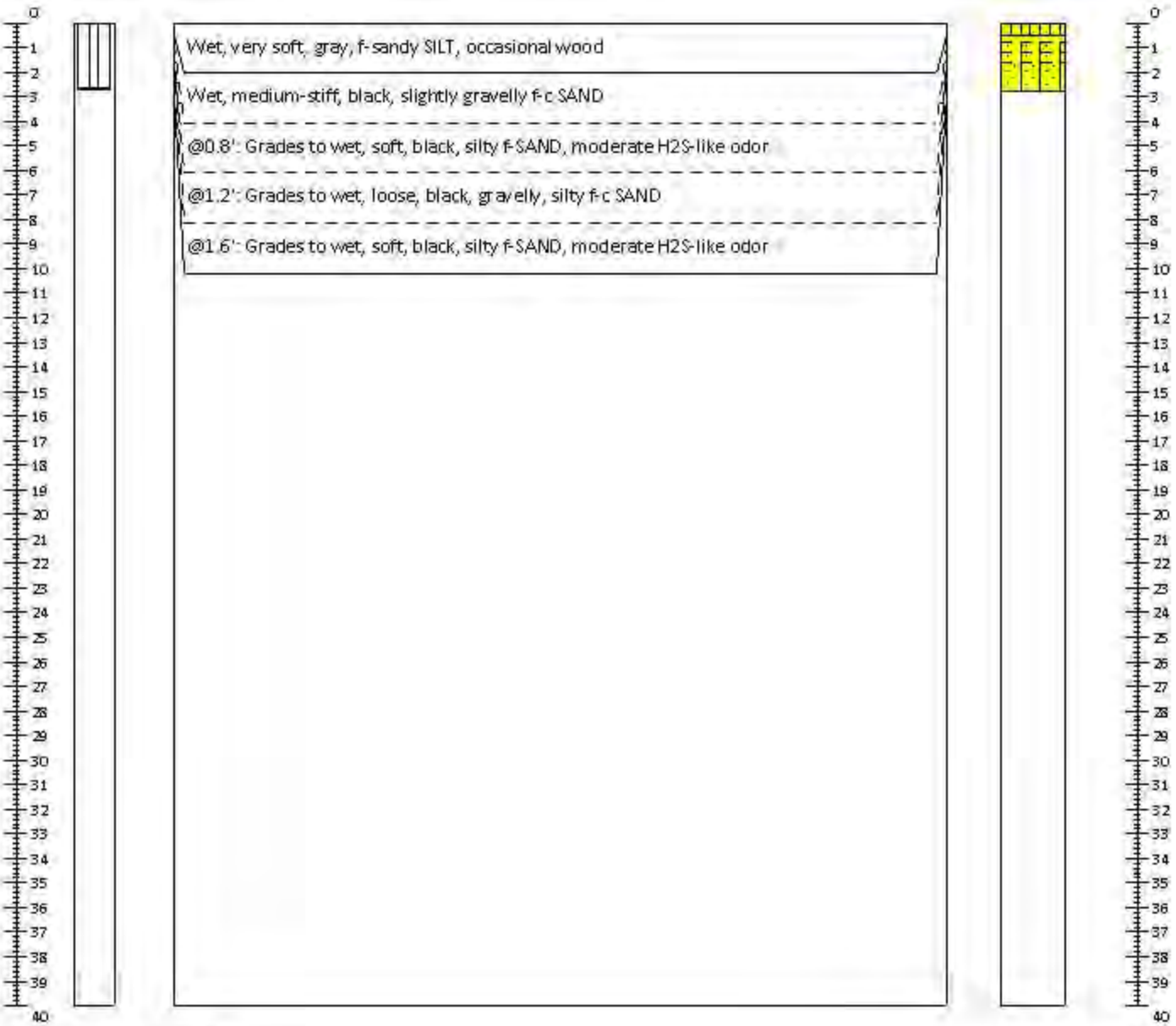
Geoprobe Soil Boring Log

SMU4-I3

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 1303BB-01.02	Northing: 316013.4239 Easting: 1211169.443	Total Depth (ft): 4
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/10/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
		Samples and descriptions are in recovered depths. Classification scheme based on USCS		



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Geoprobe Soil Boring Log

SMU5-B1

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 1303BB-01.02	Northing: 315694.2555 Easting: 1211000.761	Total Depth (ft): 10
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/10/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
0–40		Samples and descriptions are in recovered depths. Classification scheme based on USCS		0–40
		Dry, loose, gray, subangular and rounded GRAVEL		
		@0.4': Grades to damp, medium-dense, gray, slightly gravelly f-c SAND		
		Damp, gray, sandy GRAVEL		
		@1.1': Pocket of damp, stiff, dark gray, CLAY		
		Damp, gray, sandy GRAVEL		
		Damp, stiff, gray, gravelly, sandy CLAY		
		Damp, gray, sandy GRAVEL		
		@2.3': Grades to dry, loose, black, slightly clayey, gravelly f-c SAND		
		@2.7-3.3': Trace wood debris		
		Damp, loose, gray, f-SAND, trace shells		
		Damp, loose, gray, gravelly f-SAND, small pockets of dark gray CLAY		
		Damp, medium-dense, black and gray, gravelly f-c SAND		
		Moist, medium-dense, gray, shelly f-SAND		
		Moist, dark gray, f-c SAND, trace shells		
		@7': Grades to black, silty f-c SAND		
		@7.7-7.8': Layer of moist, soft, black, slightly f-sandy SILT		
		Moist, loose, dark gray, f-SAND		
		@8.6-8.7': Layer of moist, stiff, brown, woody SILT		
		Moist, loose, dark gray, f-SAND, with interbedded pockets of black SILT and fibrous woody debris		

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Geoprobe Soil Boring Log

Sheet 1 of 1

SMU5-B2

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 1303BB-01.02	Northing: 315599.1521 Easting: 1210885.292	Total Depth (ft): 10
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/10/2015		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
		Samples and descriptions are in recovered depths. Classification scheme based on USCS		
0		Dry, loose, sub-angular GRAVEL, trace clover		0
1		Dry loose, brown, gravelly, silty f-c SAND		1
2		Damp, dense, black, gravelly, sandy SILT		2
3		Dry, loose, gray, sandy GRAVEL (concrete)		3
4		Damp, dense, black, gravelly, sandy SILT		4
5		@1.5-1.6': Angular contact		5
6		Dry, loose, gray, sandy GRAVEL (concrete)		6
7		Damp, dense, black, gravelly, sandy SILT		7
8		Dry, loose, gray, sandy GRAVEL (concrete)		8
9		Damp, dense, black, gravelly, sandy SILT, occasionaly brick debris		9
10		Damp, loose, brown and gray, gravelly f-c SAND, occasional brick debris		10
11		Damp, loose, gray, gravelly f-SAND		11
12		@5.7': Grades to silty f-SAND		12
13		Damp, loose, gray, slightly gravelly f-m SAND, trace silt		13
14				14
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36				36
37				37
38				38
39				39
40				40

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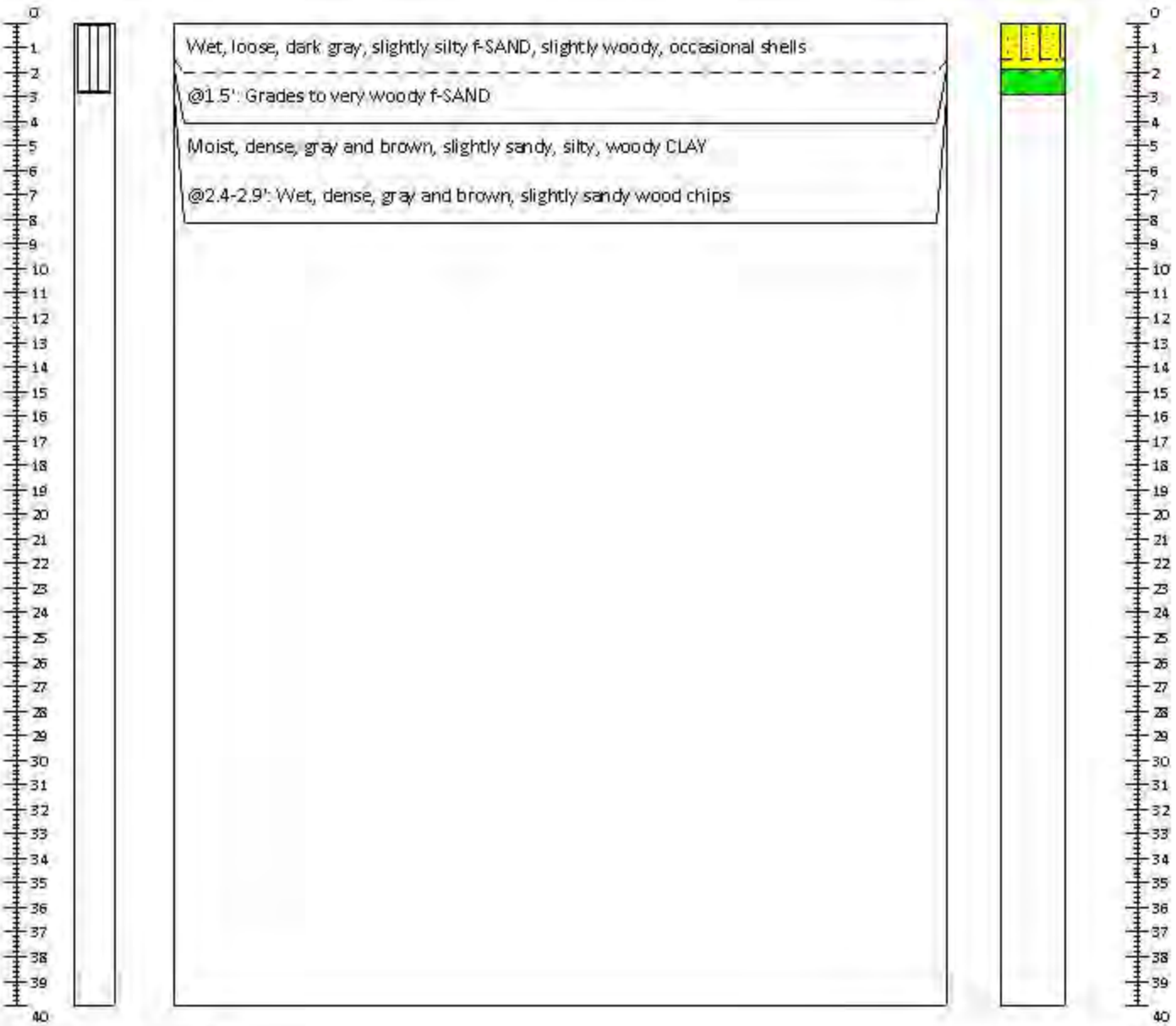
Geoprobe Soil Boring Log

SMU5-I1

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 130388-01.02	Northing: 315651.544 Easting: 1211174.09	Total Depth (ft): 4
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/10/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
		Samples and descriptions are in recovered depths. Classification scheme based on USCS		



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Geoprobe Soil Boring Log

SMU5-I2

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 130388-01.02	Northing: 515504.1837 Easting: 1211114.479	Total Depth (ft): 4
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/10/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
0		Samples and descriptions are in recovered depths. Classification scheme based on USCS		0
1		Wet, loose, dark gray, slightly silty f-SAND, trace gravel, occasional shells		1
2		@0.5': 1" piece of wood		2
3		@1.7': Pocket of decomposing wood		3
4				4
5				5
6				6
7				7
8				8
9				9
10				10
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12				12
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35				35
36				36
37				37
38				38
39				39
40				40

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Geoprobe Soil Boring Log

SMU5-I3

Sheet 1 of 1

Project: Port Gamble	Location: Port Gamble, WA	Method: Geoprobe
Project #: 130388-01.02	Northing: 315545.7007 Easting: 1211014.286	Total Depth (ft): 4
Client: Pope Resources LP and OPG Properties LLC	Horizontal Datum: NAD83 WA State Plane North Zone	Logged By: Delaney Peterson
Collection Date: 7/10/2014		
Contractor: Cascade Drilling		

Recovered Depth (ft)	Sample Recovery	Soil Description	Graphic Log	Recovered Depth (ft)
		Samples and descriptions are in recovered depths. Classification scheme based on USCS		
0–4		Wet, medium-dense, dark gray, slightly shelly f-m SAND @1.5': Grades to f-SAND		0–4

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ATTACHMENT A-3-2
MUDMOLE CORE LOGS

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-01**

Maximum depth of retained sediment: 9.8 ft

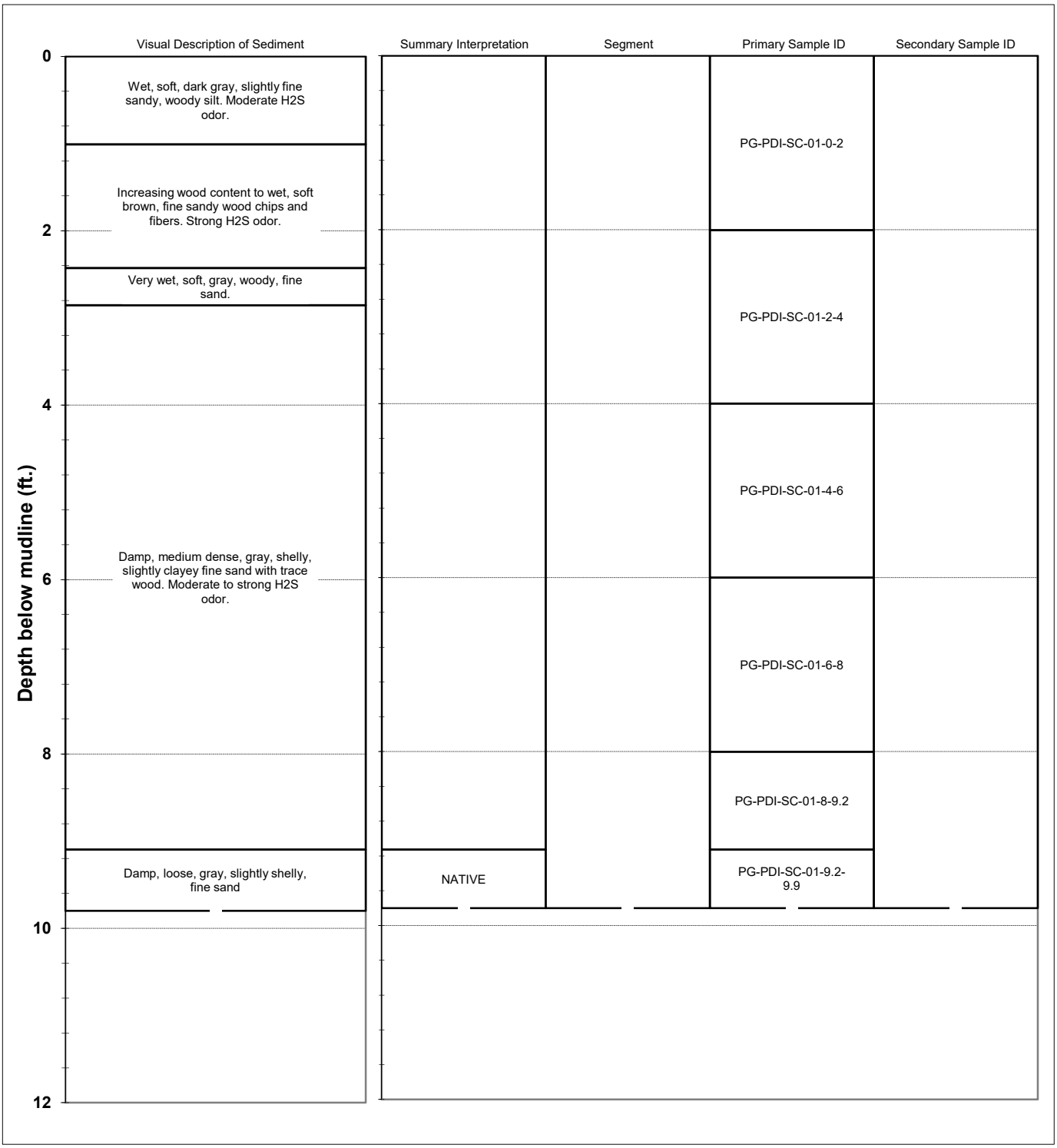
Mudline elevation: -18.0 **ft MLLW**

Percent recovery (on-deck): 71%

	Core collection	Laboratory processing
Date:	7/21/2014	7/21/2014
Time:	9:37	0:00

Field Log: DP

Summary Log: NB



File name: PG-PDI-SC-01_dp_nws
Summary Core Log

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-02R2**

Maximum depth of retained sediment: 13.1 ft

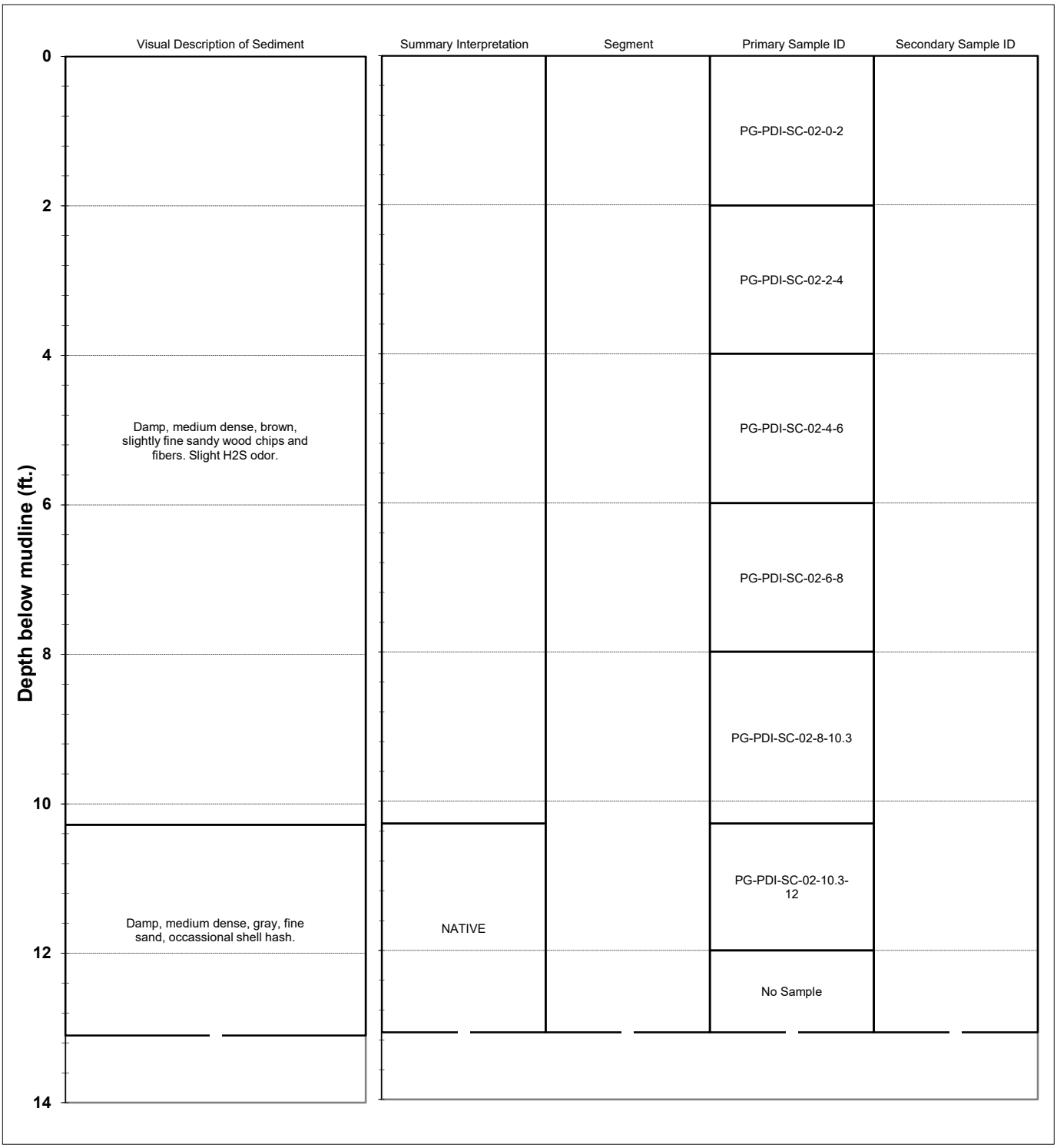
Mudline elevation: -9.0 **ft MLLW**

Percent recovery (on-deck): 70%

	Core collection	Laboratory processing
Date:	7/21/2014	7/21/2014
Time:	15:37	0:00

Field Log: DP

Summary Log: NB



File name: PG-PDI-SC-02R2_dp.xls
Summary Core Log

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-03**

Maximum depth of retained sediment: 13.3 ft

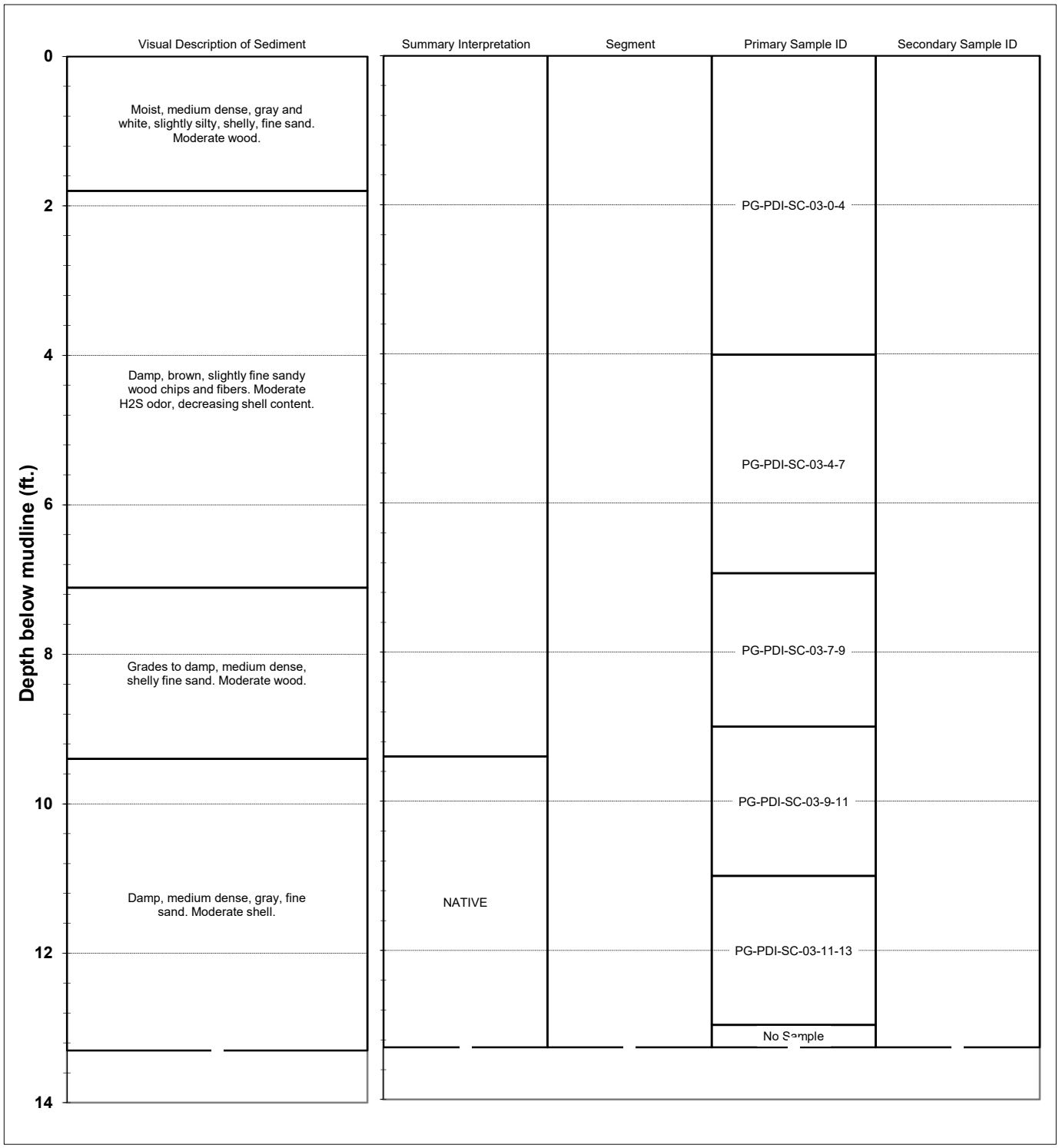
Mudline elevation: -7.4 **ft MLLW**

Percent recovery (on-deck): 50%

	Core collection	Laboratory processing
Date:	7/21/2014	7/21/2014
Time:	13:25	0:00

Field Log: DP

Summary Log: NB



File name: PG-PDI-SC-03_dp.xls
Summary Core Log

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-04**

Maximum depth of retained sediment: 8.9 ft

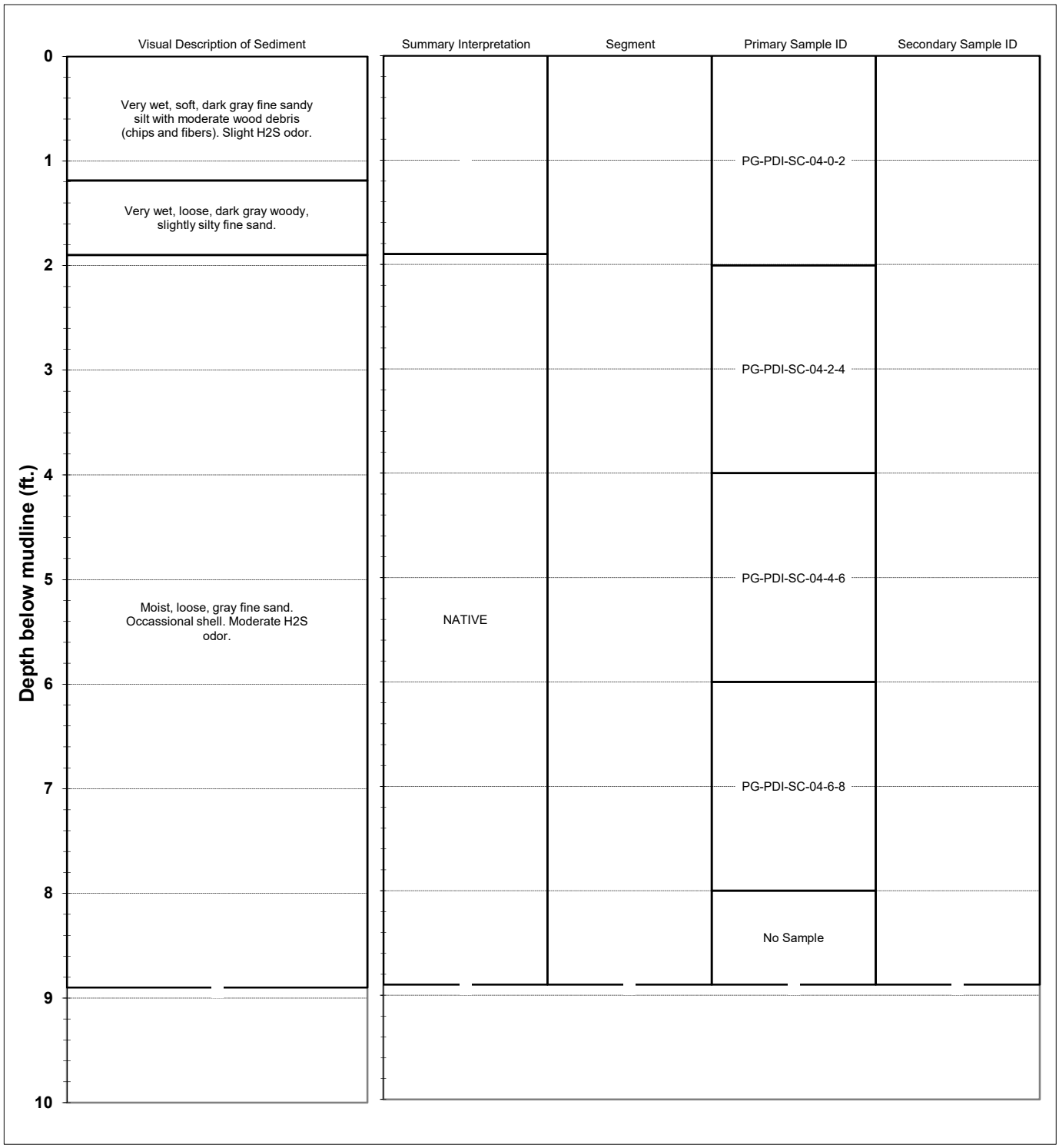
Mudline elevation: -17.1 **ft MLLW**

Percent recovery (on-deck): 85%

	Core collection	Laboratory processing
Date:	7/21/2014	7/21/2014
Time:	14:15	0:00

Field Log: DP

Summary Log: NB



File name: PG-PDI-SC-04_dp.xls
Summary Core Log

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-05r2**

Maximum depth of retained sediment: 20.0 ft

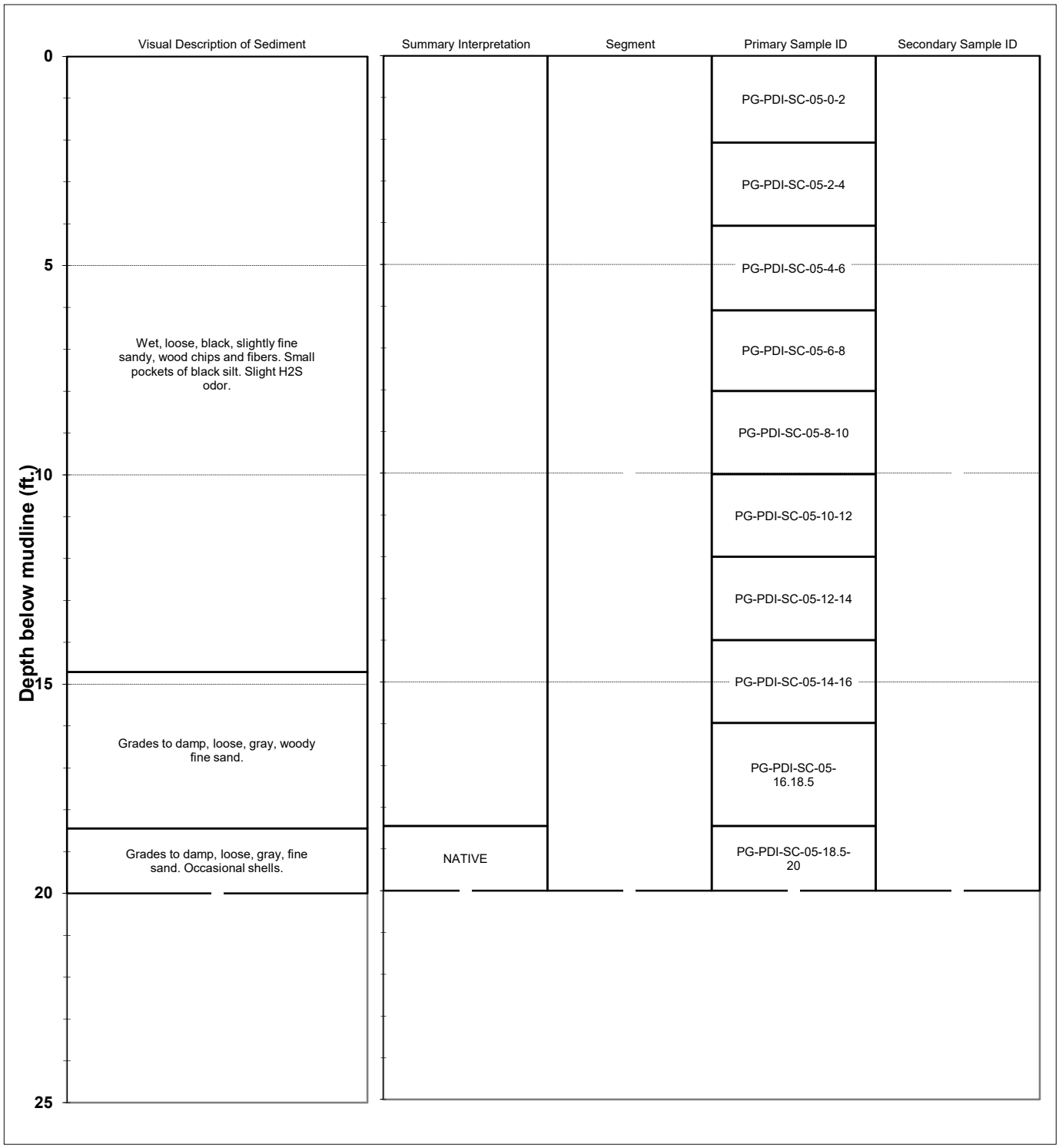
Mudline elevation: -22.6 **ft MLLW**

Percent recovery (on-deck): 64%

	Core collection	Laboratory processing
Date:	7/22/2014	7/22/2014
Time:	15:01	0:00

Field Log: DP

Summary Log: NB



File name: PG-PDI-SC-05r2_dp.xls
Summary Core Log

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-06**

Maximum depth of retained sediment: 20.2 ft

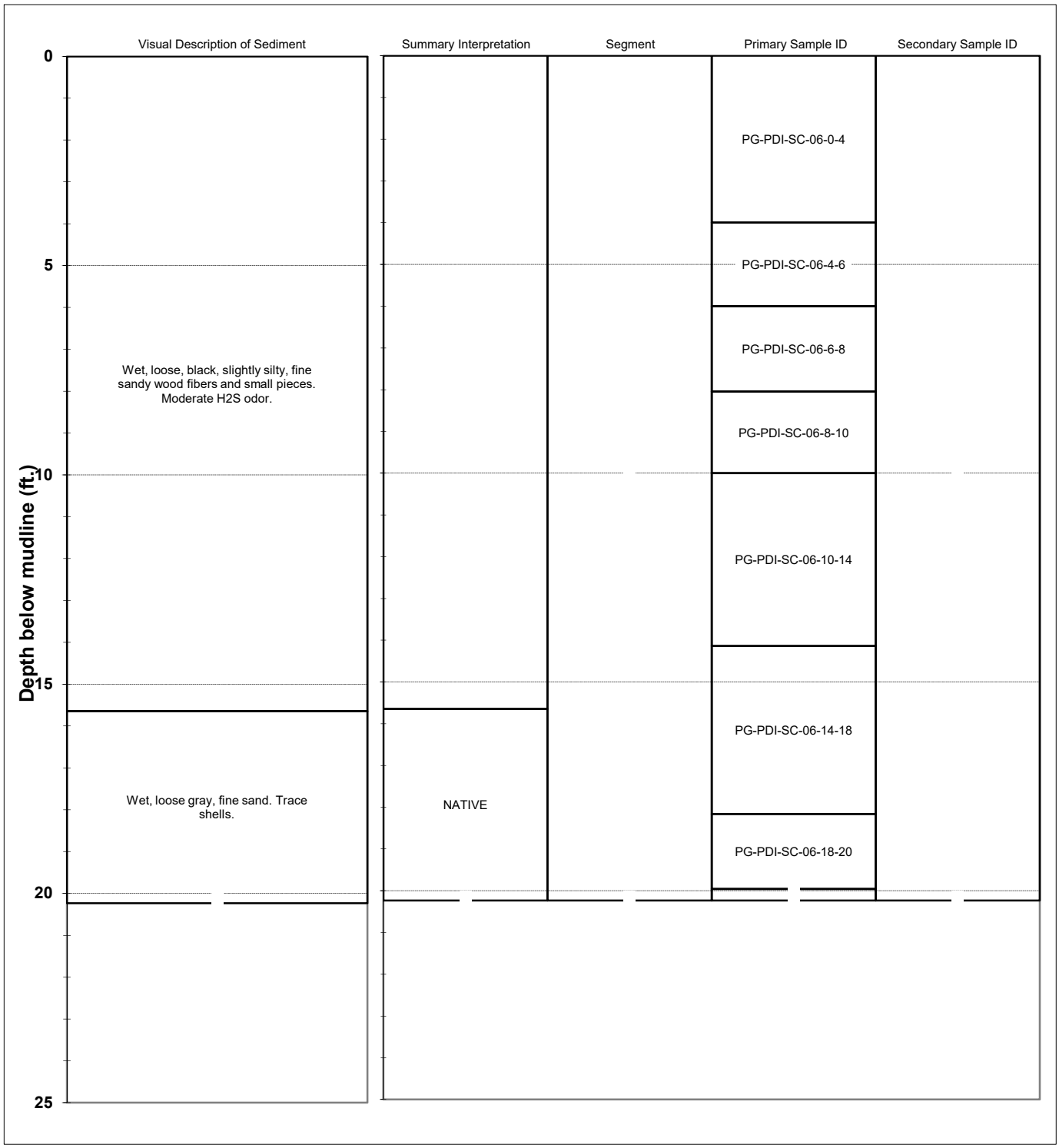
Mudline elevation: -13.4 **ft MLLW**

Percent recovery (on-deck): 48%

	Core collection	Laboratory processing
Date:	7/22/2014	7/22/2014
Time:	9:30	0:00

Field Log: DP

Summary Log: NB



File name: PG-PDI-SC-06_dp.xls
Summary Core Log

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-07R2**

Maximum depth of retained sediment: 14.3 ft

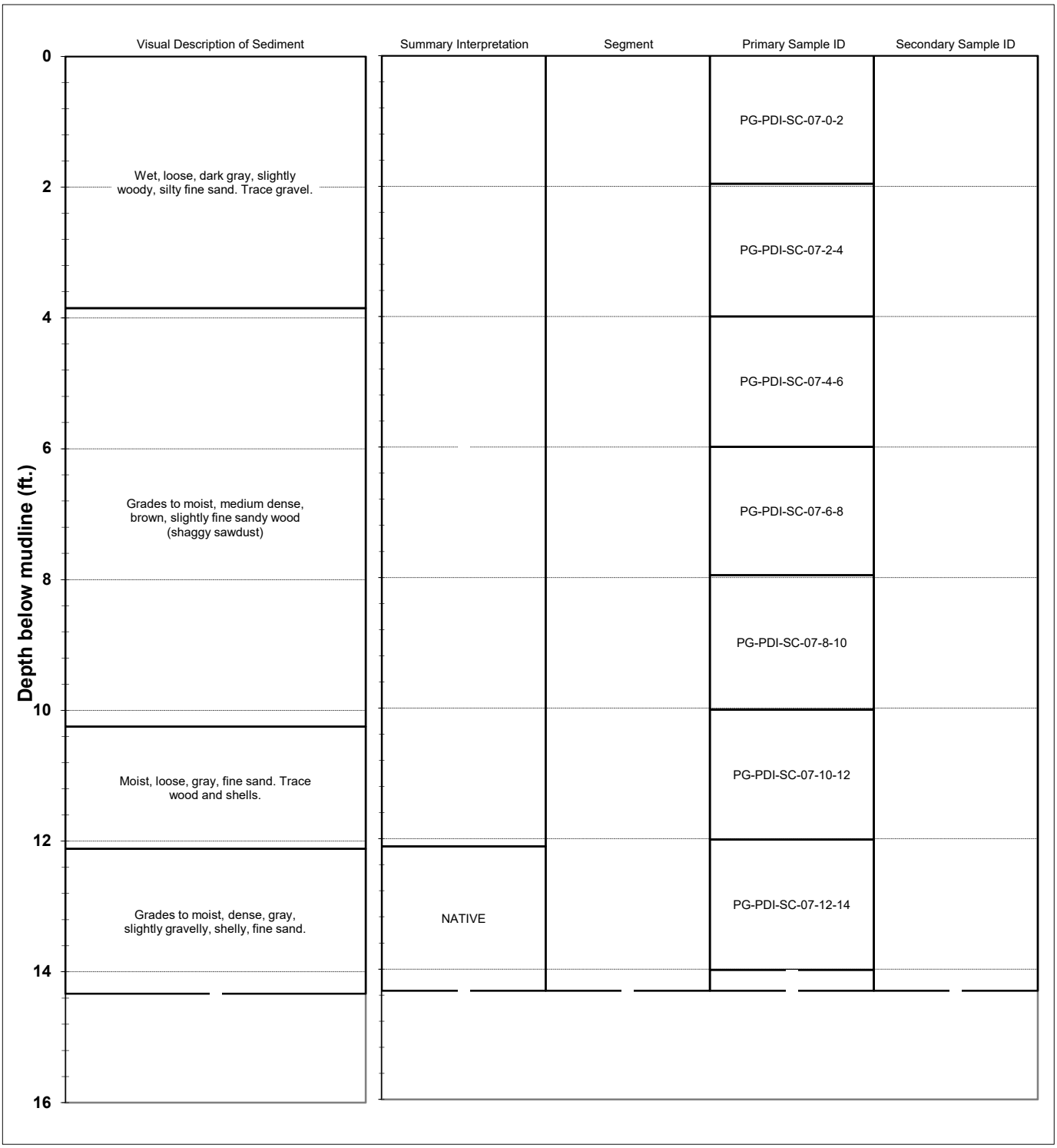
Mudline elevation: -11.2 **ft MLLW**

Percent recovery (on-deck): 55%

	Core collection	Laboratory processing
Date:	7/24/2014	7/24/2014
Time:	13:48	0:00

Field Log: DP

Summary Log: NB



File name: PG-PDI-SC-07R2_dp.xls
Summary Core Log

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-08**

Maximum depth of retained sediment: 13.5 ft

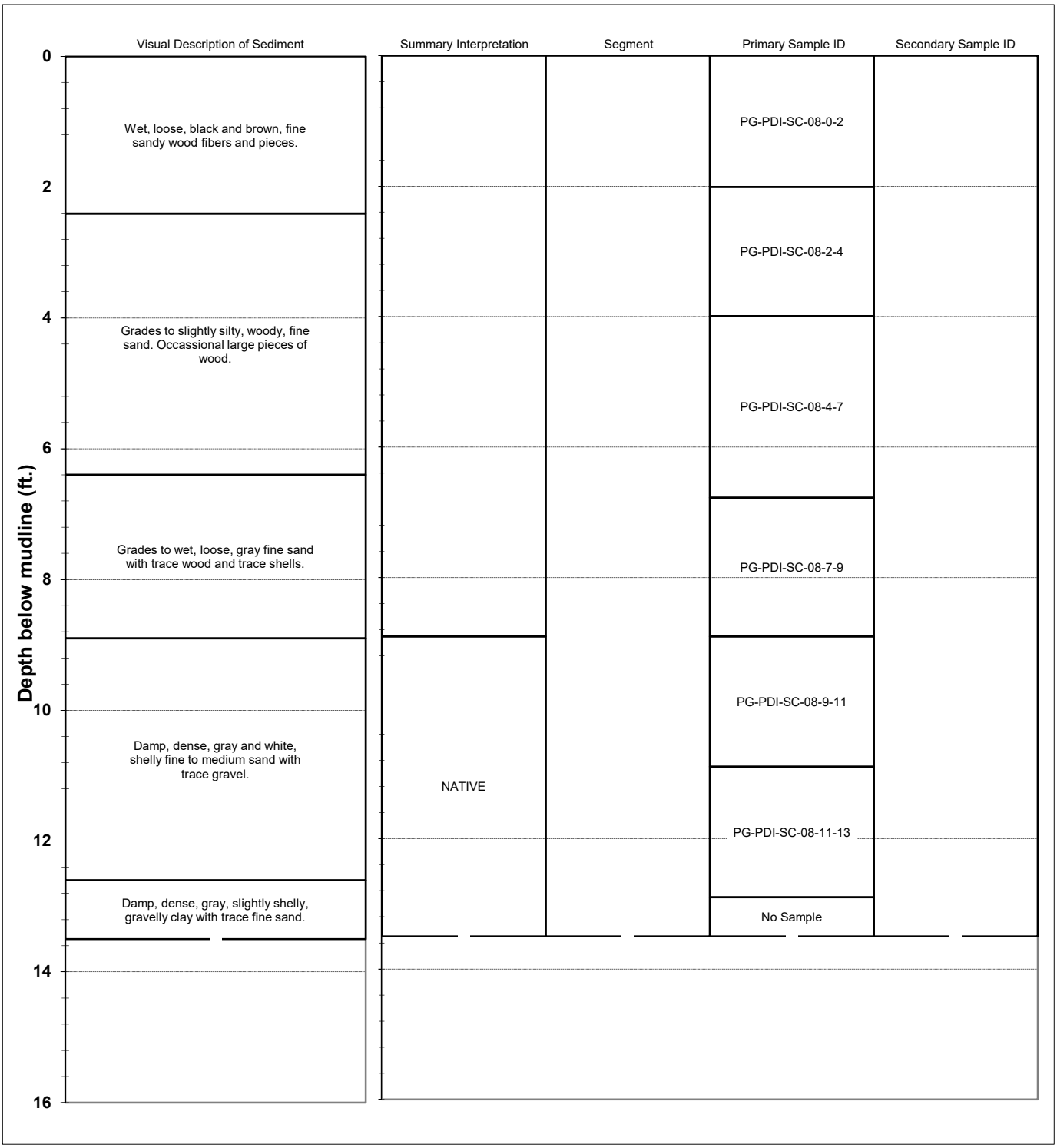
Mudline elevation: -17.9 **ft MLLW**

Percent recovery (on-deck): 68%

	Core collection	Laboratory processing
Date:	7/22/2014	7/22/2014
Time:	11:48	0:00

Field Log: DP

Summary Log: NB



File name: PG-PDI-SC-08_dp.xls
Summary Core Log

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-09**

Maximum depth of retained sediment: 9.7 ft

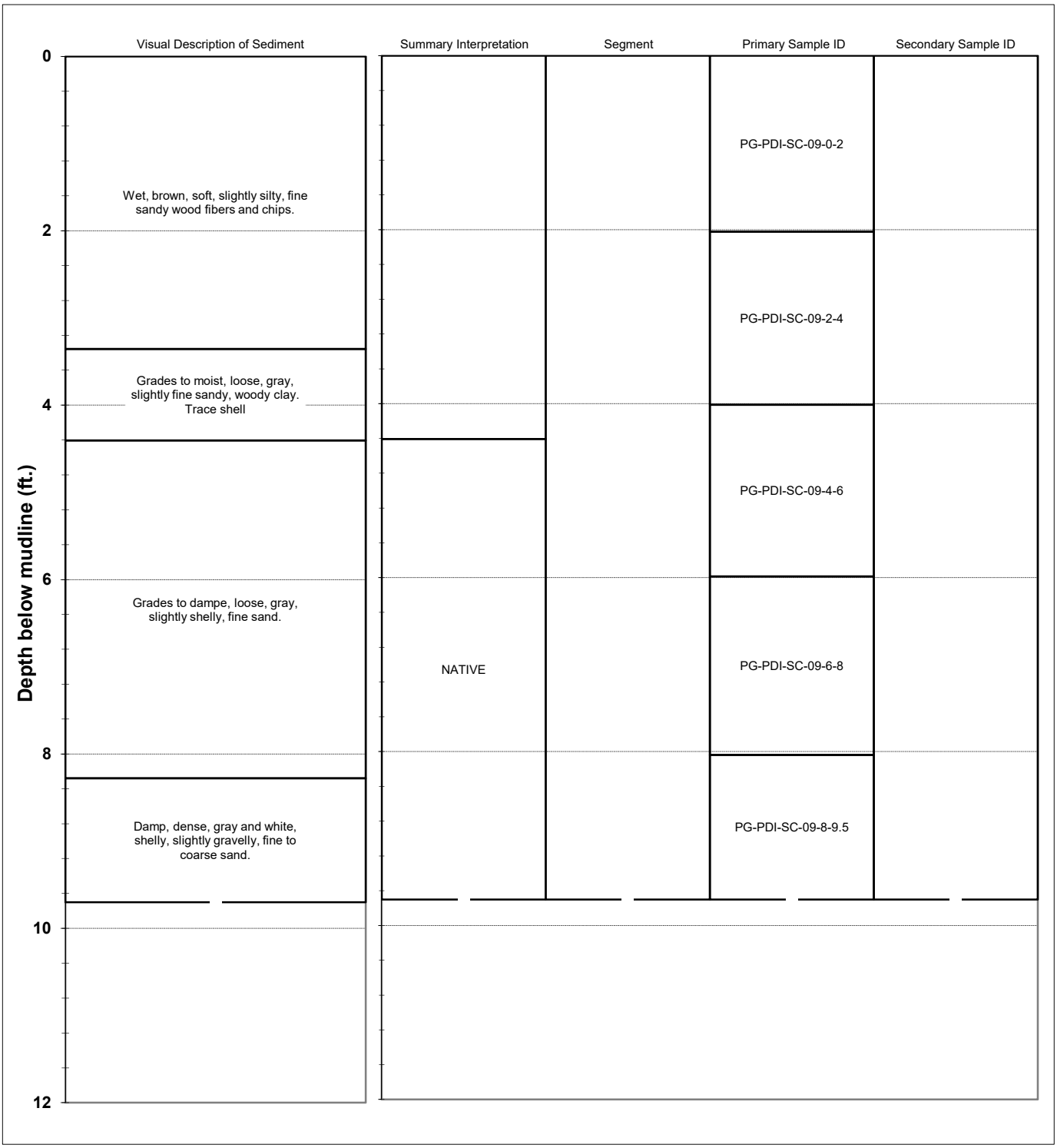
Mudline elevation: -13.1 **ft MLLW**

Percent recovery (on-deck): 71%

	Core collection	Laboratory processing
Date:	7/22/2014	7/22/2014
Time:	14:16	0:00

Field Log: DP

Summary Log: NB



File name: PG-PDI-SC-09_dp.xls
Summary Core Log

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-10**

Maximum depth of retained sediment: 10.8 ft

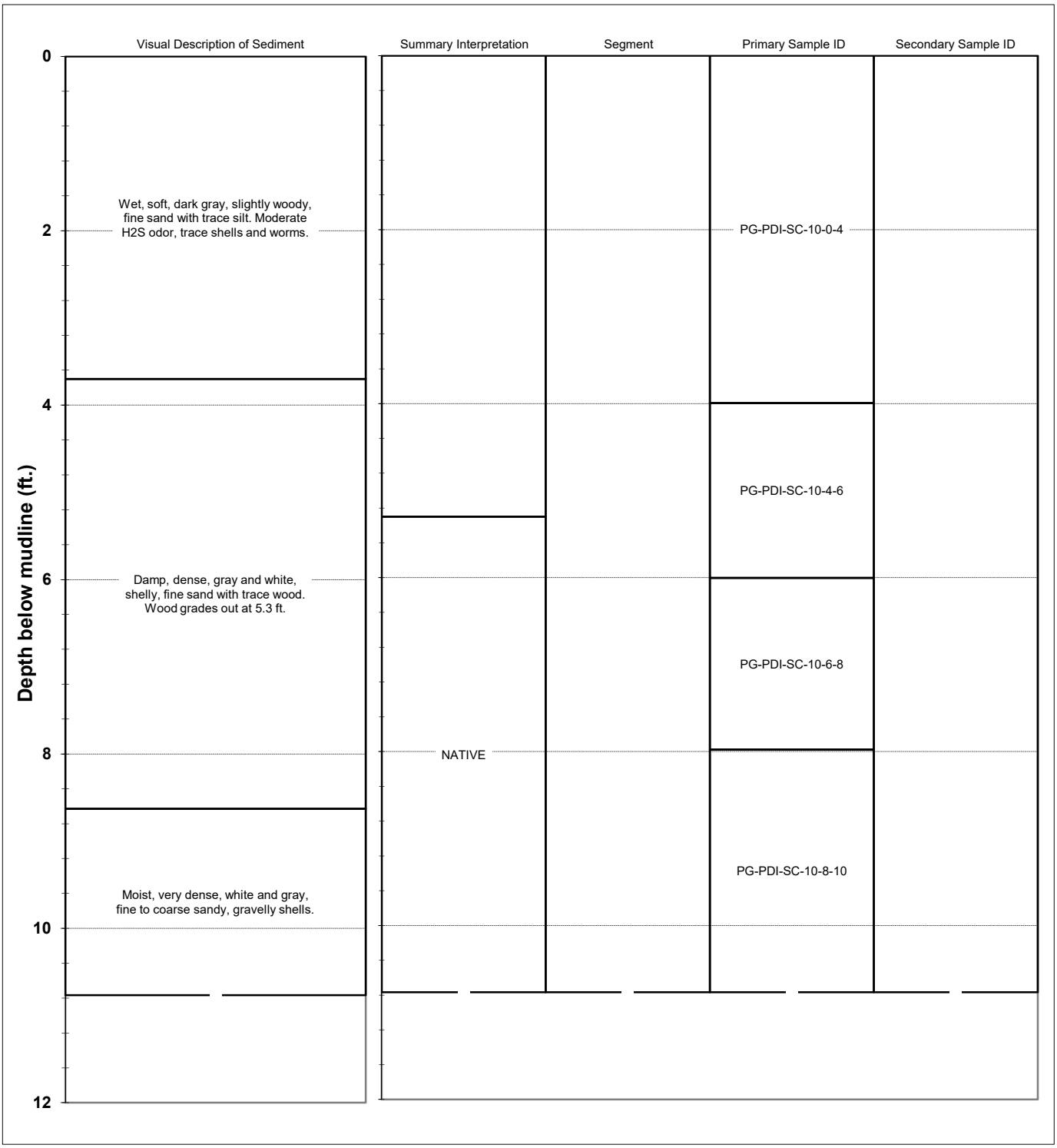
Mudline elevation: -8.6 **ft MLLW**

Percent recovery (on-deck): 64%

	Core collection	Laboratory processing
Date:	7/23/2014	7/23/2014
Time:	8:22	0:00

Field Log: DP

Summary Log: NB



File name: PG-PDI-SC-10.xls
Summary Core Log

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-11**

Maximum depth of retained sediment: 11.2 ft

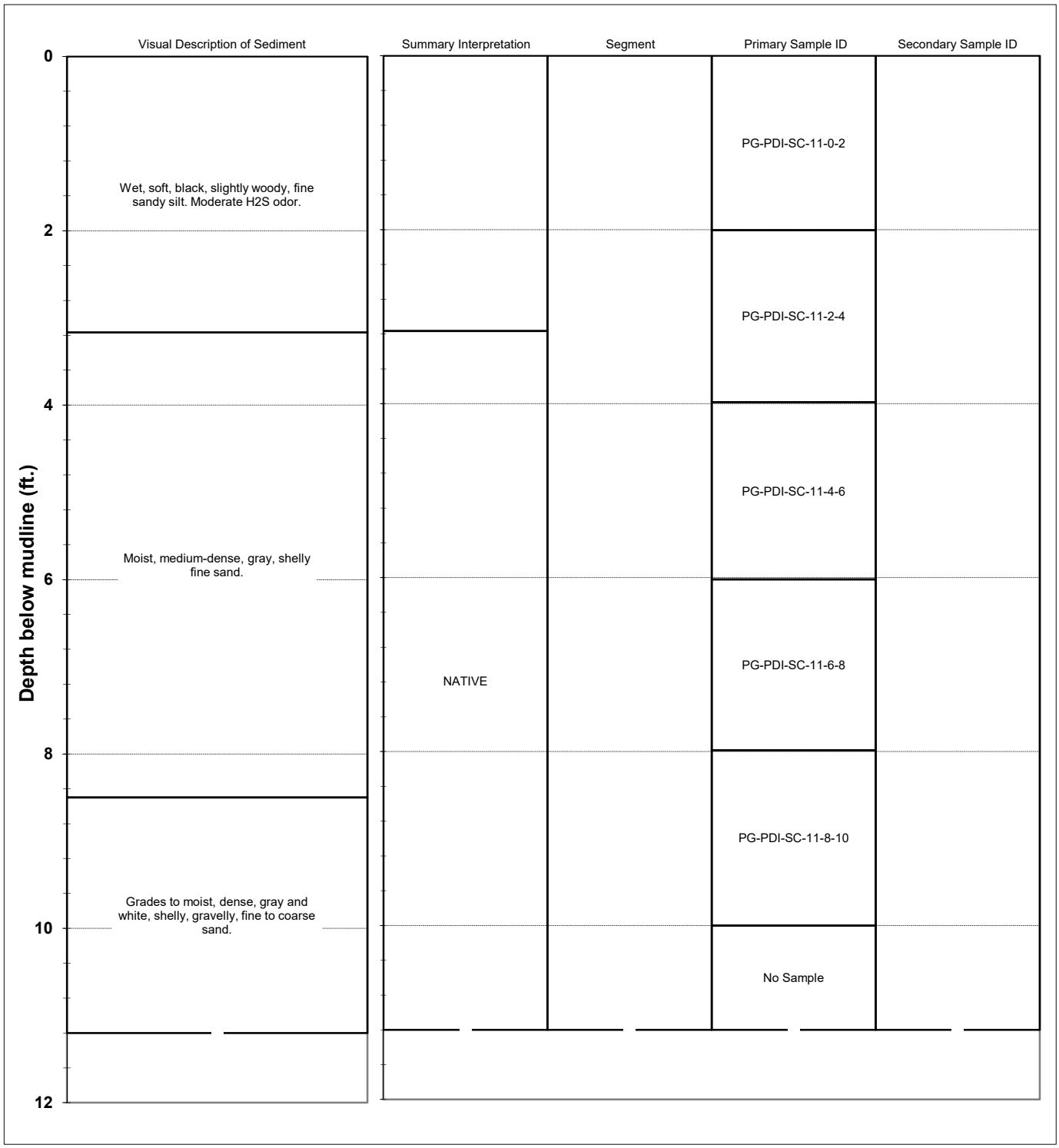
Mudline elevation: -8.3 **ft MLLW**

Percent recovery (on-deck): 73%

	Core collection	Laboratory processing
Date:	7/23/2014	7/23/2014
Time:	9:47	0:00

Field Log: DP

Summary Log: NB



File name: PG-PDI-SC-11_dp.xls
Summary Core Log

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-12**

Maximum depth of retained sediment: 12.0 ft

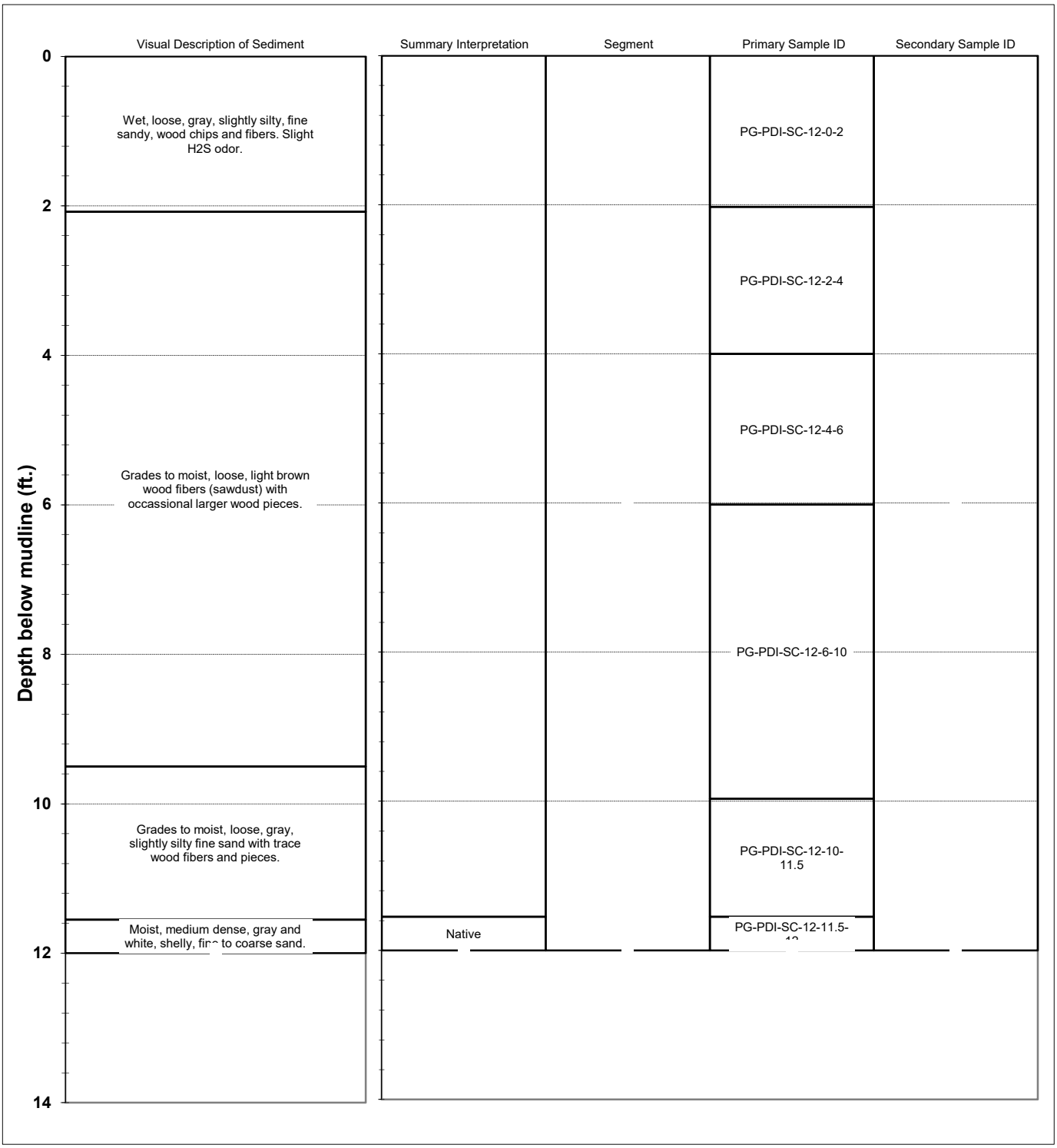
Mudline elevation: -9.9 **ft MLLW**

Percent recovery (on-deck): 38%

	Core collection	Laboratory processing
Date:	7/23/2014	7/23/2014
Time:	11:09	0:00

Field Log: DP

Summary Log: NB



File name: PG-PDI-SC-12_dp.xls
Summary Core Log

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-13**

Maximum depth of retained sediment: 11.2 ft

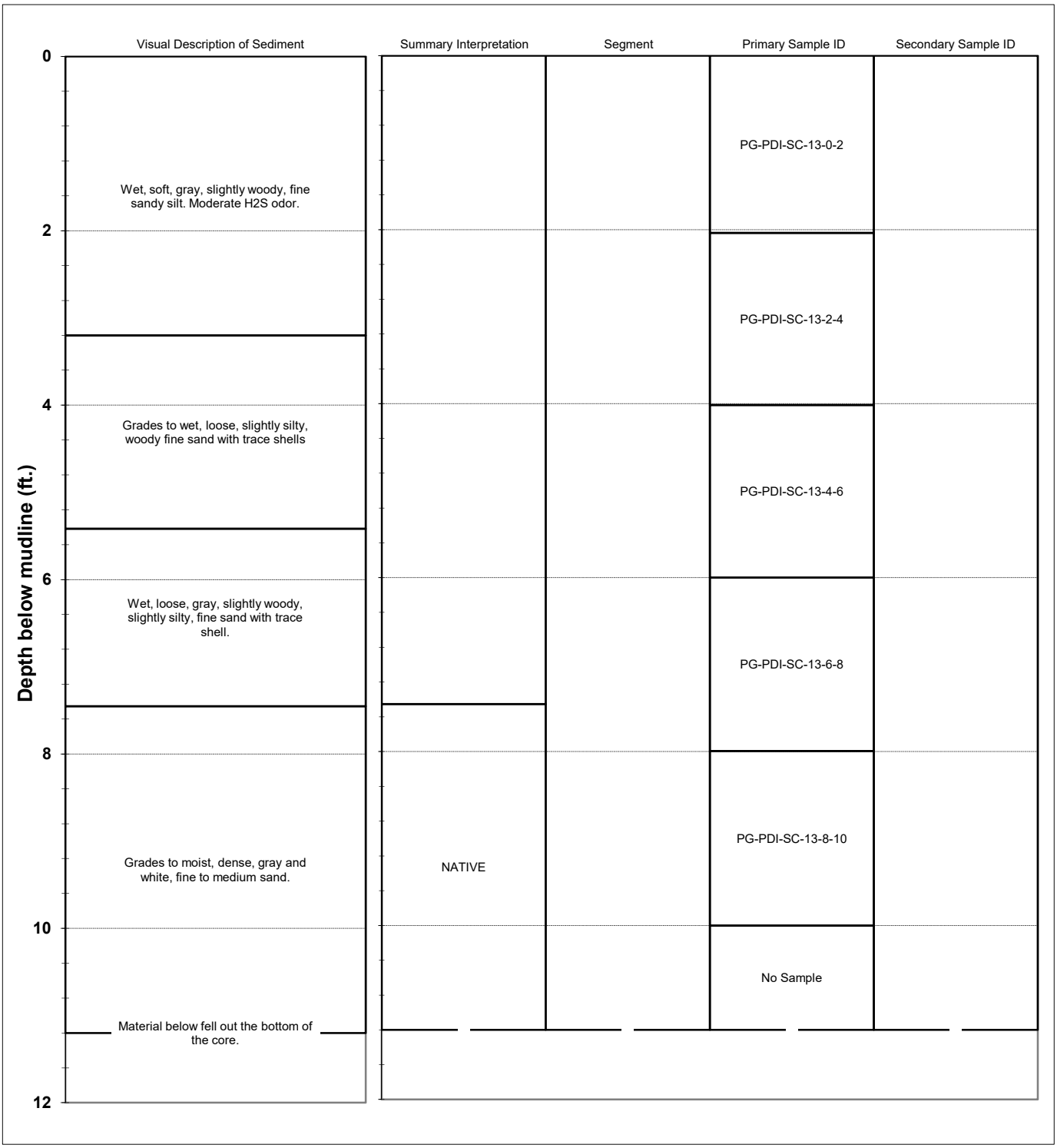
Mudline elevation: -14.7 **ft MLLW**

Percent recovery (on-deck): 81%

	Core collection	Laboratory processing
Date:	7/23/2014	7/23/2014
Time:	14:28	0:00

Field Log: DP

Summary Log: NB



File name: PG-PDI-SC-13_dp.xls
Summary Core Log

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-14**

Maximum depth of retained sediment: 10.7 ft

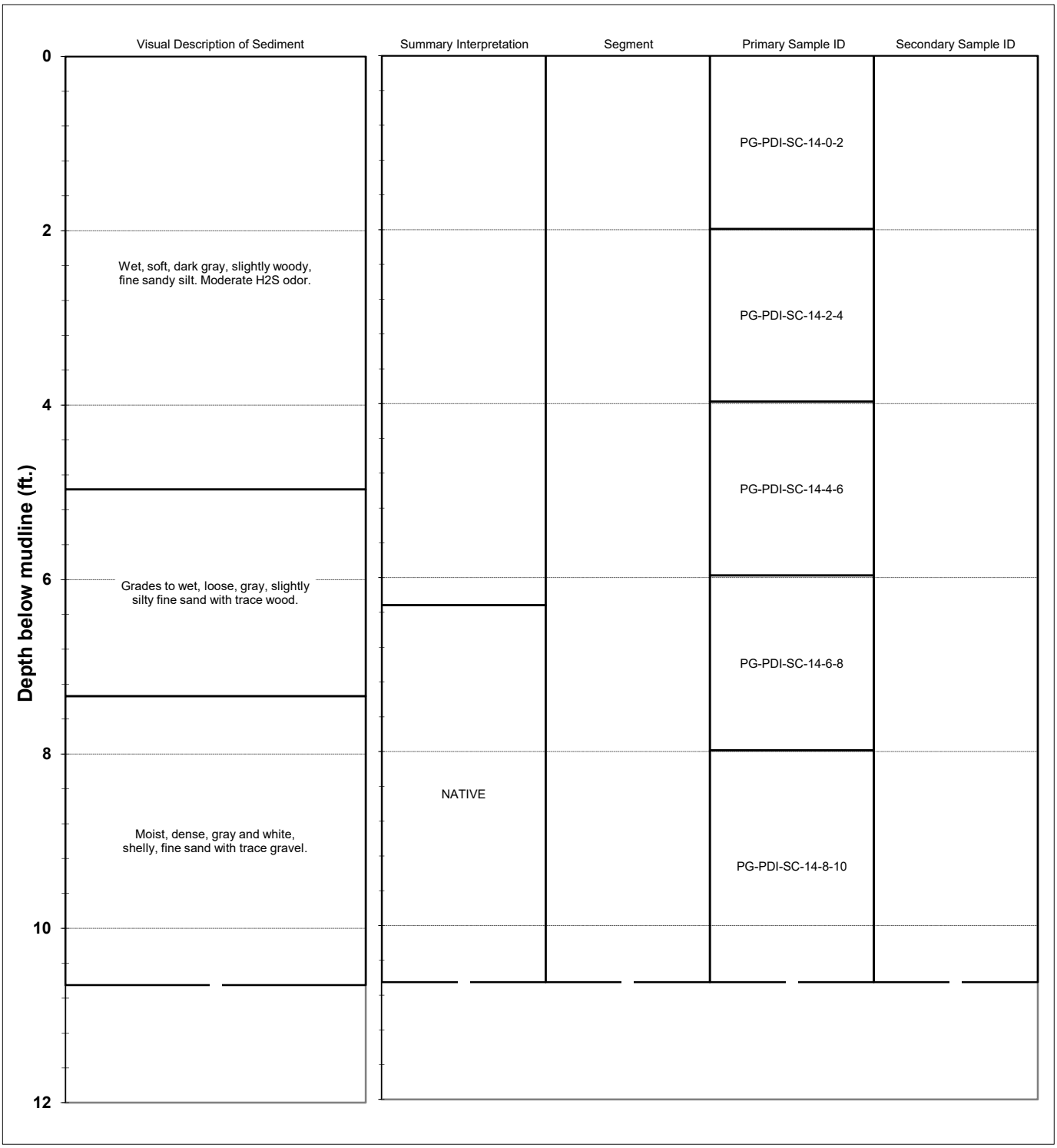
Mudline elevation: -17.4 **ft MLLW**

Percent recovery (on-deck): 81%

	Core collection	Laboratory processing
Date:	7/23/2014	7/23/2014
Time:	15:13	0:00

Field Log: DP

Summary Log: NB



File name: PG-PDI-SC-14_dp.xls
Summary Core Log

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-15**

Maximum depth of retained sediment: 8.4 ft

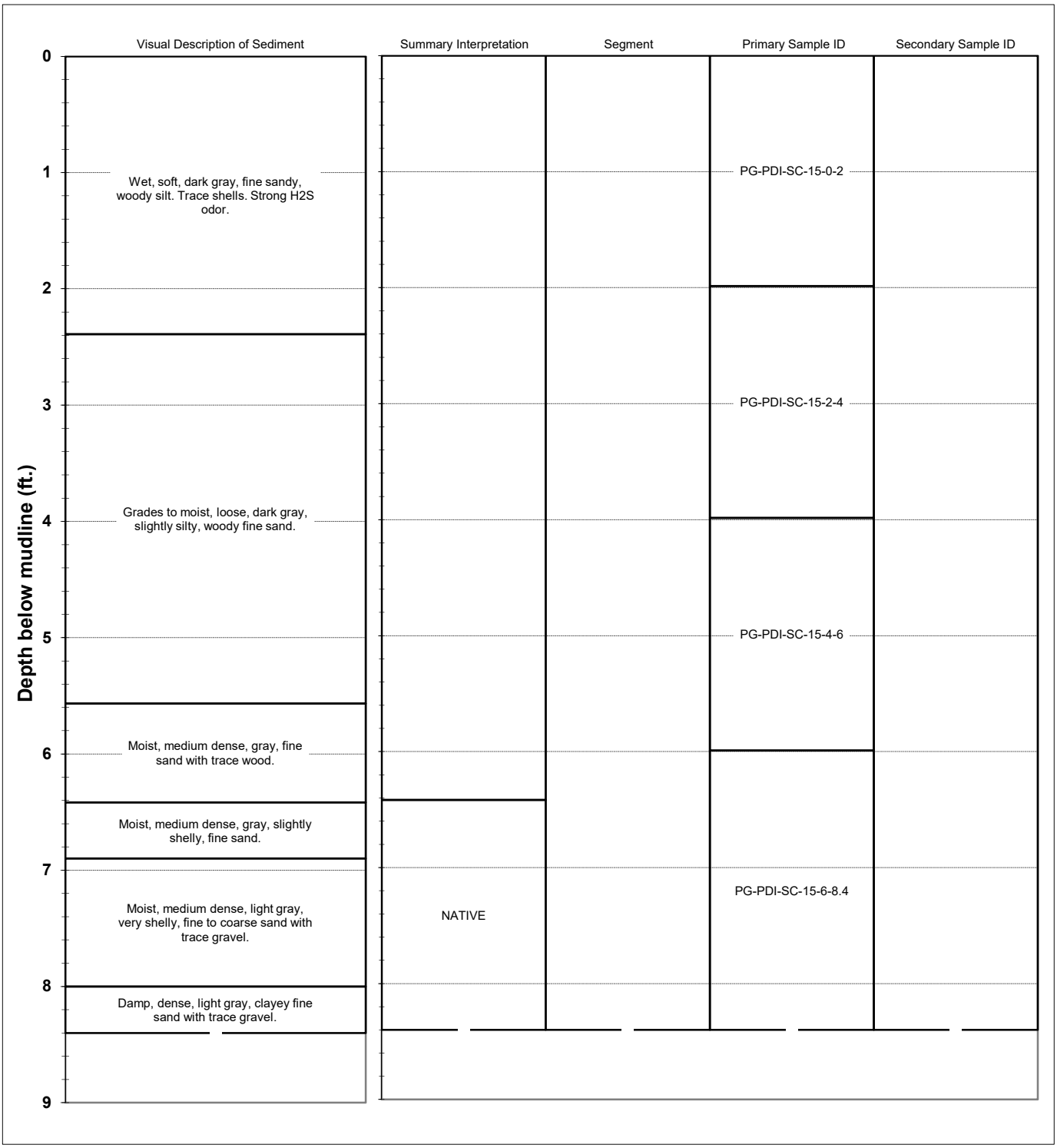
Mudline elevation: -14.9 **ft MLLW**

Percent recovery (on-deck): 74%

	Core collection	Laboratory processing
Date:	7/24/2014	7/24/2014
Time:	8:20	0:00

Field Log: DP

Summary Log: NB



File name: PG-PDI-SC-15_dp.xls
Summary Core Log

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-16**

Maximum depth of retained sediment: 7.2 ft

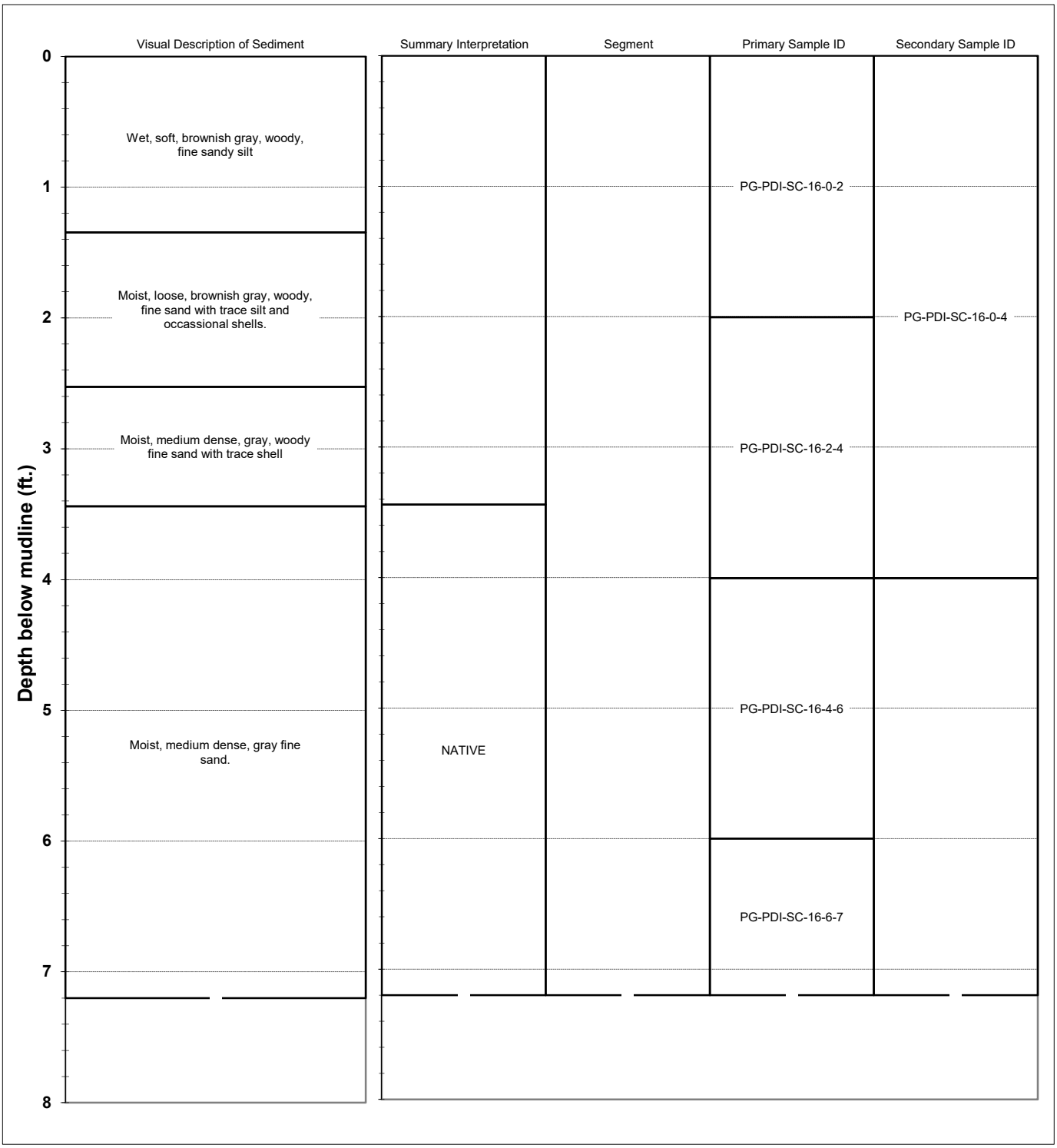
Mudline elevation: -13.9 **ft MLLW**

Percent recovery (on-deck): 76%

	Core collection	Laboratory processing
Date:	7/24/2014	7/24/2014
Time:	9:27	0:00

Field Log: DP

Summary Log: NB



File name: PG-PDI-SC-16_dp.xls
Summary Core Log

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-17**

Maximum depth of retained sediment: 7.6 ft

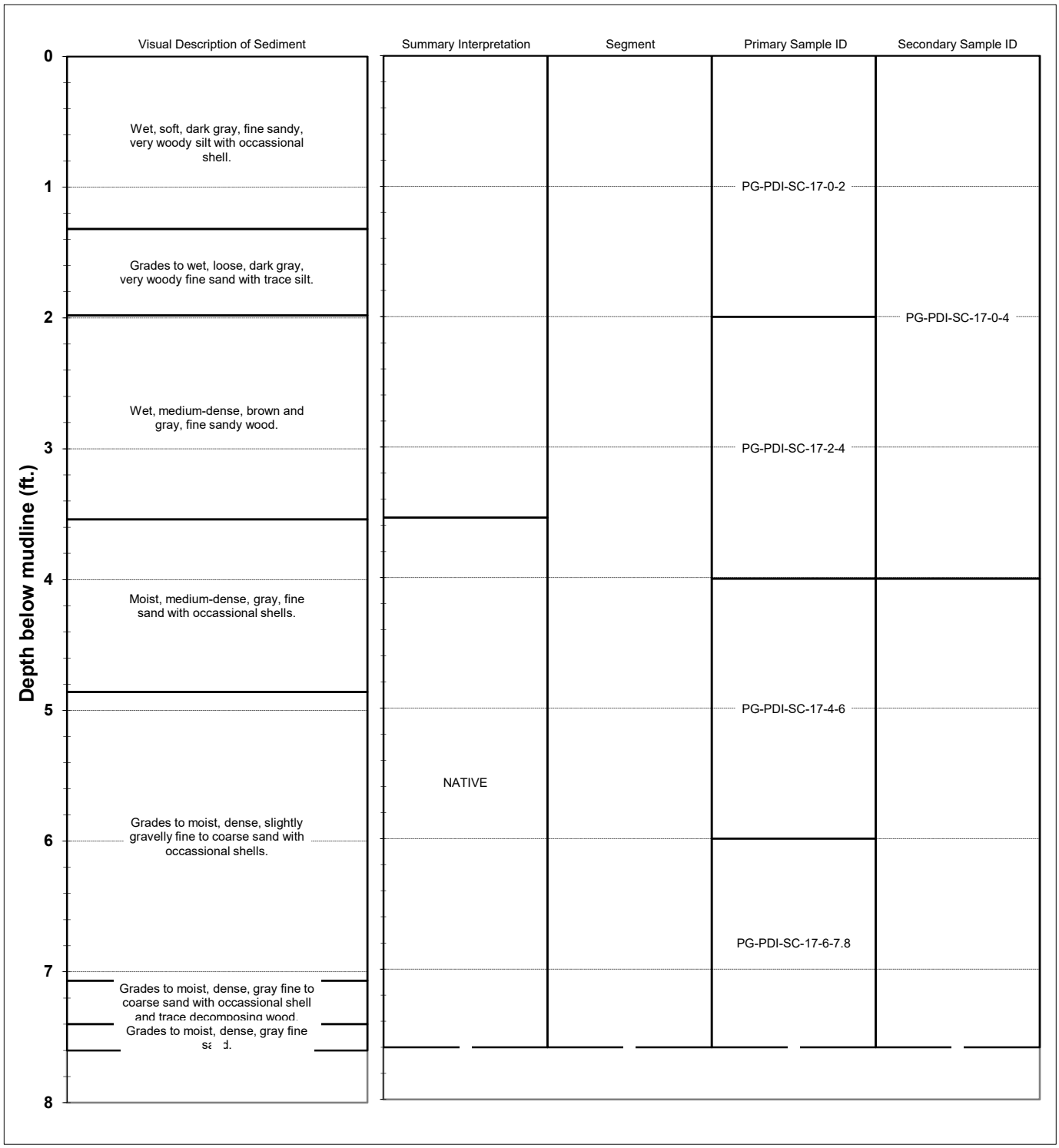
Mudline elevation: -18.6 **ft MLLW**

Percent recovery (on-deck): 62%

	Core collection	Laboratory processing
Date:	7/24/2014	7/24/2014
Time:	10:26	0:00

Field Log: DP

Summary Log: NB



File name: PG-PDI-SC-17_dp.xls
Summary Core Log

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-18**

Maximum depth of retained sediment: 14.2 ft

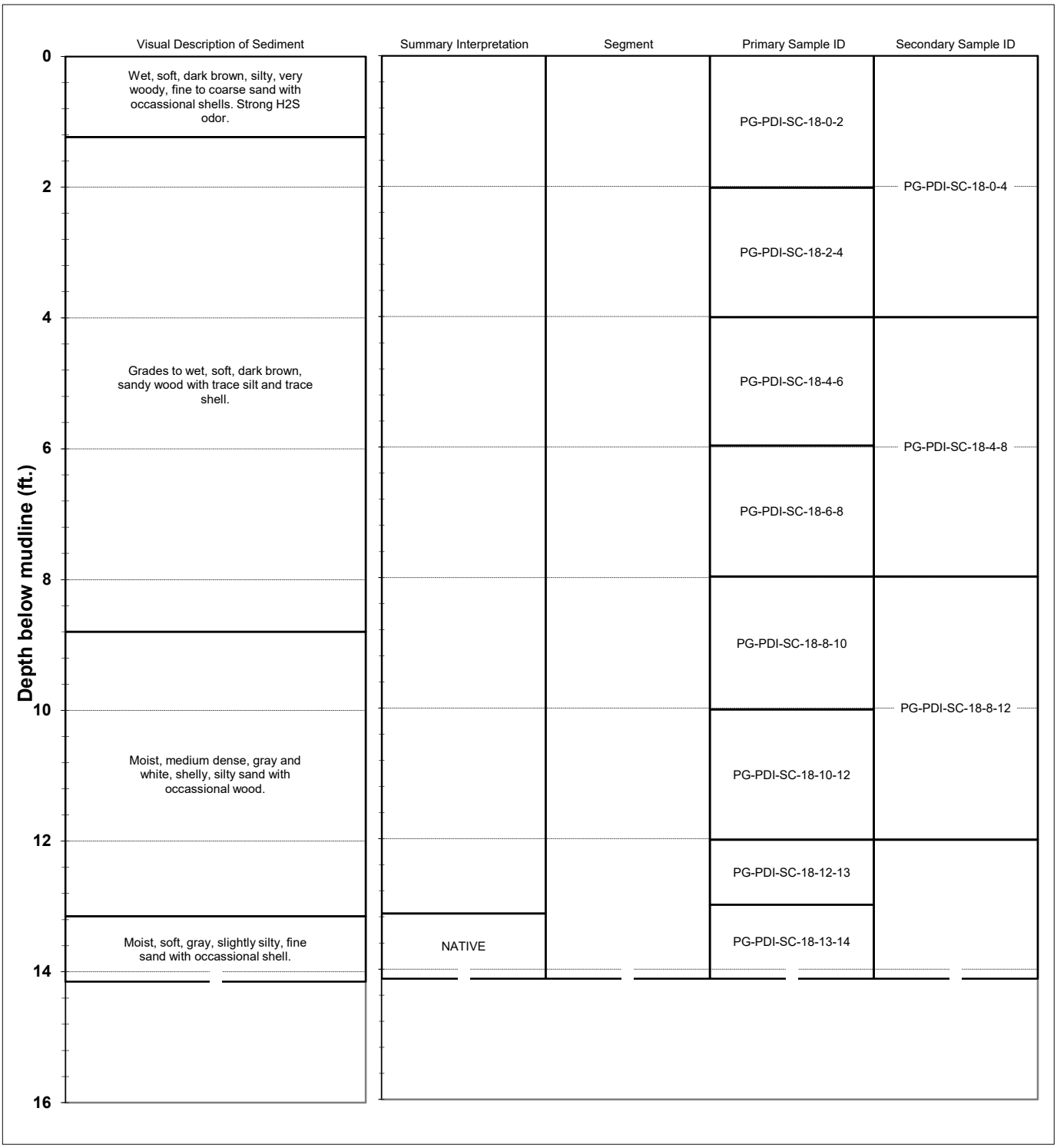
Mudline elevation: -19.6 **ft MLLW**

Percent recovery (on-deck): 44%

	Core collection	Laboratory processing
Date:	7/24/2014	7/24/2014
Time:	11:35	0:00

Field Log: DP

Summary Log: NB



File name: PG-PDI-SC-18_dp.xls
Summary Core Log

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-19**

Maximum depth of retained sediment: 11.8 ft

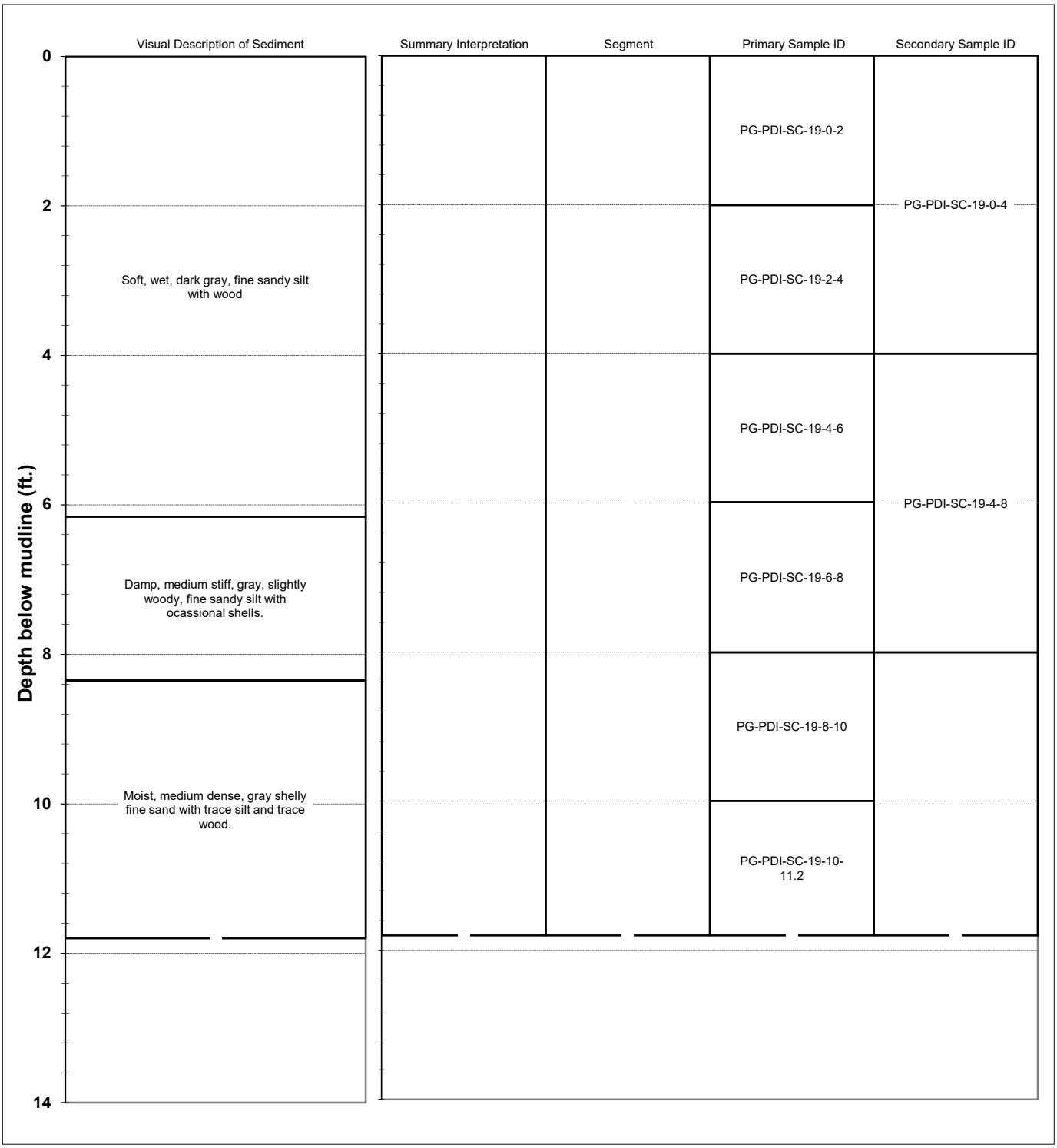
Mudline elevation: -10.3 **ft MLLW**

Percent recovery (on-deck): 58%

	Core collection	Laboratory processing
Date:	7/24/2014	7/24/2014
Time:	12:48	0:00

Field Log: DP

Summary Log: NB



File name: PG-PDI-SC-19_dp.xls
Summary Core Log

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-20**

Maximum depth of retained sediment: 6.1 ft

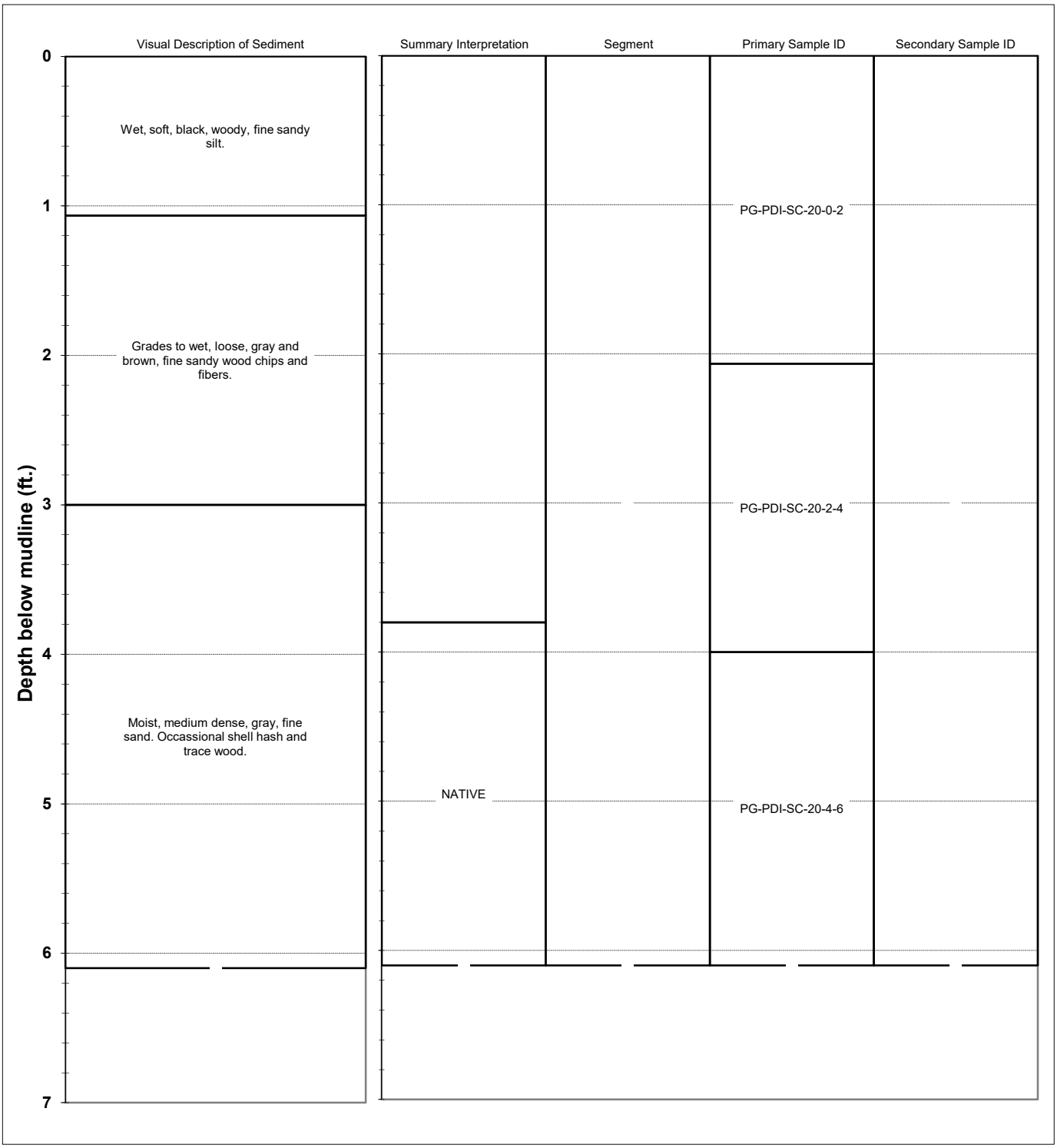
Mudline elevation: -14.6 **ft MLLW**

Percent recovery (on-deck): 77%

	Core collection	Laboratory processing
Date:	7/24/2014	7/24/2015
Time:	14:57	0:00

Field Log: DP

Summary Log: NB



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fax (425) 921-4040

File name: PG-PDI-SC-20.xls
Summary Core Log

Mudmole™ Core Summary Log

Project: Port Gamble Sediment Coring

Station: **PG-PDI-SC-21**

Maximum depth of retained sediment: 20.3 ft

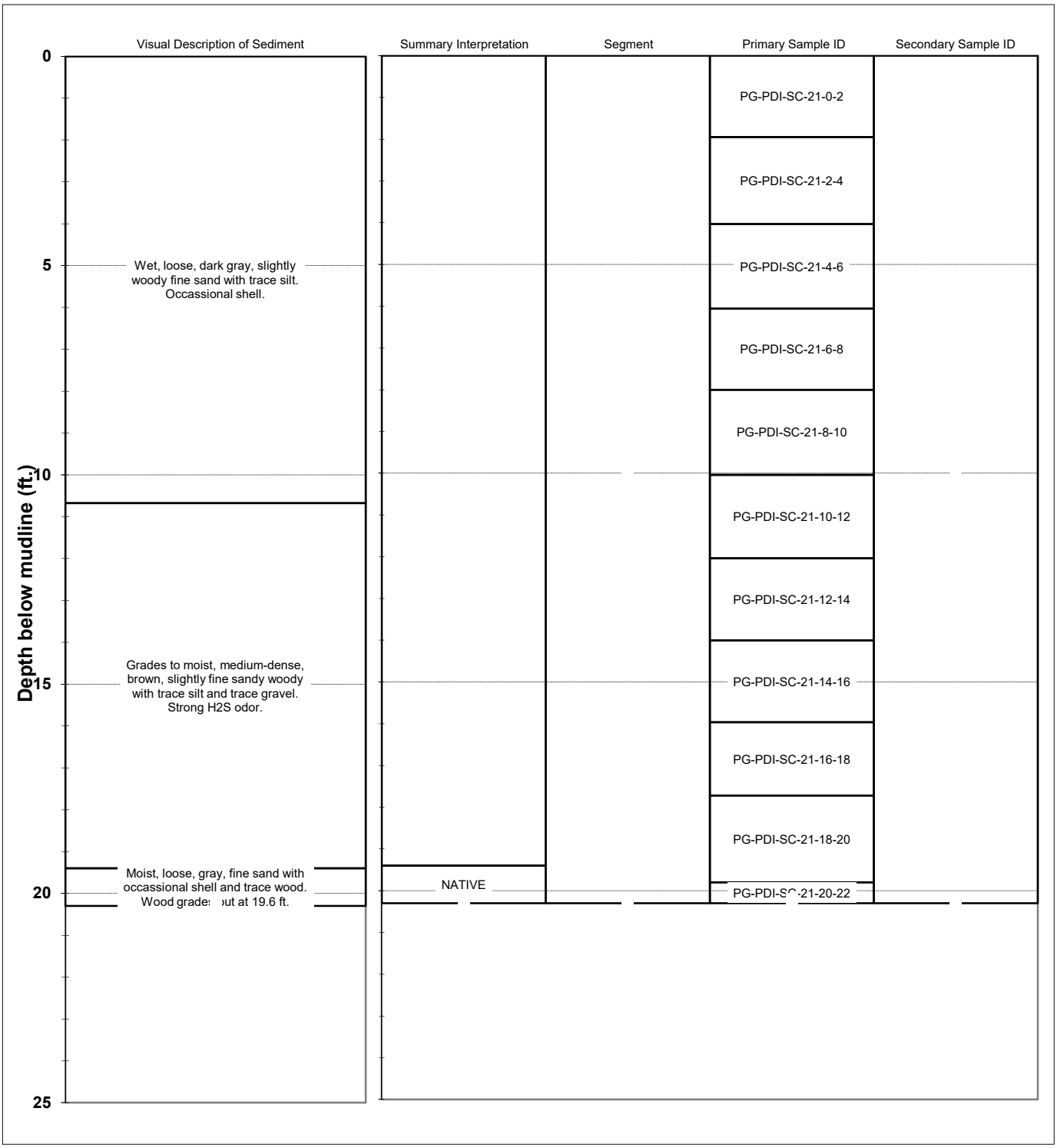
Mudline elevation: -17.2 **ft MLLW**

Percent recovery (on-deck): 53%

	Core collection	Laboratory processing
Date:	7/25/2014	7/25/2014
Time:	8:13	0:00

Field Log: DP

Summary Log: NB



File name: PG-PDI-SC-21.xls
Summary Core Log

Figure 1
Pope & Talbot -- Port Gamble
Test Pit and Boring Locations

- 250x250-foot grid
- Trees, brush
- 10-foot elevation contour
- 2-foot elevation contour
- Former building footprint (c.1995)
- Historical building footprint (approx.)
- Project boundary (soil)
- Former PCB transformer
- Fuels, lubricants, and hydraulic fluid
- Drum storage area
- Wood treatment/end seal
  - P = PCP based wood treatment
  - A = other wood treatment
  - E = end seal
- Focused area
- Concrete slab (approx. location)
- Central maintenance location (approx. location)
- Test Pit Location
- Boring Location
- Cross Section Location

Datum: Horizontal = NAD 83
Vertical = Mean Lower Low Water

Port Gamble Bay

WHARF

DOCK

Hood Canal

[1] Diesel Storage (c.1930)

[1] Train House (c. 1980)

[2] Fueling Area

[3] Wood Treatment 1

[4] End Paint 1

[5] Maintenance Area

[6] Bull Chain Area

[7] Wood Treatment 2

[8] Wood Treatment 3

[9] End Paint 2

[10] Locomotive Shed (c. 1970)

Alder Chip Mill

Planer and Sawmill Area (c.1900 - 1970)

Sawmill Area (c. 1970-1995)

Planer Building

Planer Mill and Drying Shed (c.1930)

Shipping and Storage Sheds (c.1920 - 1970)

Cooling Shed

Lumber Storage

Pellet Mill

TP-1001, TP-1002, TP-1003, TP-1004, TP-1005, TP-1006
TP-2001, TP-2002, SP-2003
TP-3001, TP-3002, TP-3003, TP-3004
TP-4001
TP-5001, TP-5002, TP-5003, TP-5004, TP-5005, TP-5006, TP-5007, SP-5008, SP-5009, SP-5010, SP-5011, TP-5016, TP-5017, SP-5012, TP-5013, TP-5014, SP-5015
TP-6001, TP-6002, TP-6003, TP-6004, SP-6005
SP-7001, SP-7003, TP-7004, TP-7002
TP-8001
TP-9001
TP-10001, TP-10002, TP-10003

Feet
0 100 200 300
Scale 1 inch = 200 feet

Prepared by Parametrix, Inc. File: p:\ecology\pope\mxd\pope_pcwtf01.grs Date: June 18, 1999

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	TP/SP NUMBER	TP-1001
PROJECT NAME	Pope & Talbot	DATE COMPLETED	February 10, 1999
LOCATION	Port Gamble Mill	TOTAL DEPTH OF BORING	8.0
COORDINATES	N 317,461 E 1,211,214	INITIAL WATER LEVEL	▽
DRILLING METHOD	Track-mounted excavator	STATIC WATER LEVEL	▼
SAMPLING METHOD	Grab	LOGGED BY	R. Skerritt
GROUND ELEVATION	16.15	TOP OF CASING ELEVATION	

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	1	SW GW		Well graded sand and gravel (SW-GW), fine to coarse sand; fine to coarse gravel, some cobbles, riprap, wood, bricks and brick fragments, moist, fill.	1	
					2				2	
					3				3	
					4				4	
					5				5	
					6				6	
0			GRAB D	G	7				7	
					8	SW		Well graded sand (SW), fine to medium grained, few shell fragments, tan and gray, very moist. End of test pit = 8'	8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER 55-2004-11 (03)
TP/SP NUMBER TP-1002
PROJECT NAME Pope & Talbot
DATE COMPLETED February 10, 1999
LOCATION Port Gamble Mill
TOTAL DEPTH OF BORING 6.0
COORDINATES N 317,436 E 1,211,198
INITIAL WATER LEVEL ▽
DRILLING METHOD Track-mounted excavator
STATIC WATER LEVEL ▼
SAMPLING METHOD Grab
LOGGED BY R. Skerritt
GROUND ELEVATION 18.49
TOP OF CASING ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	0–3	SW GW		Well graded sand and gravel (SW/GW), fine to coarse sand; fine to coarse gravel, some cobbles, wood, bricks and brick fragments, some black staining, moist, fill.	0–6	
0			GRAB D	G	3–6	SW		Well graded sand with gravel (SW), fine to coarse sand, fine to coarse gravel, some clay, shell fragments, tan and gray, moist, fill. Well graded sand, fine to medium grained, shell fragments, tan and gray, very moist.		
					6			End of test pit = 6'		

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER 55-2004-11 (03)
TP/SP NUMBER TP-1003
PROJECT NAME Pope & Talbot
DATE COMPLETED February 10, 1999
LOCATION Port Gamble Mill
TOTAL DEPTH OF BORING 11.0
COORDINATES N 317,379 E 1,211,194
INITIAL WATER LEVEL ▽ 10.0 1200
DRILLING METHOD Track-mounted excavator
STATIC WATER LEVEL ▼
SAMPLING METHOD Grab
LOGGED BY R. Skerritt
GROUND ELEVATION 17.40
TOP OF CASING ELEVATION NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
			GRAB S	G	0–5	SP GP		Poorly graded sand and gravel (SP/GP), wood chips, logs, black organic material, fill.	0–5	
0			GRAB D	G	5–11	SW		Well graded sand with gravel (SW), fine to coarse sand, subangular gravel, few cobbles, shell fragments, gray, brown, tan, wet. ▽	5–11	
					11			End of test pit = 11'	11	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

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TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	TP-1004
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 10, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	7.0
COORDINATES	N 317,353 E 1,211,210	**INITIAL WATER LEVEL**	▽
DRILLING METHOD	Track-mounted excavator	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Grab	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	14.53	**TOP OF CASING ELEVATION**	

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	1	SP		Asphalt thickness = 0.15' Poorly graded sand with gravel (SP), coarse sand, subangular, fine to coarse gravel, brown, moist, fill.	1	
					2	SW GW		Well graded sand and gravel (SW/GW), medium to coarse sand, subangular fine to coarse gravel, shell fragments, gray, most, fill.	2	
					3				3	
					4				4	
					5				5	
0			GRAB D	G	6				6	
					7			End of test pit = 7'	7	
					8				8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER 55-2004-11 (03)
PROJECT NAME Pope & Talbot
LOCATION Port Gamble Mill
COORDINATES N 317,291 E 1,211,228
DRILLING METHOD Track-mounted excavator
SAMPLING METHOD Grab
GROUND ELEVATION 14.31

TP/SP NUMBER TP-1005
DATE COMPLETED February 10, 1999
TOTAL DEPTH OF BORING 8.0
INITIAL WATER LEVEL ▽ 7.7 0920
STATIC WATER LEVEL ▼
LOGGED BY R. Skerritt
TOP OF CASING ELEVATION NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
			GRAB S	G	1	SW GW		Asphalt thickness = 0.2' Well graded sand and gravel (SW/GW), medium to coarse sand, fine to coarse gravel, shells and shell fragments, gray, moist, fill.	1	
					2	SW		Well graded sand (SW), some shell fragments, tan and gray layers, very moist.	2	
0			GRAB D	G	3				3	
					4				4	
					5				5	
					6				6	
					7			▽	7	
					8			End of test pit = 8'	8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	TP-1006
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 10, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	8.0
COORDINATES	N 317,233 E 1,211,324	**INITIAL WATER LEVEL**	▽
DRILLING METHOD	Track-mounted excavator	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Grab	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	13.89	**TOP OF CASING ELEVATION**	

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S		0–2	SW GW		Well graded sand and gravel (SW/GW), fine to coarse sand, fine to coarse gravel, well rounded, moist, light to dark brown, fill.		
					2–8	SW		Well graded sand with some gravel (SW), fine to coarse sand, fine gravel, very moist, gray and tan, fill.		
0			GRAB D		5.5–6			Black layer, no odor		
					8			End of test pit = 8'		

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER 55-2004-11 (03)
PROJECT NAME Pope & Talbot
LOCATION Port Gamble Mill
COORDINATES N 317,129 E 1,211,019
DRILLING METHOD Track-mounted excavator
SAMPLING METHOD Grab
GROUND ELEVATION 15.17

TP/SP NUMBER TP-2001
DATE COMPLETED February 11, 1999
TOTAL DEPTH OF BORING 7.0
INITIAL WATER LEVEL ▽ 5.0 0755
STATIC WATER LEVEL ▼
LOGGED BY R. Skerritt
TOP OF CASING ELEVATION NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
			GRAB S	G	1	SP		Asphalt thickness = 0.3' Poorly graded sand with some gravel and silt (SP), coarse sand, shells and shell fragments, wet, fill.	1	
					2				2	
					3				3	
					4				4	
					5				▽ 5	
0			GRAB D	G	6				6	
					7			End of test pit = 7'	7	
					8				8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	TP-2002
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 11, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	3.0
COORDINATES	N 317,090 E 1,211,005	**INITIAL WATER LEVEL**	▽
DRILLING METHOD	Track-mounted excavator	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Grab	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	14.84	**TOP OF CASING ELEVATION**	

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	1	SP		Poorly graded sand with gravel (SP), medium to coarse sand, little silt, brick fragments, gray and brown, very wet, fill.	1	
					2				2	
					3			End of test pit = 3'	3	
					4				4	
					5			No deep sample was collected because the excavator hit a water pipe and the hole was backfilled.	5	
					6				6	
					7				7	
					8				8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER 55-2004-11 (03)
TP/SP NUMBER SP-2003
PROJECT NAME Pope & Talbot
DATE COMPLETED February 15, 1999
LOCATION Port Gamble Mill
TOTAL DEPTH OF BORING 9.0
COORDINATES N 317,023 E 1,211,001
INITIAL WATER LEVEL ▽ 6.0 1220
DRILLING METHOD Soil Probe
STATIC WATER LEVEL ▼
SAMPLING METHOD Split Spoon
LOGGED BY R. Skerritt
GROUND ELEVATION 14.72
TOP OF CASING ELEVATION NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
		3	SS S		0–3	SP GP		Poorly graded sand and gravel (SP/GP), fine sand, fine gravel, some silt, brick fragments, gray, green, brown, moist, fill.	0–3	
					3–8	SP		Poorly graded sand (SP), medium to coarse, wood chips, roots, gray to brown, very moist, fill. ▽	3–8	
		3	SS D		6–7				6–7	
		3			8–9	SP GP		Poorly graded sand and gravel (SP/GP), coarse sand, fine gravel, wet.	8–9	
					9			End of soil probe = 9'	9	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	TP-3001
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 12, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	6.8
COORDINATES	N 317,066 E 1,211,371	**INITIAL WATER LEVEL**	▽ 6.7 1210
DRILLING METHOD	Track-mounted excavator	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Grab	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	13.56	**TOP OF CASING ELEVATION**	NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	1	SW GW		Asphalt thickness = 0.15' Well graded sand and gravel (SW/GW), fine to coarse sand, fine gravel, some shell fragments, tan and gray, moist, fill.	1	
					2				2	
					3				3	
					4				4	
					5			Decayed wood pilings, black.	5	
0			GRAB D	G	6	SP		Poorly graded sand with gravel (SP), coarse sand, fine gravel, shell fragments, gray, wet. ▽	6	
					7			End of test pit = 6.8'	7	
					8				8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER 55-2004-11 (03)
PROJECT NAME Pope & Talbot
LOCATION Port Gamble Mill
COORDINATES N 317,084 E 1,211,308
DRILLING METHOD Track-mounted excavator
SAMPLING METHOD Grab
GROUND ELEVATION 13.21

TP/SP NUMBER TP-3002
DATE COMPLETED February 10, 1999
TOTAL DEPTH OF BORING 7.0
INITIAL WATER LEVEL ▽ 6.5 1615
STATIC WATER LEVEL ▼
LOGGED BY R. Skerritt
TOP OF CASING ELEVATION NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	1	SW GW		Asphalt thickness = 0.15' Well graded sand and gravel (SW/GW), medium to coarse sand, fine to coarse gravel, subangular, tan and gray, moist, fill.	1	
					2				2	
					3				3	
					4				4	
					5				5	
			GRAB D	G	6			▽	6	
					7			End of test pit = 7'	7	
					8				8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER 55-2004-11 (03)
TP/SP NUMBER TP-3003
PROJECT NAME Pope & Talbot
DATE COMPLETED February 12, 1999
LOCATION Port Gamble Mill
TOTAL DEPTH OF BORING 6.5
COORDINATES N 316,991 E 1,211,288
INITIAL WATER LEVEL ▽ 6.3 1145
DRILLING METHOD Track-mounted excavator
STATIC WATER LEVEL ▼
SAMPLING METHOD Grab
LOGGED BY R. Skerritt
GROUND ELEVATION 14.06
TOP OF CASING ELEVATION NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	1	SW SM		Asphalt thickness = 0.3' Well graded sand and gravel with silt (SW-SM/GW-GM), fine to coarse sand; fine to coarse gravel, trace clay, odor, mint green, tan, brown, gray, moist, fill.	1	
					2				2	
					3	SW GW		Well graded sand and gravel (SW/GW), trace silt, fine to coarse sand, bricks, wood chips, sawdust, gray with black staining, wet, fill.	3	
					4				4	
					5				5	
0			GRAB D	G	6			▽	6	
					7			End of test pit = 6.5'	7	
					8				8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER 55-2004-11 (03)
TP/SP NUMBER TP-3004
PROJECT NAME Pope & Talbot
DATE COMPLETED February 11, 1999
LOCATION Port Gamble Mill
TOTAL DEPTH OF BORING 7.0
COORDINATES N 316,972 E 1,211,060
INITIAL WATER LEVEL ▽ 6.0 0835
DRILLING METHOD Track-mounted excavator
STATIC WATER LEVEL ▼
SAMPLING METHOD Grab
LOGGED BY R. Skerritt
GROUND ELEVATION 14.14
TOP OF CASING ELEVATION NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	1	SW GW		Asphalt thickness = 0.2' Well graded sand and gravel (SW/GW), fine to coarse sand, fine to medium gravel, subangular, shells and shell fragments, tan and gray, fill.	1	
					2				2	
					3				3	
					4				4	
					5				5	
			GRAB D	G	6				▽ 6	
					7			End of test pit = 7'	7	
					8				8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER 55-2004-11 (03)
TP/SP NUMBER TP-4001
PROJECT NAME Pope & Talbot
DATE COMPLETED February 10, 1999
LOCATION Port Gamble Mill
TOTAL DEPTH OF BORING 7.5
COORDINATES N 317,006 E 1,211,668
INITIAL WATER LEVEL ▽ 7.0 1305
DRILLING METHOD Track-mounted excavator
STATIC WATER LEVEL ▼
SAMPLING METHOD Grab
LOGGED BY R. Skerritt
GROUND ELEVATION 14.18
TOP OF CASING ELEVATION NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	1	SW GW		Asphalt thickness = 0.15' Well graded sand and gravel (SW/GW), fine to coarse sand, subangular, fine to coarse gravel, tan and brown, moist, fill.	1	
					2	SW		Well graded sand with gravel (SW), fine to coarse sand, subangular fine to coarse gravel, tan and gray, moist, fill.	2	
					3				3	
					4	SP GP		Poorly graded sand and gravel (SP/GP), coarse sand, medium to coarse gravel, some cobbles, shells and shell fragments, gray, wet.	4	
					5				5	
					6				6	
0			GRAB D	G	7			▽	7	
					8			End of test pit = 7.5'	8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

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TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	TP-5001
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 10, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	5.5
COORDINATES	N 316,710 E 1,211,550	**INITIAL WATER LEVEL**	▽
DRILLING METHOD	Track-mounted excavator	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Grab	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	14.81	**TOP OF CASING ELEVATION**	

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	1	SP GP		Poorly graded sand and gravel (SP/GP), coarse sand, medium to coarse gravel, bricks, concrete chunks, pilings, concrete wall along east side of pit, dark brown, moist, fill.	1	
					2				2	
					3				3	
					4				4	
0			GRAB D	G	5				5	
					6			End of test pit = 5.5'	6	
					7				7	
					8				8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

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TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	TP-5002
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 10, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	7.0
COORDINATES	N 316,925 E 1,211,519	**INITIAL WATER LEVEL**	▽ 6.9 1530
DRILLING METHOD	Track-mounted excavator	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Grab	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	15.56	**TOP OF CASING ELEVATION**	NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	1	SW GW		Well graded sand and gravel (SW/GW), fine to coarse sand, subangular fine to coarse gravel, metal scraps, green and tan, moist, fill.	1	
					2				2	
					3				3	
					4				4	
					5				5	
					6				6	
0			GRAB D	G	7			▽ End of test pit = 7'	7	
					8				8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	TP-5003
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 10, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	7.0
COORDINATES	N 316,830 E 1,211,574	**INITIAL WATER LEVEL**	▽
DRILLING METHOD	Track-mounted excavator	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Grab	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	14.71	**TOP OF CASING ELEVATION**	

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
						GW GC		Well graded gravel with clay (GW-GC), subangular, fine to coarse gravel, some cobbles, gray and green, most, fill.		
0			GRAB S	G	1	SP		Poorly graded sand with gravel (SP), fine sand, subangular medium to coarse gravel, moist, fill.	1	
					2				2	
					3				3	
					4				4	
					5				5	
0			GRAB D	G	6	MH		Elastic silt (MH), rubbery in appearance, very fine, black, moist.	6	
						SP GP		Poorly graded sand and gravel (SP/GP), coarse sand, medium to coarse gravel, gray, wet.		
					7			End of test pit = 7'	7	
					8				8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

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TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	TP-5004
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 10, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	7.0
COORDINATES	N 316,877 E 1,211,463	**INITIAL WATER LEVEL**	▽
DRILLING METHOD	Track-mounted excavator	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Grab	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	15.17	**TOP OF CASING ELEVATION**	

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	1	SW GW		Well graded sand and gravel (SW/GW), fine to coarse sand, subrounded fine to coarse gravel, concrete walls on two sides and bottom, wood, moist, fill.	1	
					2				2	
					3				3	
					4				4	
					5				5	
0			GRAB D	G	6				6	
					7			End of test pit = 7'	7	
					8				8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

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TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	TP-5005
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 10, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	7.0
COORDINATES	N 316,715 E 1,211,434	**INITIAL WATER LEVEL**	▽ 6.8 1435
DRILLING METHOD	Track-mounted excavator	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Grab	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	14.22	**TOP OF CASING ELEVATION**	NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	0–2	SW GW		Well graded sand and gravel (SW/GW), fine to coarse sand, fine to coarse gravel, brown-tan, moist, fill.	0–7	
					2–7	SW		Well graded sand with gravel (SW), fine to medium sand, medium gravel, brown and gray, moist to wet, fill. ▽		
			GRAB D	G	7			End of test pit = 7'	7–15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

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TEST PIT/SOIL PROBE LOG

PROJECT NUMBER 55-2004-11 (03)
PROJECT NAME Pope & Talbot
LOCATION Port Gamble Mill
COORDINATES N 316,967 E 1,211,419
DRILLING METHOD Track-mounted excavator
SAMPLING METHOD Grab
GROUND ELEVATION 14.75

TP/SP NUMBER TP-5006
DATE COMPLETED February 10, 1999
TOTAL DEPTH OF BORING 6.0
INITIAL WATER LEVEL ▽
STATIC WATER LEVEL ▼
LOGGED BY R. Skerritt
TOP OF CASING ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	0–5	SW GW		Well graded sand and gravel (SW/GW), fine to coarse sand, fine to coarse gravel, some cobbles, tan, gray, black staining, moist, fill.	0–5	
0			GRAB D	G	5–6	SP		Poorly graded sand with gravel (SP), coarse sand, fine to medium subangular gravel, shells and shell fragments, very moist.	5–6	
					6			End of test pit = 6'	6	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

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TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	TP-5007
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 11, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	5.7
COORDINATES	N 316,901 E 1,211,412	**INITIAL WATER LEVEL**	▽
DRILLING METHOD	Track-mounted excavator	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Grab	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	14.35	**TOP OF CASING ELEVATION**	

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
								Asphalt thickness = 0.3'		
0			GRAB S	G	1	SP GP		Poorly graded sand and gravel (SP/GP), fine sand, brick pieces, dark brown, moist, fill.	1	
					2	SW GW		Well graded sand and gravel (SW/GW) fine to coarse sand, fine to coarse gravel, some cobbles, tan and black, moist, fill.	2	
						SW		Well graded sand with some gravel (SW), small to medium sand, small to medium gravel, subangular gravel gray/green, moist, fill.		
0			GRAB D	G	5				5	
					6			End of test pit = 5.7'	6	
					7				7	
					8				8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

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TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	SP-5008
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 15, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	12.0
COORDINATES	N 316,945 E 1,211,376	**INITIAL WATER LEVEL**	▽ 7.0 1020
DRILLING METHOD	Soil Probe	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Split Spoon	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	15.25	**TOP OF CASING ELEVATION**	NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0		1	SS S		1–2	SP		Poorly sorted sand with some gravel (SP), fine to medium sand, tan and green, moist, fill.	1–2	
					3	SP GP		Poorly sorted sand and gravel (SP/GP), fine sand, fine to medium gravel, wood and bricks, moist, fill.	3	
		2			4–5				4–5	
					6	SP SM		Poorly sorted sand with some silt and gravel (SP/SM), fine sand, wood chips, very wet, fill.	6	
					7				▽ 7	
					8–9				8–9	
		1	SS D		10–11				10–11	
					12			End of soil probe = 12'	12	
					13–15				13–15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	SP-5009
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 15, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	9.0
COORDINATES	N 316,865 E 1,211,309	**INITIAL WATER LEVEL**	▽
DRILLING METHOD	Soil Probe	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Split Spoon	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	15.50	**TOP OF CASING ELEVATION**	

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
		2	SS S		1	SP GP		Poorly sorted sand and gravel (SP/GP), fine to medium sand, medium gravel, brick and brick fragments, wood chips, tan and gray, moist, fill.	1	
					2				2	
					3				3	
					4				4	
		2			5				5	
0			SS D		6	SP		Poorly sorted sand (SP), coarse sand, gray, very moist, shell fragments.	6	
		2			7				7	
					8				8	
					9			End of soil probe = 9'	9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	SP-5010
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 15, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	9.0
COORDINATES	N 316,735 E 1,211,314	**INITIAL WATER LEVEL**	▽ 6.5 1050
DRILLING METHOD	Soil Probe	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Split Spoon	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	15.22	**TOP OF CASING ELEVATION**	NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0		2	SS S		1	SP GP		Poorly graded sand and gravel (SP/GP), fine to medium sand, fine gravel, some shell fragments, wood chips, tan to dark gray, moist, fill.	1	
					2				2	
					3				3	
					4				4	
		1			5				5	
					6	SW GW		Well graded sand and gravel (SW/GW), fine to coarse sand, fine to coarse gravel,some shell fragments, dark gray, very wet, fill. ▽	6	
0		1	SS D		7				7	
					8				8	
					9	SP		Poorly graded sand with some gravel (SP), coarse sand, fine to medium subangular gravel, shells and shell fragments, very wet.	9	
					10			End of soil probe = 9'	10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	SP-5011
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 15, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	9.0
COORDINATES	N 316,598 E 1,211,312	**INITIAL WATER LEVEL**	▽ 7.0 0935
DRILLING METHOD	Soil Probe	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Split Spoon	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	15.47	**TOP OF CASING ELEVATION**	NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
					0	SW GW		Well graded sand and gravel (SW/GW), fine to coarse sand, fine to coarse gravel, subangular, tan, moist, fill.	0	
0		1	SS S		1				1	
					2				2	
					3	SW		Well graded sand (SW), coarse to fine sand, few shell fragments, tan and light gray, wet.	3	
					4				4	
0		2	SS D		5				5	
					6				6	
					7				▽ 7	
		2			8				8	
					9			End of soil probe = 9'	9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER 55-2004-11 (03)
PROJECT NAME Pope & Talbot
LOCATION Port Gamble Mill
COORDINATES N 316,879 E 1,211,224
DRILLING METHOD Soil Probe
SAMPLING METHOD Split Spoon
GROUND ELEVATION 15.55

TP/SP NUMBER SP-5012
DATE COMPLETED February 15, 1999
TOTAL DEPTH OF BORING 9.0
INITIAL WATER LEVEL ▽ 8.0 1145
STATIC WATER LEVEL ▼
LOGGED BY R. Skerritt
TOP OF CASING ELEVATION NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0		2	SS S		1	SP		Poorly graded sand (SP), fine to medium, shell fragments, black striations, tan and green, moist, fill.	1	
					2	ML		Silt (ML), brown and black, brick fragments, moist, fill.	2	
					3	SP GP		Poorly graded sand and gravel (SP/GP), fine sand, fine to coarse gravel, subangular, brick fragments, shell fragments, tan and green, moist, fill.	3	
		2			4				4	
					5				5	
0			SS D		6				6	
					7				7	
					8	SP		▽ Poorly graded sand (SP), coarse sand, shell fragments, little fine gravel, gray, wet.	8	
					9			End of soil probe = 9'	9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	TP-5013
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 12, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	6.0
COORDINATES	N 316,838 E 1,211,156	**INITIAL WATER LEVEL**	▽ 5.7 1120
DRILLING METHOD	Track-mounted excavator	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Grab	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	15.11	**TOP OF CASING ELEVATION**	NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	1	SP GP		Asphalt thickness = 0.2" Poorly graded sand with gravel (SP/GP), some silt, fine to medium sand, fine to coarse gravel, some shell fragments, tan/brown, moist, fill.	1	
					2			Poorly graded sand and gravel, fine sand, fine to medium gravel, subangular, black stained, moist, fill.	2	
					3				3	
					4			Sawdust, wood chips	4	
0			GRAB D	G	5	SP		Poorly graded sand with some gravel (SP), coarse sand, shell fragments, gray, moist. ▽	5	
					6			End of test pit = 6'	6	
					7				7	
					8				8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	TP-5014
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 12, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	6.5
COORDINATES	N 316,771 E 1,211,155	**INITIAL WATER LEVEL**	▽ 6.0 1020
DRILLING METHOD	Track-mounted excavator	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Grab	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	15.61	**TOP OF CASING ELEVATION**	NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	1	SP GP		Gravel thickness = 0.2' Poorly graded sand and gravel (SP/GP), fine sand, fine to coarse gravel, subangular, trace clay, shell fragments, tan and gray/green, moist, fill.	1	
					2				2	
					3				3	
					4	SP		Poorly graded sand and gravel, fine sand, fine to coarse gravel, subangular shell fragments, black organic layer, moist, fill. Poorly graded sand with some gravel (SP), coarse sand, fine gravel, shell fragments, gray, wet.	4	
					5				5	
0			GRAB D	G	6			▽	6	
					7			End of test pit = 6.5'	7	
					8				8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER 55-2004-11 (03)
TP/SP NUMBER SP-5015
PROJECT NAME Pope & Talbot
DATE COMPLETED February 15, 1999
LOCATION Port Gamble Mill
TOTAL DEPTH OF BORING 9.0
COORDINATES N 316,572 E 1,211,233
INITIAL WATER LEVEL ▽ 6.0 0915
DRILLING METHOD Soil Probe
STATIC WATER LEVEL ▼
SAMPLING METHOD Split Spoon
LOGGED BY R. Skerritt
GROUND ELEVATION 15.49
TOP OF CASING ELEVATION NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0		2	SS S		1	SP GP		Poorly graded sand and gravel (SP/GP), fine to medium sand, medium gravel, shell fragments, wood chips, bricks and brick fragments, gray and tan, black staining, moist to wet, fill.	1	
					2				2	
					3				3	
					4				4	
		2			5				5	
0			SS D		6				▽ 6	
					7				7	
		3			8				8	
					9	SP		Poorly graded sand with some gravel (SP), coarse sand, shell fragments, gray, wet. End of soil probe = 9'	9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	TP-5016
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 11, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	5.8
COORDINATES	N 316,641 E 1,211,371	**INITIAL WATER LEVEL**	▽ 5.5 0940
DRILLING METHOD	Track-mounted excavator	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Grab	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	14.36	**TOP OF CASING ELEVATION**	NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	1	SP GP		Asphalt thickness = 0.2' Poorly graded sand and gravel (SP/GP), fine sand, fine gravel, subangular, gray and black and tan, fill.	1	
					2	SP		Poorly graded sand with some gravel (SP), coarse sand, shell fragments, gray, wet.	2	
					3				3	
					4				4	
0			GRAB D	G	5			▽	5	
					6			End of test pit = 5.5'	6	
					7				7	
					8				8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	TP-5017
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 11, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	9.5
COORDINATES	N 316,901 E 1,211,320	**INITIAL WATER LEVEL**	▽ 6.7 1010
DRILLING METHOD	Track-mounted excavator	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Grab	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	14.60	**TOP OF CASING ELEVATION**	NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S		1	SW		Well graded sand with some gravel (SW), fine to coarse sand, bricks, wood debris, green and tan, moist, fill.	1	
					2				2	
					3				3	
					4			Well graded sand (SW), fine to coarse sand, bricks, sawdust, brown-red, wet, fill.	4	
					5				5	
0			GRAB D		6				6	
					7			▽	7	
					8				8	
					9				9	
						SP GP		Poorly graded sand and gravel (SP/GP), coarse sand, medium to coarse gravel, shells and shell fragments, gray, wet.		
					10			End of test pit = 9.5'	10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	TP-6001
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 12, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	6.5
COORDINATES	N 316,518 E 1,211,202	**INITIAL WATER LEVEL**	▽ 6.0 1010
DRILLING METHOD	Track-mounted excavator	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Grab	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	15.15	**TOP OF CASING ELEVATION**	NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S		1	SP GP		Asphalt thickness = 0.2' Poorly graded sand and gravel (SP/GP), coarse sand, fine to medium gravel, some cobbles, some wood debris, tan and orange, moist, fill.	1	
					2			Black layer with hydrocarbon odor.	2	
					3			Fine gravel, shell fragments, gray, wet.	3	
0			GRAB D		4				4	
					5				5	
					6			▽	6	
					7			End of test pit = 6.5'	7	
					8				8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	TP-6002
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 12, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	6.7
COORDINATES	N 316,532 E 1,211,118	**INITIAL WATER LEVEL**	▽ 6.5 0935
DRILLING METHOD	Track-mounted excavator	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Grab	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	14.38	**TOP OF CASING ELEVATION**	NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S		1	SW GW		Asphalt thickness = 0.3' Well graded sand and gravel (SW/GW), fine to coarse sand, tan, moist, fill.	1	
					2				2	
					3	SP		Poorly graded sand (SP), coarse sand, shell fragments, gray, wet.	3	
			GRAB D		4				4	
					5				5	
					6			▽	6	
					7			End of test pit = 6.7'	7	
					8				8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER 55-2004-11 (03) | **TP/SP NUMBER** TP-6003

PROJECT NAME Pope & Talbot | **DATE COMPLETED** February 12, 1999

LOCATION Port Gamble Mill | **TOTAL DEPTH OF BORING** 7.0

COORDINATES N 316,398 E 1,211,118 | **INITIAL WATER LEVEL** ▽ 6.5 0850

DRILLING METHOD Track-mounted excavator | **STATIC WATER LEVEL** ▼

SAMPLING METHOD Grab | **LOGGED BY** R. Skerritt

GROUND ELEVATION 16.29 | **TOP OF CASING ELEVATION** NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
			GRAB S		0–4	SW GW		Well graded sand and gravel (SW/GW), fine to coarse sand, fine to coarse gravel, some cobbles, shell fragments, brown and gray, moist, fill.		
								Well graded sand, some gravel, fine to coarse sand, fine gravel, brown, tree roots, moist, fill.		
0			GRAB D		4–7	SP		Poorly graded sand (SP), coarse sand, shell fragments, gray, wet. ▽		
					7			End of test pit = 7'		

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER 55-2004-11 (03)
PROJECT NAME Pope & Talbot
LOCATION Port Gamble Mill
COORDINATES N 316,393 E 1,211,073
DRILLING METHOD Track-mounted excavator
SAMPLING METHOD Grab
GROUND ELEVATION 16.11

TP/SP NUMBER TP-6004
DATE COMPLETED February 12, 1999
TOTAL DEPTH OF BORING 7.5
INITIAL WATER LEVEL ▽ 7.0 0905
STATIC WATER LEVEL ▼
LOGGED BY R. Skerritt
TOP OF CASING ELEVATION NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S		1	SW GW		Well graded sand and gravel (SW/GW), fine to coarse sand, fine to coarse gravel, some cobbles, some shell fragments, green/tan, moist, fill.	1	
					2	SW SC		Well graded sand and clay (SW/SC), fine to medium sand, shell fragments, light gray, moist, fill.	2	
					3				3	
					4	SP GP		Poorly graded sand with some gravel (SP/GP), coarse sand, shell fragments, gray, wet.	4	
0			GRAB D		5				5	
					6				6	
					7			▽	7	
					8			End of test pit = 7.5'	8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER 55-2004-11 (03) | **TP/SP NUMBER** SP-6005

PROJECT NAME Pope & Talbot | **DATE COMPLETED** February 15, 1999

LOCATION Port Gamble Mill | **TOTAL DEPTH OF BORING** 9.0

COORDINATES N 316,388 E 1,211,033 | **INITIAL WATER LEVEL** ▽ 8.0 0820

DRILLING METHOD Soil Probe | **STATIC WATER LEVEL** ▼

SAMPLING METHOD Split Spoon | **LOGGED BY** R. Skerritt

GROUND ELEVATION 16.93 | **TOP OF CASING ELEVATION** NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0		2	SS S		1	SP GP		Poorly graded sand with gravel (SP/GP), fine to medium sand, fine gravel, some shell fragments, wood pilings, tan/gray/dark gray, moist, fill.	1	
					2				2	
					3				3	
					4				4	
		2			5				5	
					6				6	
					7	SP		Poorly graded sand (SP), coarse sand, shell fragments, gray, wet, slight odor and sheen.	7	
		2	SS D		8			▽	8	
					9			End of soil probe = 9'	9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER 55-2004-11 (03)
TP/SP NUMBER SP-7001
PROJECT NAME Pope & Talbot
DATE COMPLETED February 15, 1999
LOCATION Port Gamble Mill
TOTAL DEPTH OF BORING 9.0
COORDINATES N 316,159 E 1,211,054
INITIAL WATER LEVEL ▽ 7.0 1120
DRILLING METHOD Soil Probe
STATIC WATER LEVEL ▼
SAMPLING METHOD Split Spoon
LOGGED BY R. Skerritt
GROUND ELEVATION 16.62
TOP OF CASING ELEVATION NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0		2	SS S		1	SP		Poorly graded sand (SP), fine to medium sand, shell fragments, tan and gray layers, moist to wet, fill.	1	
					2				2	
					3				3	
					4				4	
0		2			5				5	
					6				6	
		2	SS D		7	SP GP		▽ Poorly graded sand with gravel (SP/GP), coarse sand, fine gravel, shell fragments, dark gray, wet.	7	
					8				8	
					9			End of soil probe = 9'	9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	TP-7002
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 11, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	5.0
COORDINATES	N 316,158 E 1,210,967	**INITIAL WATER LEVEL**	▽
DRILLING METHOD	Track-mounted excavator	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Grab	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	16.19	**TOP OF CASING ELEVATION**	

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
								Asphalt thickness = 0.4'		
0			GRAB S	G	1	GW		Well graded gravel with some sand (GW), subangular, some fines, tan, moist, fill.	1	
					2	SP		Poorly graded sand (SP), coarse sand, with shell fragments, gray, wet.	2	
					3				3	
					4				4	
0			GRAB D	G	5			End of test pit = 5'	5	
					6				6	
					7				7	
					8			Note: water rushing into hole from surface, water level unreliable.	8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	SP-7003
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 15, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	9.0
COORDINATES	N 316,242 E 1,211,044	**INITIAL WATER LEVEL**	▽ 7.5 0915
DRILLING METHOD	Soil Probe	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Split Spoon	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	16.76	**TOP OF CASING ELEVATION**	NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0		2	SS S		1	SW		Well graded sand (SW), fine to coarse grained sand, shell fragments, tan and gray layers, moist, fill.	1	
					2				2	
					3				3	
					4				4	
0		2			5	CL		Clay (CL), green/gray	5	
					6	SP		Poorly graded sand (SP), coarse sand, with shell fragments, gray, wet.	6	
		2	SS D		7			▽	7	
					8				8	
					9			End of soil probe = 9'	9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	TP-7004
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 11, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	7.3
COORDINATES	N 316,108 E 1,211,021	**INITIAL WATER LEVEL**	▽ 7.0 1140
DRILLING METHOD	Track-mounted excavator	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Grab	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	16.25	**TOP OF CASING ELEVATION**	NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	1	SP GP		Asphalt thickness = 0.4' Poorly graded sand and gravel (SP/GP), fine sand, fine subangular gravel, tan, green, moist, fill.	1	
					2	SP		Poorly graded sand (SP), coarse sand, shell fragments, gray, wet.	2	
0			GRAB D	G	3				3	
					4				4	
					5				5	
					6				6	
					7			▽	7	
					8			End of test pit = 7.3'	8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	TP-8001
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 11, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	10.0
COORDINATES	N 315,962 E 1,210,908	**INITIAL WATER LEVEL**	▽ 9.8 1220
DRILLING METHOD	Track-mounted excavator	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Grab	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	17.63	**TOP OF CASING ELEVATION**	NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S		1	SP		Poorly graded sand (SP), fine to medium sand, tan, moist, fill.	1	
					2				2	
					3			Coarse sand, some shells and shell fragments, gray and tan, moist, fill.	3	
					4				4	
					5	CL		Clay (CL), dark gray.	5	
			GRAB D		6	SP		Poorly graded sand (SP), coarse sand, shell fragments, gray, wet.	6	
					7				7	
					8				8	
					9			▽	9	
					10			End of test pit = 10'	10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER 55-2004-11 (03) | **TP/SP NUMBER** TP-9001

PROJECT NAME Pope & Talbot | **DATE COMPLETED** February 11, 1999

LOCATION Port Gamble Mill | **TOTAL DEPTH OF BORING** 8.0

COORDINATES N 315,865 E 1,210,988 | **INITIAL WATER LEVEL** ▽ 7.8 1330

DRILLING METHOD Track-mounted excavator | **STATIC WATER LEVEL** ▼

SAMPLING METHOD Grab | **LOGGED BY** R. Skerritt

GROUND ELEVATION 17.06 | **TOP OF CASING ELEVATION** NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	0–1	SP GP		Poorly graded sand and gravel (SP/GP), fine sand, fine to medium gravel, brown, moist, fill.	0–1	
					1–4	SW		Well graded sand (SW), fine to coarse sand, shell fragments, tannish green, moist, fill.	1–4	
					4–7	SP SC		Poorly graded sand with some clay (SP/SC), fine sand, gray/tan, moist, fill.	4–7	
0			GRAB D	G	7–8	SP		Poorly graded sand (SP), coarse sand, shell fragments, gray, wet. ▽	7–8	
					8			End of test pit = 8'	8	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER 55-2004-11 (03)
PROJECT NAME Pope & Talbot
LOCATION Port Gamble Mill
COORDINATES N 315,816 E 1,210,791
DRILLING METHOD Track-mounted excavator
SAMPLING METHOD Grab
GROUND ELEVATION 16.70

TP/SP NUMBER TP-10001
DATE COMPLETED February 11, 1999
TOTAL DEPTH OF BORING 7.0
INITIAL WATER LEVEL ▽ 6.5 1530
STATIC WATER LEVEL ▼
LOGGED BY R. Skerritt
TOP OF CASING ELEVATION NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
								Asphalt thickness = 0.3'		
0			GRAB S	G	1	SW GW		Well graded sand and gravel (SW/GW), fine to coarse sand and gravel, some silt, trace clay, red, brown, moist, fill.	1	
					2	SC		Poorly graded sand with clay (SC), fine sand, some gravel, fine to coarse gravel, gray, moist.	2	
					3	SP		Poorly graded sand (SP), coarse sand, shell fragments, gray, wet.	3	
0			GRAB D	G	6			▽	6	
					7			End of test pit = 7'	7	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER 55-2004-11 (03)
TP/SP NUMBER TP-10002
PROJECT NAME Pope & Talbot
DATE COMPLETED February 11, 1999
LOCATION Port Gamble Mill
TOTAL DEPTH OF BORING 5.0
COORDINATES N 315,752 E 1,210,777
INITIAL WATER LEVEL ▽ 4.5 1455
DRILLING METHOD Track-mounted excavator
STATIC WATER LEVEL ▼
SAMPLING METHOD Grab
LOGGED BY R. Skerritt
GROUND ELEVATION 15.68
TOP OF CASING ELEVATION NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	1	SP GP		Poorly graded sand and gravel (SP/GP), medium to coarse sand, fine gravel, some silt, tan, gray, dark brown, black staining, moist, fill.	1	
					2				2	
					3				3	
					4	SP		Poorly graded sand (SP), coarse, shell fragments, gray and green, wet. ▽	4	
0			GRAB D	G	5			End of test pit = 5'	5	
					6				6	
					7				7	
					8			Note: Hole won't stay open, water seeping in at 3'.	8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99

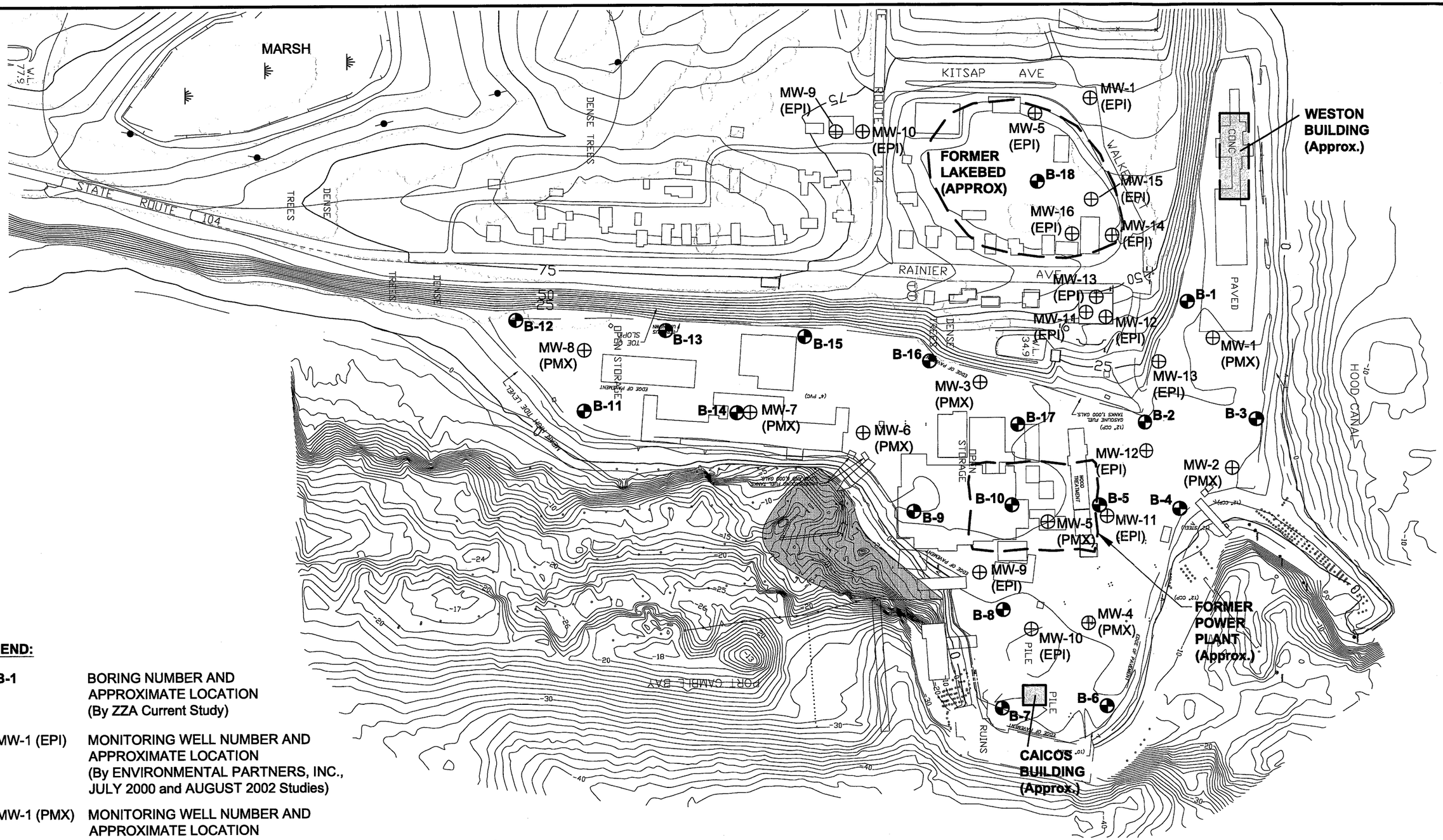
Parametrix, Inc.

TEST PIT/SOIL PROBE LOG

PROJECT NUMBER	55-2004-11 (03)	**TP/SP NUMBER**	TP-10003
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	February 11, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	5.3
COORDINATES	N 315,722 E 1,210,779	**INITIAL WATER LEVEL**	▽ 4.9 1430
DRILLING METHOD	Track-mounted excavator	**STATIC WATER LEVEL**	▼
SAMPLING METHOD	Grab	**LOGGED BY**	R. Skerritt
GROUND ELEVATION	16.28	**TOP OF CASING ELEVATION**	NA

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
0			GRAB S	G	1	SP GP		Poorly graded sand with some gravel (SP/GP), fine sand, fine to coarse gravel, subangular, some silt, dark brown, some organic material, very wet, fill.	1	
					2				2	
					3				3	
					4				4	
0			GRAB D	G	5	SW		▽ Well graded sand (SW), fine to coarse sand, tan and gray, shell fragments, very wet. End of test pit = 5.3'	5	
					6			Note: Hole will not stay open because water seeping in from surface.	6	
					7				7	
					8				8	
					9				9	
					10				10	
					11				11	
					12				12	
					13				13	
					14				14	
					15				15	

TEST PIT LOG PORTGAMB.GPJ 4/13/99



LEGEND:

◓ B-1	BORING NUMBER AND APPROXIMATE LOCATION (By ZZA Current Study)
⊕ MW-1 (EPI)	MONITORING WELL NUMBER AND APPROXIMATE LOCATION (By ENVIRONMENTAL PARTNERS, INC., JULY 2000 and AUGUST 2002 Studies)
⊕ MW-1 (PMX)	MONITORING WELL NUMBER AND APPROXIMATE LOCATION (By PARAMETRIX, INC., JULY 1999 Study)

NOTE:

LOCATIONS OF MONITORING WELLS WERE PROVIDED BY ENVIRONMENTAL PARTNERS, INC.

0 250 500

APPROXIMATE SCALE IN FEET

Zipper Zeman Associates, Inc.
Geotechnical and Environmental Consulting

18905 33rd Avenue West, Suite 117
Lynnwood, Washington 98036
Tele: (425) 771-3304 Fax: (425) 771-3549

Project No: J-2238-03

Drawn by:J. Duncan

Date: May, 2006

Scale: As Noted

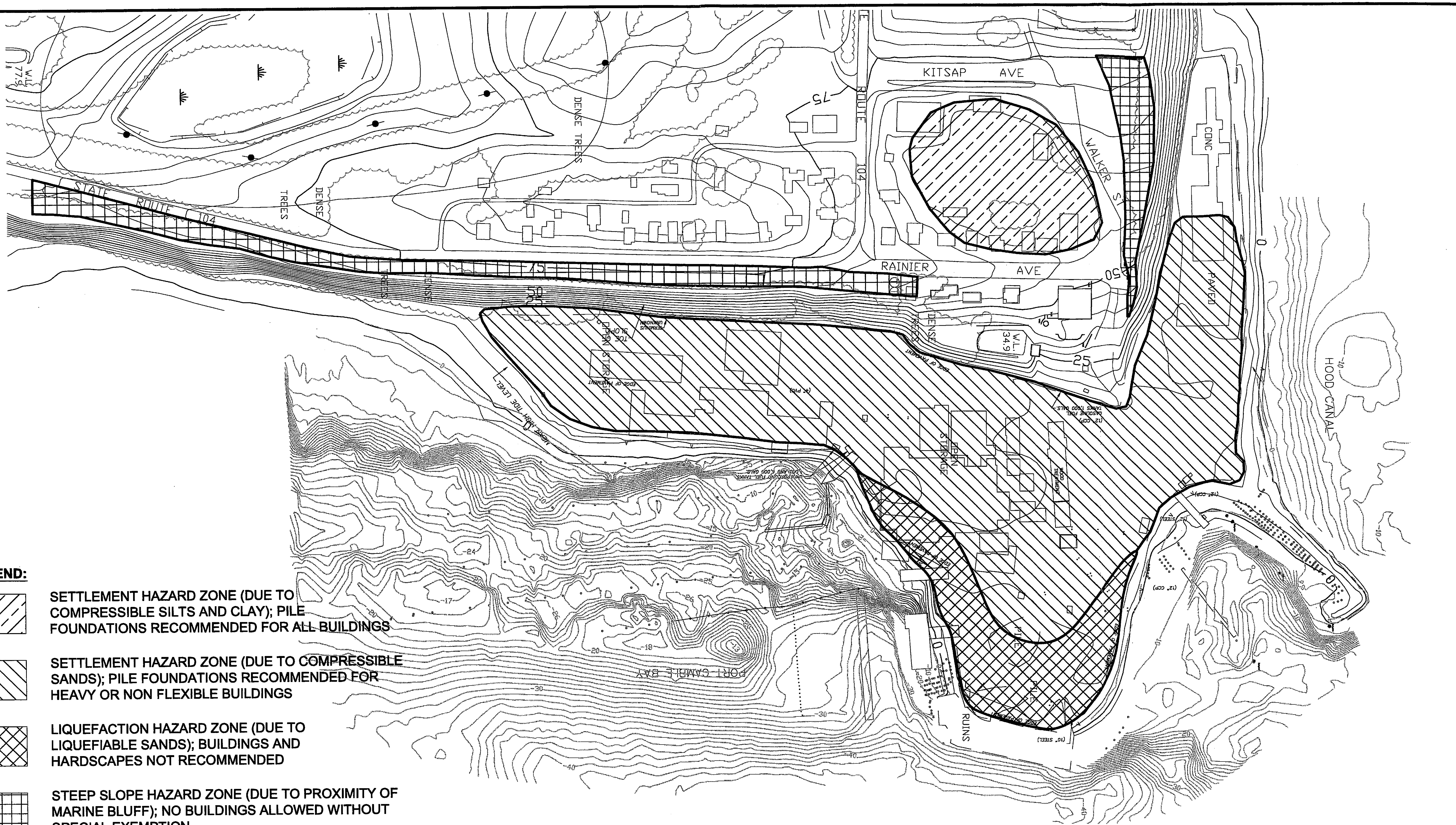
Port Gamble Multi - Use Development
Port Gamble, Washington

FIGURE 2 - SITE AND EXPLORATION PLAN

Basemap DWG File Provided by ENVIRONMENTAL PARTNERS INC., dated 12/5/05 and modified by ZZA

E:\Shared files_Current Projects\2200s\J-2238\Fig4.dwg 02/

E:\Shared files_Current Projects\2200s\J-2238\Fig4.dwg 02/2



LEGEND:

SETTLEMENT HAZARD ZONE (DUE TO COMPRESSIBLE SILTS AND CLAY); PILE FOUNDATIONS RECOMMENDED FOR ALL BUILDINGS

SETTLEMENT HAZARD ZONE (DUE TO COMPRESSIBLE SANDS); PILE FOUNDATIONS RECOMMENDED FOR HEAVY OR NON FLEXIBLE BUILDINGS

LIQUEFACTION HAZARD ZONE (DUE TO LIQUEFIABLE SANDS); BUILDINGS AND HARDSCAPES NOT RECOMMENDED

STEEP SLOPE HAZARD ZONE (DUE TO PROXIMITY OF MARINE BLUFF); NO BUILDINGS ALLOWED WITHOUT SPECIAL EXEMPTION

NOTE:

ALL HAZARD ZONES ARE APPROXIMATE AND INTENDED FOR PRE-DESIGN PLANNING PURPOSES ONLY; SITE - SPECIFIC GEOTECHNICAL EVALUATIONS WILL BE REQUIRED FOR DESIGN PURPOSES.

0 250 500
APPROXIMATE SCALE IN FEET

ZZA
Zipper Zeman Associates, Inc.
Geotechnical and Environmental Consulting
18905 33rd Avenue West, Suite 117
Lynnwood, Washington 98036
Tele: (425) 771-3304 Fax: (425) 771-3549

Project No: J-2238-03
Drawn by:J. Duncan
Date: May, 2006
Scale: As Noted

Port Gamble Multi - Use Development
Port Gamble, Washington

FIGURE 3 - SITE HAZARD PLAN

Basemap DWG File Provided by ENVIRONMENTAL PARTNERS INC., dated 12/5/05 and modified by ZZA

TABLE 2
SUMMARY OF STRATIGRAPHIC SITE DATA
FOR CURRENT ZZA STUDY

Boring	Thickness of Granular Fill Soil (feet)	Thickness of Wood-Laden Fill Soil (feet)	Thickness of Upper Loose Marine Sand (feet)	Depth to Medium Dense or Stiff Marine Soil (feet)	Depth to Dense or Hard Glacial Soil (feet)
B-1	5	6	0	11	16
B-2	5½	5	5½	16	N/E
B-3	5	15	0	N/O	20
B-4	10	10	0	20	31
B-5	13½	6½	0	20	27
B-6	16	0	5	21*	67
B-7	5	11½	33½	50	N/E
B-8	9	3	0	12**	N/E
B-9	12	4	19	N/O	35
B-10	20	0	0	N/O	20
B-11	20	0	0	20	25
B-12	16	0	0	N/O	16
B-13	9½	0	6½	N/O	16
B-14	6½	0	2½	9	20
B-15	7	2	0	N/O	9
B-16	7	0	0	7	20½
B-17	7	4	0	11	21

Note: All stratigraphic measurements are based on interpretation of gradual or undulating soil contacts and should be regarded only as approximate or average values.
N/E = not encountered within depth of exploration, but possibly present at greater depth.
N/O = not observed in soil samples, but possibly present between sample intervals.
* Underlain by *deep loose native sand* layer at depth of about 41 feet.
** Underlain by *deep loose native sand* layer at depth of about 25 feet.

Townsite Soil Conditions

Our boring B-18 was advanced near the center of the large, circular depression within the townsite. As previously mentioned, this depression represents a former lakebed that was drained many decades ago, and some filling has reportedly occurred there since then. Our exploration revealed a sequence of fill materials mantling native soils that appear to be lacustrine (lakebed) sediments transitioning into pre-glacial soils.

APPENDIX A

FIELD EXPLORATION

PROCEDURES AND LOGS

BY

ZIPPER ZEMAN ASSOCIATES, INC.

APPENDIX A

FIELD EXPLORATION PROCEDURES

The following paragraphs describe our procedures associated with the on-site subsurface explorations and field tests that we conducted for this project. Interpretive stratigraphic logs of our explorations are enclosed in this appendix.

Auger Boring Procedures

Our exploratory borings were advanced with a hollow-stem auger, using a truck-mounted drill rig operated by an independent drilling firm working under subcontract to ZZA. A geotechnical specialist from our firm continuously observed the borings, logged the subsurface conditions, and collected representative soil samples. All samples were stored in watertight containers and later transported to our laboratory for further visual examination and/or testing. After each boring was completed, the borehole was backfilled with a mixture of bentonite chips and soil cuttings, and the surface was patched with asphalt or concrete (where appropriate).

Throughout the drilling operation, soil samples were obtained at 2½- or 5-foot depth intervals by means of the Standard Penetration Test (SPT) per ASTM: D-1586. This testing and sampling procedure consists of driving a standard 2-inch-diameter steel split-spoon sampler 18 inches into the soil with a 140-pound hammer free-falling 30 inches. The number of blows required to drive the sampler through each 6-inch interval is counted, and the total number of blows struck during the final 12 inches is recorded as the Standard Penetration Resistance (often called the "SPT blow count" or "N value"). If a total of 50 blows are struck within any 6-inch interval, the driving is stopped and the blow count is recorded as 50 blows for the actual penetration distance. The resulting Standard Penetration Resistance values indicate the relative density of granular soils and the relative consistency of cohesive soils.

Each enclosed *Boring Log* describes the vertical sequence of soils and other materials encountered in the respective borehole, based primarily on our field classifications and supported by our subsequent laboratory examination and/or testing. Where a soil contact was observed to be gradational within the sampler, our logs indicate the average contact depth; where a soil type changed between two sample intervals, we show an inferred contact depth. Our logs also graphically indicate the blow count, sample type, sample number, and approximate depth of each soil sample obtained from the borings, as well as any laboratory tests performed on these soil samples. If any groundwater was encountered in a borehole, the approximate groundwater depth is depicted on the boring log. Groundwater depth estimates are typically based on the moisture content of soil samples, the wetted height on the drilling rods, and the water level measured in the borehole after the auger has been extracted.

PROJECT: Port Gamble Multi-Use Development | **JOB NO.:** J-2238-03 | **BORING:** B-1 | **PAGE 1 OF 2**

Location: Port Gamble, WA | **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
0	Loose to medium dense, moist, gray/black, fine to medium SAND with some silt, coarse sand, gravel, and shells (Fill)		S-1		▲ Blow count overstated	24	
5	Loose, moist to wet, brown silty SAND with some gravel, red brick (~4"). Tip sandy SILT, some organics (Fill)		S-2		▲	6	
	Loose, wet, dark brown, silty SAND mixed with WOOD SAWDUST (~6") (Fill)		S-3	▼ ATD	▲	7	
10	Loose, wet, dark brown, silty SAND mixed with WOOD SAWDUST (~2") (Fill)		S-4		▲	11	
	Medium dense, saturated, gray, silty SAND with some gravel						
	Medium dense, saturated, gray, fine to coarse SAND with trace silt, gravel		S-5		▲	18	
15	-- becomes stiffer						
	Hard, moist, gray, fine sandy SILT with some clay (Massive)		S-6		▲	36	
20							
	Hard, moist, gray, fine sandy SILT with some clay (Massive)		S-7		▲	41	
25							

Explanation

- I — 2-inch O.D. split spoon sample
- II — 3-inch I.D Shelby tube sample
- ⊗ — No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
200W = 200 Wash Analysis
Att. = Atterberg Limits
Consol. = Consolidation Test

PROJECT: Port Gamble Multi-Use Development	JOB NO.: J-2238-03	BORING: B-1	PAGE 2 OF 2
Location: Port Gamble, WA	Approximate Surface Elevation:		

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
25	Hard, moist, gray, fine sandy SILT with some clay (Massive)	I	S-8		▲ at ~41	41	
30	Boring completed at 29 feet on 04/03/06. Groundwater observed at approximately 8 feet at time of drilling.						
35							
40							
45							
50							

Explanation

- I — 2-inch O.D. split spoon sample
- II — 3-inch I.D Shelby tube sample
- ⊗ — No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
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Zipper Zeman Associates, Inc. Geotechnical and Environmental Consulting	BORING LOG	Figure A-1
	Date Drilled: 4/3/2006	Logged By: CRT

PROJECT: Port Gamble Multi-Use Development | **JOB NO.:** J-2238-03 | **BORING:** B-2 | **PAGE 1 OF 1**

Location: Port Gamble, WA | **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot)	N-values	Testing
0	2" asphalt over 3" concrete atop Gray SAND, shells (Cuttings)						
	Loose to medium dense, moist, gray, silty SAND with some gravel, shells (Fill)		S-1		▲	16	
5	Loose, moist to wet, brown-gray, silty SAND with some shells mixed with WOOD SAWDUST (Fill)		S-2		▲	8	
	Loose, wet, brown, silty SAND mixed with WOOD SAWDUST and (Fill)		S-3	▼ ATD	▲	5	
10	Loose, saturated, gray, fine to medium SAND with trace coarse sand, gravel, and silt (Native)		S-4		▲	7	
	Loose, saturated, gray, fine to coarse SAND with some gravel and silt		S-5		▲	5	
15	-- becomes stiffer						
	Stiff, wet, gray, sandy SILT with some clay, trace gravel		S-6		▲	9	
20	Boring completed at 19 feet on 04/03/06. Groundwater observed at approximately 8 feet at time of drilling.						
25							

Explanation

- 2-inch O.D. split spoon sample
- 3-inch I.D Shelby tube sample
- No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

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Consol. = Consolidation Test

ZZA **Zipper Zeman Associates, Inc.**
Geotechnical and Environmental Consulting

BORING LOG	Figure A-2
Date Drilled: 4/3/2006	Logged By: CRT

PROJECT: Port Gamble Multi-Use Development **JOB NO.:** J-2238-03 **BORING:** B-3 **PAGE 1 OF 2**

Location: Port Gamble, WA **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
0							
	Loose, moist, brown-black, silty SAND with some shells, gravel (Fill) Tip - brown fine to medium SAND (~3")		S-1			6	
5			S-2			5	
	Loose, moist to wet, gray-black, silty SAND, some shells mixed with Wood fragments (Fill)						
	Loose, moist to wet, gray-black, silty SAND, some shells mixed with WOOD SAWDUST (Fill)		S-3			4	
10			S-4	▼ ATD		4	
	Loose, wet to saturated, gray-black, silty SAND, some shells mixed with WOOD SAWDUST (Fill)						
	Loose, wet to saturated, gray-black, silty SAND with mixed Wood Sawdust and silty SAND (Fill)		S-5			6	
	Loose, saturated, gray, fine to medium SAND with trace coarse sand, gravel, silt (Fill)						
15							
	Very loose, saturated, brown-gray silty SAND with some gravel and shells mixed with WOOD SAWDUST (Fill)		S-6			3	
20	- firmer drilling						
	Dense to very dense, moist, gray, silty SAND with some gravel (Tillish)		S-7			66	
25							

Explanation

- 2-inch O.D. split spoon sample
- 3-inch I.D Shelby tube sample
- ⊗ No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
200W = 200 Wash Analysis
Att. = Atterberg Limits
Consol. = Consolidation Test

ZZA **Zipper Zeman Associates, Inc.**
Geotechnical and Environmental Consulting

BORING LOG | **Figure A-3**
Date Drilled: 4/3/2006 | **Logged By: CRT**

PROJECT: Port Gamble Multi-Use Development | **JOB NO.:** J-2238-03 | **BORING:** B-3 | **PAGE 2 OF 2**

Location: Port Gamble, WA | **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
25	Very dense, most, gray, silty SAND with some gravel (Tillish)		S-8		▲	50/6"	
30	Hard, moist, brown-gray, sandy SILT with some clay		S-9		▲	45	
35			S-10		▲	69	
40	Boring completed at 39 feet on 04/03/06. Groundwater observed at approximately 10 feet at time of drilling.						
45							
50							

Explanation

- 2-inch O.D. split spoon sample
- 3-inch I.D Shelby tube sample
- No Recovery
- ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

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Consol. = Consolidation Test

Zipper Zeman Associates, Inc.
Geotechnical and Environmental Consulting

BORING LOG | **Figure A-3**
Date Drilled: 4/3/2006 | **Logged By: CRT**

PROJECT: Port Gamble Multi-Use Development **JOB NO.:** J-2238-03 **BORING:** B-4 **PAGE 1 OF 2**

Location: Port Gamble, WA **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
0	Loose, moist, brown-black, silty SAND with some gravel (1-3" spalls) Fill)						
	Very loose, moist, brown-black, silty SAND with some shells, gravel, and wood (Fill)		S-1		▲	1	
5	Very loose, wet, brown, silty SAND with some shells, gravel (Fill)		S-2	▼ ATD	▲	2	
	Loose, wet, gray, fine to medium SAND with some coarse sand, gravel, shells, trace silt (Fill)		S-3		▲	9	
10	Loose, wet, brown-gray, silty SAND with some shells mixed with WOOD SAWDUST (4") (Fill)		S-4		▲	7	
	Loose to medium dense, wet, gray, silty SAND with some shells with wood fragments (Fill)		S-5		▲	13	
15							
	Medium dense, wet, gray, silty SAND with some shells, gravel mixed with WOOD SAWDUST, and wood fragments (2") (Fill)		S-6		▲	15	
20	- firmer drilling						
	Medium dense to dense, wet, greenish gray, silty SAND with abundant shells and some gravel		S-7		▲	27	
25							

Explanation

- 2-inch O.D. split spoon sample
- 3-inch I.D Shelby tube sample
- No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
200W = 200 Wash Analysis
Att. = Atterberg Limits
Consol. = Consolidation Test

PROJECT: Port Gamble Multi-Use Development **JOB NO.:** J-2238-03 **BORING:** B-4 **PAGE 2 OF 2**

Location: Port Gamble, WA **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
25	Medium Dense to Dense, wet, greenish gray, silty SAND with abundant shells, some gravel, wood fragments		S-8		▲	31	
30	Very dense, wet, greenish gray, silty SAND with some gravel (Tillish)		S-9		▲	50/5"	
35			S-10		▲	83	
40	Boring completed at 39 feet on 04/03/06. Groundwater observed at approximately 6 feet at time of drilling.						
45							
50							

Explanation

- 2-inch O.D. split spoon sample
- 3-inch I.D Shelby tube sample
- No Recovery
- ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
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Att. = Atterberg Limits
Consol. = Consolidation Test

Zipper Zeman Associates, Inc.
Geotechnical and Environmental Consulting

BORING LOG	Figure A-4
Date Drilled: 4/3/2006	Logged By: CRT

PROJECT: Port Gamble Multi-Use Development **JOB NO.:** J-2238-03 **BORING:** B-5 **PAGE 1 OF 2**

Location: Port Gamble, WA **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
0	Surficial sand (Fill)						
	Loose to medium dense, moist, brown, silty SAND with trace gravel, wood (Fill)		S-1		▲	11	
5	Loose, moist, brown-gray, silty SAND with some shells (Fill)		S-2		▲	8	
	Loose to medium dense, saturated, gray, fine to medium SAND with abundant shells, some silt, coarse sand, trace gravel (Fill)		S-3	▼ ATD	▲	10	
10	Loose, saturated, gray, fine to medium SAND with abundant shells (Fill)		S-4		▲	6	
	Loose to medium dense, saturated, gray, fine to medium SAND with abundant shells (Fill)		S-5		▲	12	
15	Medium dense, wet, brown, silty SAND with some shells, interbedded with WOOD FRAGMENTS (2") PEATY WOOD (2") and gray SAND						
	Dense, saturated, gray, fine to coarse SAND with abundant shells and reddish brick/cinder (approx. 1 inch diameter) (Possible Fill)		S-6		Blow count ▲	51	
20							
	Medium dense, wet, gray, fine to medium SAND with abundant shells, some silt, coarse sand, trace gravel		S-7		▲	29	
25							

Explanation

- I — 2-inch O.D. split spoon sample
- II — 3-inch I.D Shelby tube sample
- ⊗ — No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
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Att. = Atterberg Limits
Consol. = Consolidation Test

ZZA **Zipper Zeman Associates, Inc.**
Geotechnical and Environmental Consulting

BORING LOG | **Figure A-5**
Date Drilled: 4/4/2006 | **Logged By: CRT**

PROJECT: Port Gamble Multi-Use Development **JOB NO.:** J-2238-03 **BORING:** B-5 **PAGE 2 OF 2**

Location: Port Gamble, WA **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0 10 20 30 40 50)	N-values	Testing
25	Dense, wet, gray, fine to medium SAND with abundant shells, some silt, coarse sand, trace gravel	I	S-8		▲ at 41	41	
30	Boring completed at 29 feet on 04/043/06. Groundwater observed at approximately 8 feet at time of drilling.						
35							
40							
45							
50							

Explanation

- I — 2-inch O.D. split spoon sample
- II — 3-inch I.D Shelby tube sample
- ⊗ — No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
200W = 200 Wash Analysis
Att. = Atterberg Limits
Consol. = Consolidation Test

ZZA **Zipper Zeman Associates, Inc.**
Geotechnical and Environmental Consulting

BORING LOG | **Figure A-5**
Date Drilled: 4/4/2006 | **Logged By: CRT**

PROJECT: Port Gamble Multi-Use Development | **JOB NO.:** J-2238-03 | **BORING:** B-6 | **PAGE 1 OF 3**

Location: Port Gamble, WA | **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
0	6" Asphalt over loose, moist, brown, silty gravelly SAND with abundant wood (Fill) (Encounter wood piling, move and redrill)						
	Loose, moist, brown, silty SAND with some wood (Fill)		S-1		▲	5	
5	Loose to medium dense, wet, brown-gray, silty SAND with some wood (Fill)		S-2		▲	14	
				▼ ATD			
	Loose to medium dense, saturated, gray, fine to coarse SAND with some shells, trace gravel and silt		S-3		▲	10	
10	Loose, saturated, gray, fine to coarse SAND with some shells, trace gravel and silt		S-4		▲	9	
	Medium dense, saturated, gray, fine to coarse SAND with abundant shells, trace gravel and silt		S-5		▲	17	
15							
	Loose, saturated, brown-gray, silty SAND with abundant shells, some wood fragments (siltier)		S-6		▲	9	
20							
	Dense, saturated, gray, silty SAND with abundant shells, some wood fragments		S-7		▲	37	
25							

Explanation

- I — 2-inch O.D. split spoon sample
- II — 3-inch I.D Shelby tube sample
- ⊗ — No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
200W = 200 Wash Analysis
Att. = Atterberg Limits
Consol. = Consolidation Test

PROJECT: Port Gamble Multi-Use Development | **JOB NO.:** J-2238-03 | **BORING:** B-6 | **PAGE 2 OF 3**

Location: Port Gamble, WA | **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
25	Medium dense to dense, saturated, gray-black, silty SAND with abundant shells, some gravel, trace wood fragments (blowcount probably overstated; density inferred)		S-8		▲	62	
30	Medium dense to dense, saturated, gray, silty SAND with some gravel, abundant shells (siltier) (blowcount probably overstated; density inferred)		S-9		▲	55	
35	Medium dense, saturated, gray, silty SAND with abundant shells, trace gravel		S-10		▲	19	
40	Loose, saturated, gray, silty SAND with abundant shells, trace gravel, wood fragments		S-11		▲	9	
45			S-12		▲	7	
50							

Explanation

- 2-inch O.D. split spoon sample
- 3-inch I.D Shelby tube sample
- No Recovery
- ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
200W = 200 Wash Analysis
Att. = Atterberg Limits
Consol. = Consolidation Test

Zipper Zeman Associates, Inc.
Geotechnical and Environmental Consulting

BORING LOG	Figure A-6
Date Drilled: 4/4/2006	Logged By: CRT

PROJECT: Port Gamble Multi-Use Development | **JOB NO.:** J-2238-03 | **BORING:** B-6 | **PAGE 3 OF 3**

Location: Port Gamble, WA | **Approximate Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
50	Medium dense to dense, wet, gray, silty SAND with some shells, trace gravel, wood fragments		S-13		▲ at 30	30	
55	Very loose, saturated, gray, fine to medium SAND with some silt, abundant shells, trace gravel, wood		S-14		▲ at 1	1	
60	- scattered gravels						
	Dense, wet, gray, silty SAND with abundant shells and 1" sandy silt zone (siltier), trace gravel		S-15		▲ at 47	47	
65	- firmer drilling						
	Dense, wet, gray, silty SAND with trace gravel (tillish)		S-16		▲ at 34	34	
70	Boring completed at 69 feet on 04/04/06. Groundwater observed at approximately 7 feet at time of drilling.						
75							

Explanation

- 2-inch O.D. split spoon sample
- 3-inch I.D Shelby tube sample
- No Recovery
- ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
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Zipper Zeman Associates, Inc.
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BORING LOG	Figure A-6
Date Drilled: 4/4/2006	Logged By: CRT

PROJECT: Port Gamble Multi-Use Development | **JOB NO.:** J-2238-03 | **BORING:** B-7 | **PAGE 1 OF 3**

Location: Port Gamble, WA | **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
0	Asphalt 3" over loose, moist, brown-gray, silty gravelly SAND (Fill)						
	Loose, moist, gray, fine to medium SAND with some coarse sand, gravel, silt, and abundant shells (Fill)	I	S-1		▲	5	
5	Loose, wet, brown-gray, silty, gravelly SAND with some shells, organics (wood) (Fill)	I	S-2		▲	7	
	Loose, wet, brown-gray, silty, gravelly SAND with trace shells, organics (wood) (Fill)	I	S-3	▼ ATD	▲	9	
10	Loose to medium dense, wet, silty SAND with some gravel mixed with WOOD (Fill)	I	S-4		▲	13	
	Loose to medium dense, saturated, brown, silty, gravelly SAND with WOOD (2") (Fill)	I	S-5		▲	11	
15	Loose to medium dense, saturated, gray, silty, gravelly SAND with some wood	I	S-6		▲	10	
20	Loose, saturated, gray, silty SAND, trace gravel, wood and abundant shells	I	S-7		▲	4	
25							

Explanation

- I — 2-inch O.D. split spoon sample
- II — 3-inch I.D Shelby tube sample
- ⊗ — No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
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Moisture Content

Plastic Limit — Natural — Liquid Limit

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ZZA **Zipper Zeman Associates, Inc.**
Geotechnical and Environmental Consulting

BORING LOG	Figure A-7
Date Drilled: 4/4/2006	Logged By: CRT

PROJECT: Port Gamble Multi-Use Development | **JOB NO.:** J-2238-03 | **BORING:** B-7 | **PAGE 2 OF 3**

Location: Port Gamble, WA | **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
25	Loose, saturated, gray, silty SAND, trace gravel, wood, and abundant shells		S-8		▲	8	
30	Loose, saturated, gray, silty SAND, some wood, organics, shells, and trace gravel		S-9		▲	4	
35			S-10		▲	4	
40	Loose to medium dense, wet, gray, silty SAND with some shells, trace gravel, wood		S-11		▲	10	
45			S-12		▲	6	
50							

Explanation

- 2-inch O.D. split spoon sample
- 3-inch I.D Shelby tube sample
- No Recovery
- ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
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Moisture Content

Plastic Limit — Natural — Liquid Limit

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Consol. = Consolidation Test

Zipper Zeman Associates, Inc.	BORING LOG	Figure A-7
Geotechnical and Environmental Consulting	Date Drilled: 4/4/2006	Logged By: CRT

PROJECT: Port Gamble Multi-Use Development	JOB NO.: J-2238-03	BORING: B-7	PAGE 3 OF 3
Location: Port Gamble, WA	Approximate Elevation:		

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
50							
	Medium dense, wet, gray, silty SAND with some shells, trace gravel, wood		S-13		▲	14	
55							
			S-14		▲	13	
60							
	Very loose, saturated, gray, silty SAND with some shells, trace gravel		S-15		▲	1	
65							
	Loose to medium dense, saturated, fine to medium SAND with trace silt, gravel, abundant shells		S-16		▲	11	
70	Boring completed at 69 feet on 04/04/06. Groundwater observed at approximately 8 feet at time of drilling.						
75							

Explanation

- 2-inch O.D. split spoon sample
- 3-inch I.D Shelby tube sample
- No Recovery
- ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
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- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

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Zipper Zeman Associates, Inc.	BORING LOG	Figure A-7
Geotechnical and Environmental Consulting	Date Drilled: 4/4/2006	Logged By: CRT

PROJECT: Port Gamble Multi-Use Development | **JOB NO.:** J-2238-03 | **BORING:** B-8 | **PAGE 1 OF 2**

Location: Port Gamble, WA | **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
0	Quarry spall rock, over loose, moist, brown, silty, gravelly SAND (Fill)						
	Medium dense to dense, moist, brown, silty SAND, some gravel (Fill)		S-1		▲ ~30	32	
5	Medium dense, moist, brown-gray, silty, gravelly SAND (Fill)		S-2		▲ ~10	12	
	Medium dense, saturated, brown, silty gravelly SAND, some broken gravels		S-3	▼ ATD	▲ ~10	12	
10	Loose, wet, gray, silty SAND with some gravel with interbedded WOOD (2" fragments)		S-4		▲ ~7	9	
	Medium dense, saturated, gray, fine to medium SAND with some coarse sand, silt, trace gravel		S-5		▲ ~15	16	
15	Medium dense to dense, saturated, gray, fine to medium SAND with some coarse sand, silt, gravel, trace shells		S-6		▲ ~30	32	
20	Medium dense, saturated, gray, fine to medium SAND with some coarse sand, silt, trace gravel, and abundant shells		S-7		▲ ~15	15	
25							

Explanation

- I — 2-inch O.D. split spoon sample
- II — 3-inch I.D Shelby tube sample
- ⊗ — No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
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Consol. = Consolidation Test

ZZA **Zipper Zeman Associates, Inc.**
Geotechnical and Environmental Consulting

BORING LOG | **Figure A-8**

Date Drilled: 4/5/2006 | **Logged By: CRT**

PROJECT: Port Gamble Multi-Use Development **JOB NO.:** J-2238-03 **BORING:** B-8 **PAGE 2 OF 2**

Location: Port Gamble, WA **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0 10 20 30 40 50)	N-values	Testing
25	Very loose, saturated, gray, fine to medium SAND with some silt, shells, trace coarse sand, gravel	I	S-8		▲	3	
30	Loose, wet, greenish-gray, silty SAND with some shells, trace gravel, wood	I	S-9		▲	8	
35	Loose, wet, greenish-gray, silty SAND with trace gravel and abundant shells	I	S-10		▲	8	
40	Boring completed at 39 feet on 04/05/06. Groundwater observed at approximately 7 feet at time of drilling.						
45							
50							

Explanation

- I — 2-inch O.D. split spoon sample
- II — 3-inch I.D Shelby tube sample
- ⊗ — No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
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- Blank Casing

Moisture Content

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ZZA **Zipper Zeman Associates, Inc.**
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BORING LOG	Figure A-8
Date Drilled: 4/5/2006	Logged By: CRT

PROJECT: Port Gamble Multi-Use Development **JOB NO.:** J-2238-03 **BORING:** B-9 **PAGE 1 OF 2**

Location: Port Gamble, WA **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
0	Quarry spalls atop loose, moist, brown, silty, gravelly SAND (Fill)						
	Medium dense, moist, tan-brown, fine to medium SAND with some silt, trace coarse sand, gravel (Fill)		S-1		▲	26	
5	Medium dense, moist, brown, fine to medium SAND with some coarse sand, gravel, and silt (Fill)		S-2		▲	16	
	Medium dense, wet, gray, fine to medium SAND with some gravel, coarse sand, silt, and abundant shells (Fill)		S-3	▼ ATD	▲	12	
10	Medium dense to dense, wet, gray, fine to medium SAND with some gravel, coarse sand, silt, and abundant shells (Fill)		S-4		▲	31	
	Medium dense, wet, gray, silty SAND, some gravel, shells, with interbedded WOOD SAWDUST (6") (Fill) (density inferred)		S-5		Blow count overstated ▲	67	
15	Loose to medium dense, wet, gray, silty SAND with trace gravel, wood, and abundant shells (Possible Fill)		S-6		▲	12	
20	Very loose, saturated, gray, fine SAND with some medium sand, silt, trace coarse sand, gravel, and shells		S-7		▲	1	
25							

Explanation

- 2-inch O.D. split spoon sample
- 3-inch I.D Shelby tube sample
- No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
200W = 200 Wash Analysis
Att. = Atterberg Limits
Consol. = Consolidation Test

PROJECT: Port Gamble Multi-Use Development **JOB NO.:** J-2238-03 **BORING:** B-9 **PAGE 2 OF 2**

Location: Port Gamble, WA **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
25	Very loose, saturated, gray, fine SAND with some medium sand, silt, trace coarse sand, gravel, and shells	I	S-8		▲	2	
30	Loose, saturated, greenish-gray, silty SAND with trace gravel and abundant shells	I	S-9		▲	7	
35	Dense, wet, greenish-gray, silty SAND with some gravel (coarser), trace wood, and abundant shells	I	S-10		▲	38	
40	Boring completed at 39 feet on 04/05/06. Groundwater observed at approximately 8 feet at time of drilling.						
45							
50							

Explanation

- I — 2-inch O.D. split spoon sample
- II — 3-inch I.D Shelby tube sample
- ⊗ — No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

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BORING LOG	Figure A-9
Date Drilled: 4/5/2006	Logged By: CRT

PROJECT: Port Gamble Multi-Use Development **JOB NO.:** J-2238-03 **BORING:** B-10 **PAGE 1 OF 2**

Location: Port Gamble, WA **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
0	Quarry spalls atop loose, moist, brown, silty, gravelly SAND (Fill)						
	Loose, moist, brown, silty, gravelly SAND with some brick and wood (Fill)		S-1		▲	5	
5	Loose, saturated, brown, silty, gravelly SAND with some wood (Fill)		S-2	▼ ATD	▲	7	
	Very loose to loose, wet, gray, gravelly SAND with trace silt and wood and abundant shells (Fill)		S-3		▲	4	
10	Medium dense to dense, wet, gray, gravelly SAND with trace silt and wood and abundant shells (Fill)		S-4		▲	32	
	Dense, wet, gray, gravelly SAND with trace silt and wood and abundant shells (Fill))		S-5		▲	48	
15							
	Medium dense, wet, gray, gravelly SAND with trace silt and wood and abundant shells (Fill)		S-6		▲	20	
20							
	Dense to very dense, wet, gray, silty SAND with some gravel and abundant shells		S-7		▲	54	
25							

Explanation

- I — 2-inch O.D. split spoon sample
- II — 3-inch I.D Shelby tube sample
- ⊗ — No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
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Att. = Atterberg Limits
Consol. = Consolidation Test

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Geotechnical and Environmental Consulting

BORING LOG | **Figure A-10**
Date Drilled: 4/5/2006 | **Logged By: CRT**

PROJECT: Port Gamble Multi-Use Development **JOB NO.:** J-2238-03 **BORING:** B-10 **PAGE 2 OF 2**

Location: Port Gamble, WA **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
25	Dense, wet, gray, silty SAND with some gravel, trace wood, and abundant shells.	I	S-8		▲ at 30	33	
30	Boring completed at 29 feet on 04/05/06. Groundwater observed at approximately 7 feet at time of drilling.						
35							
40							
45							
50							

Explanation

- I — 2-inch O.D. split spoon sample
- II — 3-inch I.D Shelby tube sample
- ⊗ — No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
200W = 200 Wash Analysis
Att. = Atterberg Limits
Consol. = Consolidation Test

PROJECT: Port Gamble Multi-Use Development **JOB NO.:** J-2238-03 **BORING:** B-11 **PAGE 1 OF 2**

Location: Port Gamble, WA **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0 10 20 30 40 50)	N-values	Testing
0	Asphalt, 2" atop loose, moist, brown-gray, silty, gravelly SAND, some shells (Fill)						
	Loose, moist, brown-gray, silty SAND with some gravel and shells (Fill)		S-1		▲	7	
5	Loose, moist to wet, brown-gray-black, silty gravelly SAND with some wood and shells (Fill)		S-2		▲	6	
				▼ ATD			
	Medium dense, saturated, brown-gray, gravelly SAND with some broken gravels, silt, shells (Fill) (density inferred)		S-3		Blow count overstated ▲	50/6"	
10	Medium dense, saturated, gray, silty SAND with some wood, organics, gravel, shells		S-4		▲	15	
	Medium dense, wet, gray, fine to medium SAND with some silt, trace coarse sand, gravel, wood, shells		S-5		▲	16	
15							
	Medium dense, wet, gray, fine to medium SAND with some silt, gravel, wood and abundant shells		S-6		▲	24	
20							
	Medium dense, saturated, gray, gravelly SAND with some silt and abundant shells		S-7		▲	14	
25							

Explanation

- I — 2-inch O.D. split spoon sample
- II — 3-inch I.D Shelby tube sample
- ⊗ — No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
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Consol. = Consolidation Test

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BORING LOG	Figure A-11
Date Drilled: 4/5/2006	Logged By: CRT

PROJECT: Port Gamble Multi-Use Development | **JOB NO.:** J-2238-03 | **BORING:** B-11 | **PAGE 2 OF 2**

Location: Port Gamble, WA | **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
25	Very dense, wet, gray silty SAND with some gravel		S-8			78	
30	Very dense, wet, gray, silty SAND with some gravel interbedded with sandy SILT (2") and fine to medium SAND (2")		S-9			53	
35	Very dense, saturated, gray-black, fine to coarse SAND with some silt, gravel		S-10			50/5"	
40	Hard, moist, gray, SILT, with some fine sand, trace clay (massive)		S-11			50/6"	
45	Hard, moist, gray, SILT with some fine sand, trace clay (massive)		S-12			50/5"	
50	Boring completed at 49 feet on 04/05/06. Groundwater observed at approximately 7 feet at time of drilling.						

Explanation

- 2-inch O.D. split spoon sample
- 3-inch I.D Shelby tube sample
- No Recovery
- ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

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ZZA **Zipper Zeman Associates, Inc.**
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BORING LOG | **Figure A-11**
Date Drilled: 4/5/2006 | **Logged By: CRT**

PROJECT: Port Gamble Multi-Use Development **JOB NO.:** J-2238-03 **BORING:** B-12 **PAGE 1 OF 2**

Location: Port Gamble, WA **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot 0–50)	N-values	Testing
0	Asphalt, ~2" atop loose, moist, brown, silty, gravelly SAND						
	Medium dense, moist, brown, silty, gravelly SAND with some concrete (Fill) (density inferred)		S-1		Blow count overstated ▲	50/5"	
5	Loose, moist, brown-gray, silty SAND with some gravel and wood (2") (Fill)		S-2		▲	7	
				▼ ATD			
	Medium dense, saturated, gray, fine to medium SAND with some coarse sand, gravel, and silt		S-3		▲	21	
10	Medium dense, wet, brown-gray, fine to medium SAND with some coarse sand, gravel, and silt		S-4		▲	18	
	Loose, saturated, brown-gray, fine to medium SAND with some coarse sand, gravel, and silt		S-5		▲	7	
15							
	Hard, wet, gray, sandy SILT with interbedded silty SAND (2") and horizontal fine sand laminae.		S-6		▲	34	
20							
	Dense, wet, gray, silty SAND with interbedded sandy SILT (3"), trace gravel		S-7		▲	38	
25							

Explanation

- I — 2-inch O.D. split spoon sample
- II — 3-inch I.D Shelby tube sample
- ⊗ — No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
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Consol. = Consolidation Test

Zipper Zeman Associates, Inc.
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BORING LOG | **Figure A-12**
Date Drilled: 4/6/2006 | **Logged By: CRT**

PROJECT: Port Gamble Multi-Use Development **JOB NO.:** J-2238-03 **BORING:** B-12 **PAGE 2 OF 2**

Location: Port Gamble, WA **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
25	Hard, moist, gray, SILT with some fine sand, clay (massive)	I	S-8		▲ at ~40	37	
30	Dense, saturated, gray, silty SAND, trace gravel, with interbedded sandy SILT	I	S-9		▲ at ~40	39	
35	Hard, moist, greenish-gray, SILT with some fine sand, clay (massive)	I	S-10		▲ at ~44	44	
40	Boring completed at 39 feet on 04/06/06. Groundwater observed at approximately 7 feet at time of drilling.						
45							
50							

Explanation

- I — 2-inch O.D. split spoon sample
- II — 3-inch I.D Shelby tube sample
- ⊗ — No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
200W = 200 Wash Analysis
Att. = Atterberg Limits
Consol. = Consolidation Test

ZZA **Zipper Zeman Associates, Inc.**
Geotechnical and Environmental Consulting

BORING LOG | **Figure A-12**
Date Drilled: 4/6/2006 | **Logged By: CRT**

PROJECT: Port Gamble Multi-Use Development | **JOB NO.:** J-2238-03 | **BORING:** B-13 | **PAGE 1 OF 2**

Location: Port Gamble, WA | **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
0	Asphalt, ~3-1/2" atop Loose to medium dense, moist, brown, silty SAND, some gravel (Fill)						
	Medium dense, moist, gray, fine to medium SAND with some coarse sand, gravel, and silt (Fill)		S-1		▲	25	
5	Loose to medium dense, moist, gray, silty SAND with some gravel, wood, organics (burnt), roots, trace shells (Fill)		S-2	▼ ATD	▲	12	
	Loose, saturated, gray, silty SAND with trace gravel and interbedded wood fragments (1-2" and 1") (Fill)		S-3		▲	9	
10	Loose to medium dense, saturated, gray-blue, fine to coarse SAND with some silt, abundant shells (density inferred)		S-4		Blow count overstated ▲	50/2"	
	Loose to medium dense, saturated, gray, silty, gravelly SAND with abundant shells		S-5		▲	10	
15							
	Hard, moist, gray, fine sandy SILT to SILT with some fine sand, clay.		S-6		▲	63	
20							
	Hard, moist, brown and gray, sandy SILT with some clay with interbedded silty SAND (3")		S-7		▲	55	
25							

Explanation

- 2-inch O.D. split spoon sample
- 3-inch I.D Shelby tube sample
- ⊗ No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
200W = 200 Wash Analysis
Att. = Atterberg Limits
Consol. = Consolidation Test

PROJECT: Port Gamble Multi-Use Development **JOB NO.:** J-2238-03 **BORING:** B-13 **PAGE 2 OF 2**

Location: Port Gamble, WA **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0 10 20 30 40 50)	N-values	Testing
25	Hard, moist, brown and gray, sandy SILT with some clay with interbedded silty SAND (3")	I	S-8		▲ 52	52	
30	Boring completed at 29 feet on 04/06/06. Groundwater observed at approximately 7 feet at time of drilling.						
35							
40							
45							
50							

Explanation

- I — 2-inch O.D. split spoon sample
- II — 3-inch I.D Shelby tube sample
- ⊗ — No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
200W = 200 Wash Analysis
Att. = Atterberg Limits
Consol. = Consolidation Test

ZZA **Zipper Zeman Associates, Inc.**
Geotechnical and Environmental Consulting

BORING LOG | **Figure A-13**
Date Drilled: 4/6/2006 | **Logged By: CRT**

PROJECT: Port Gamble Multi-Use Development **JOB NO.:** J-2238-03 **BORING:** B-14 **PAGE 1 OF 2**

Location: Port Gamble, WA **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
0	Quarry spalls over loose to medium dense, silty, gravelly SAND (Fill)						
	Loose to medium dense, moist, tan-brown, silty, gravelly SAND (Fill)		S-1		▲	12	
5			S-2		▲	9	
				▼ ATD			
	Loose to medium dense, saturated, gray, gravelly SAND with some silt, abundant shells		S-3		▲	10	
10	Medium dense, saturated, gray-black, gravelly SAND with some silt, and abundant shells		S-4		▲	20	
	Medium dense to dense, saturated, gray-black fine to coarse SAND with some gravel, silt, and abundant shells		S-5		▲	31	
15							
	Medium dense, wet, gray, silty SAND with trace gravel, organics, and abundant shells		S-6		▲	29	
20							
	Dense, saturated, gray-black, silty SAND with some gravel and abundant shells with interbedded sandy SILT (4")		S-7		▲	39	
25							

Explanation

- I — 2-inch O.D. split spoon sample
- II — 3-inch I.D Shelby tube sample
- ⊗ — No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
200W = 200 Wash Analysis
Att. = Atterberg Limits
Consol. = Consolidation Test

ZZA **Zipper Zeman Associates, Inc.**
Geotechnical and Environmental Consulting

BORING LOG	Figure A-14
Date Drilled: 4/6/2006	Logged By: CRT

PROJECT: Port Gamble Multi-Use Development | **JOB NO.:** J-2238-03 | **BORING:** B-14 | **PAGE 2 OF 2**

Location: Port Gamble, WA | **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
25	Hard, moist, gray, sandy SILT with interbedded silty SAND (2")		S-8		▲	61	
30	Hard, moist, gray, sandy SILT with interbedded silty SAND (1").		S-9		▲	32	
35	Very dense, saturated, gray-black, fine to coarse SAND with some gravel and silt		S-10		▲	50/4"	
40	Hard, moist, gray, sandy SILT interbedded silty SAND (1")		S-11		▲	78	
45	Very dense, wet, gray, silty SAND interbedded sandy SILT (1")		S-12		▲	50	
50	Boring completed at 48.5 feet on 04/06/06. Groundwater observed at approximately 7 feet at time of drilling.						

Explanation

- 2-inch O.D. split spoon sample
- 3-inch I.D Shelby tube sample
- No Recovery
- ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
200W = 200 Wash Analysis
Att. = Atterberg Limits
Consol. = Consolidation Test

ZZA **Zipper Zeman Associates, Inc.**
Geotechnical and Environmental Consulting

BORING LOG	Figure A-14
Date Drilled: 4/6/2006	Logged By: CRT

PROJECT: Port Gamble Multi-Use Development **JOB NO.:** J-2238-03 **BORING:** B-15 **PAGE 1 OF 1**

Location: Port Gamble, WA **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
0	Wood chips atop loose, moist, gray, silty SAND, some gravel (Fill)						
	Loose, moist, brown-gray, silty SAND, some gravel, wood (Fill)		S-1		▲	5	
5	Loose, moist, gray, silty SAND, some gravel, trace wood (Fill)		S-2		▲	8	
				▼ ATD			
	Loose, wet, brown-gray, silty SAND, some gravel and wood interbedded with brick (~3") and sawdust (~4") (Fill)		S-3		▲	8	
10	Dense, saturated, brown-gray, silty, gravelly SAND with some broken gravels		S-4		▲	44	
	Hard, wet, gray, sandy SILT		S-5		▲	32	
15							
	Very stiff, wet, gray, sandy SILT with interbedded silty SAND (1/2")		S-6		▲	22	
20							
	Hard, moist, brown and gray, sandy SILT with some clay (massive)		S-7		▲	37	
	Boring completed at 24 feet on 04/06/06 Groundwater observed at approximately 8 feet at time of drilling						
25							

Explanation

- 2-inch O.D. split spoon sample
- 3-inch I.D Shelby tube sample
- ⊗ No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
200W = 200 Wash Analysis
Att. = Atterberg Limits
Consol. = Consolidation Test

ZZA **Zipper Zeman Associates, Inc.**
Geotechnical and Environmental Consulting

BORING LOG	Figure A-15
Date Drilled: 4/7/2006	Logged By: CRT

PROJECT: Port Gamble Multi-Use Development | **JOB NO.:** J-2238-03 | **BORING:** B-16 | **PAGE 1 OF 1**

Location: Port Gamble, WA | **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	N-values	Testing
0	Asphalt over concrete atop loose, moist, brown, silty SAND, some gravel					
	Loose to medium dense, moist, tan-brown, fine to medium SAND with some silt, trace coarse sand, gravel (Fill)	I	S-1		10	
5	Very loose, wet, brown-black, silty SAND with some gravel, abundant shells (Fill)	I	S-2		3	
	Medium dense, saturated, gray, gravelly SAND with some silt	I	S-3	▼ ATD	14	
10	Medium dense, wet, gray, silty SAND with trace gravel, interbedded with sandy SILT with some clay (mixed - possible colluvium)	I	S-4		19	
	Medium dense, wet, gray, silty SAND with trace gravel, interbedded with sandy SILT with some clay (mixed - interbedded) (possible colluvium)	I	S-5		22	
15	Medium dense, wet to saturated, gray, silty SAND with trace gravel	I	S-6		22	
20	Hard, wet, gray, sandy SILT with interbedded silty SAND (2")	I	S-7		45	
25	Boring completed at 24 feet on 04/07/06 Groundwater observed at approximately 7 feet at time of drilling					

Penetration Resistance

▲ Standard — Blows per foot — △ Other

0 10 20 30 40 50

Explanation

- I — 2-inch O.D. split spoon sample
- II — 3-inch I.D Shelby tube sample
- ⊗ — No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
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- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
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Att. = Atterberg Limits
Consol. = Consolidation Test

ZZA **Zipper Zeman Associates, Inc.**
Geotechnical and Environmental Consulting

BORING LOG | **Figure A-16**
Date Drilled: 4/6/2006 | **Logged By: CRT**

PROJECT: Port Gamble Multi-Use Development | **JOB NO.:** J-2238-03 | **BORING:** B-17 | **PAGE 1 OF 2**

Location: Port Gamble, WA | **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
0	Quarry spalls atop loose, moist, tan-brown, silty SAND, some gravel to some silt (Fill)						
	Medium dense, moist, tan-brown, fine to medium SAND with some silt, trace coarse sand gravel (Fill)		S-1		▲	19	
5	Loose, wet, brown, fine to medium SAND with some silt, coarse sand, gravel, trace organics (Fill)		S-2	▼ ATD	▲	6	
	Very loose to loose, saturated, gray-black, silty SAND with some organics interbedded with sandy SILT with some organics, wood, burnt wood		S-3		▲	2	
10			S-4		▲	14	
	Medium dense, saturated, brown-gray, silty SAND, some gravel						
	Medium dense to dense, saturated, brown-gray, fine to coarse SAND with some gravel, trace silt		S-5		▲	31	
15							
	Dense, wet, gray-black, silty SAND with some gravel, trace organics (1/2") and abundant shells		S-6		▲	39	
20							
	Dense to very dense, wet, gray, silty gravelly SAND with some borken gravels (Tillish)		S-7		▲ Blow count overstated	55	
25							

Explanation

- I — 2-inch O.D. split spoon sample
- II — 3-inch I.D Shelby tube sample
- ⊗ — No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
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ZZA **Zipper Zeman Associates, Inc.**
Geotechnical and Environmental Consulting

BORING LOG | **Figure A-17**
Date Drilled: 4/7/2006 | **Logged By: CRT**

PROJECT: Port Gamble Multi-Use Development	JOB NO.: J-2238-03	BORING: B-17	PAGE 2 OF 2
Location: Port Gamble, WA	Approximate Surface Elevation:		

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
25	Dense to very dense, wet, gray, silty gravelly SAND (Tillish)	I	S-8		▲ 51		
30	Boring completed at 29 feet on 04/07/06. Groundwater observed at approximately 6 feet at time of drilling.						
35							
40							
45							
50							

Explanation

- I — 2-inch O.D. split spoon sample
- II — 3-inch I.D Shelby tube sample
- ⊗ — No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

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Consol. = Consolidation Test

Zipper Zeman Associates, Inc.	BORING LOG	Figure A-17
Geotechnical and Environmental Consulting	Date Drilled: 4/7/2006	Logged By: CRT

PROJECT: Port Gamble Multi-Use Development | **JOB NO.:** J-2238-03 | **BORING:** B-18 | **PAGE 1 OF 1**

Location: Port Gamble, WA | **Approximate Surface Elevation:**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0 10 20 30 40 50)	N-values	Testing
0	Surface grass and topsoil						
	Loose, moist, brown, silty, gravelly SAND with some brick fragments (Fill)						
	Very soft, wet, brown-gray-black, sandy, clayey SILT with some organics, burnt organics, wood (Fill)		S-1		▲	2	
5	Soft to medium stiff, wet, gray, clayey SILT to silty CLAY with some fine sand, organics (Fill)		S-2		▲	4	
	Medium stiff, wet, gray, clayey SILT with some fine sand, with interbedded silty SAND (1")		S-3		▲	5	
10	Stiff, wet, gray, sandy SILT with some clay with interbedded silty SAND (1")		S-4		▲	14	
	Stiff, wet, gray, sandy SILT with some clay with interbedded silty SAND (2")		S-5		▲	15	
15	Hard, moist, gray, sandy SILT with some fine sand laminae		S-6		▲	34	
20	Very stiff, moist, gray, sandy SILT with some fine sand laminae		S-7		▲	17	
25	Boring completed at 24 feet on 04/07/06. No groundwater observed at time of drilling.						

Explanation

- I — 2-inch O.D. split spoon sample
- II — 3-inch I.D Shelby tube sample
- ⊗ — No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
200W = 200 Wash Analysis
Att. = Atterberg Limits
Consol. = Consolidation Test

APPENDIX B

MILLSITE

BORING/WELL LOGS

BY

PARAMETRIX, INC.

AND

ENVIRONMENTAL PARTNERS, INC.

Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	55-2004-11 (06)	BORING/WELL NUMBER	MW-1
PROJECT NAME	Pope & Talbot	DATE COMPLETED	June 17, 1999
LOCATION	Port Gamble Mill	TOTAL DEPTH OF BORING	15.0
COORDINATES	N 317,351 E 1,210,837	INITIAL WATER LEVEL	▽ 5.7
DRILLING METHOD	Hollow Stem Auger	STATIC WATER LEVEL	▼ 4.7
SAMPLING METHOD	Split Spoon	LOGGED BY	S. Matthews
GROUND ELEVATION	13.85	TOP OF CASING ELEVATION	13.27

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION
13.9			SS MW-1S			SW		Well graded sand with fine gravel (SW), fine gravel, yellow brown (10 YR 4/4), fill
						SP		Poorly graded sand (SP), fine to medium sand, dark grey (N/5)
								Medium sand, grey, shell fragments
9.7	17/17	12	SS MW-1D		5			Moist ▼ ▽
12.9	100/3	8	SS		10			Fine to medium sand, shell fragments, grey (5 GY 5/1), saturated Wood at 10.3-10.7 ft., sweet odor
1.3	60/6	6	SS		15			Coarse sand, blue grey (5B 4/1), saturated
					20			
					25			

DEPTH (ft.): 5, 10, 15, 20, 25

WELL DIAGRAM: Cement; Bentonite seal; Schedule 40 PVC screen 020 slot; Sand pack

BWC GAMBMILL.GPJ 9/3/99

Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 55-2004-11 (06)
PROJECT NAME Pope & Talbot
LOCATION Port Gamble Mill
COORDINATES N 317,411 E 1,211,175
DRILLING METHOD Hollow Stem Auger
SAMPLING METHOD Split Spoon
GROUND ELEVATION 14.88

BORING/WELL NUMBER MW-2
DATE COMPLETED June 17, 1999
TOTAL DEPTH OF BORING 20.0
INITIAL WATER LEVEL ▽ 10.2
STATIC WATER LEVEL ▼ 8.9
LOGGED BY S. Matthews
TOP OF CASING ELEVATION 17.14

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION
210			SS MW-2S			SP		Wood debris Poorly graded sand (SP), dark grey (5 GY 5/1), fill
245	21/21/15	12	SS MW-2D		5			Medium to coarse sand, shell fragments, grey (5 GY 5/1), moist, strong sulfur odor
325	36/50/6	8	SS		10			Fine to medium sand, wood pieces in sand.
	14/21/25	0	SS		15			Wood blocks sampler.
289	85/6	2	SS		20			Wood and sand (sluff)
					25			

DEPTH (ft.): 5, 10, 15, 20, 25

WELL DIAGRAM: Cement; Bentonite seal; Schedule 40 PVC screen 020 slot; Sand pack

BWC GAMBMILL.GPJ 9/3/99

Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	55-2004-11 (06)	BORING/WELL NUMBER	MW-3
PROJECT NAME	Pope & Talbot	DATE COMPLETED	June 17, 1999
LOCATION	Port Gamble Mill	TOTAL DEPTH OF BORING	15.0
COORDINATES	N 316,787 E 1,210,914	INITIAL WATER LEVEL	▽ 5.8
DRILLING METHOD	Hollow Stem Auger	STATIC WATER LEVEL	▼ 6.0
SAMPLING METHOD	Split Spoon	LOGGED BY	S. Matthews
GROUND ELEVATION	15.94	TOP OF CASING ELEVATION	18.01

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION
6.2			SS MW-3S			SW		Well graded sand with gravel (SW); fine to medium gravel, subrounded to subangular, dark grey (5 Y 3/1), fill
0	20/50/3		SS MW-3D		5			Moist Brown grey (10YR 4/3) Coarse sand, blue green, little fines, 5BG 4/1 ▼
17	65/6		SS		10			Coarse sand, brown (7.5 YR 3/2)
						ML		Clayey silt (ML), dense blue grey, slightly moist, (5B 4/1)
24	85/6	6	SS		15			
					20			
					25			

DEPTH (ft.): 5, 10, 15, 20, 25

WELL DIAGRAM: Cement; Bentonite seal; Schedule 40 PVC screen 020 slot; Sand pack

BWC_GAMBMILL.GPJ 8/30/99

Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	55-2004-11 (06)	**BORING/WELL NUMBER**	MW-4
PROJECT NAME	Pope & Talbot	**DATE COMPLETED**	June 18, 1999
LOCATION	Port Gamble Mill	**TOTAL DEPTH OF BORING**	20.0
COORDINATES	N 317,022 E 1,211,571	**INITIAL WATER LEVEL**	▽ 6.5
DRILLING METHOD	Hollow Stem Auger	**STATIC WATER LEVEL**	▼ 6.2
SAMPLING METHOD	Split Spoon	**LOGGED BY**	S. Matthews
GROUND ELEVATION	14.51	**TOP OF CASING ELEVATION**	13.93

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)
0			SS MW-4S			SW		Well graded sand with gravel (SW), olive brown (2.5 Y 4/4), medium large gravel, dry, fill	
0	18/20	6	SS MW-4D		5			Moist ▼	5
						SW		Well graded sand with fine gravel (SW), shell fragments, gravel pieces, grey (5GY 5/1)	
0		12	SS		10			Wood dust, small pieces of wood 10-11 ft.	10
0	12/25	12	SS		15			Wood 15-15.3 ft., well graded sand with shell fragments, grain size decreasing	15
0	30/30	0	SS		20				20
					25				25

WELL DIAGRAM

- Cement
- Bentonite seal
- Schedule 40 PVC screen 020 slot
- Sand pack

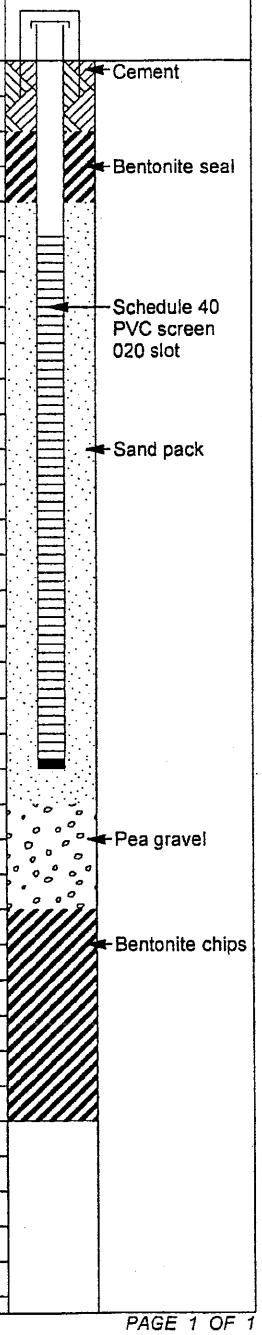
BWC_GAMBMILL.GPJ 9/3/99

Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	55-2004-11 (06)	BORING/WELL NUMBER	MW-5
PROJECT NAME	Pope & Talbot	DATE COMPLETED	June 17, 1999
LOCATION	Port Gamble Mill	TOTAL DEPTH OF BORING	30.0
COORDINATES	N 316,924 E 1,211,366	INITIAL WATER LEVEL	▽ 9.1
DRILLING METHOD	Hollow Stem Auger	STATIC WATER LEVEL	▼ 8.6
SAMPLING METHOD	Split Spoon	LOGGED BY	S. Matthews
GROUND ELEVATION	15.02	TOP OF CASING ELEVATION	17.10

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	U.S.C.S.	GEOLOGIC DESCRIPTION
205			SS MW-5S	SW	Well graded sand with gravel (SW), black (10 YR 2/1), dry, fill
110	11/4/4	6	SS MW-5D		Brownish grey (10 YR 4/2), dry
				SW	Increasing grain size, shell fragments, grey (5 GY 5/1), wood, wet
34	25/52	10	SS		
29	25/50/6	12	SS	SP	Poorly graded sand with gravel (SP), coarse sand, grey (5 GY 5/1)
0	27/50/4	10	SS		Coarse sand and fine gravel, small lenses of fine sand, grey
0	17/50/5	10	SS		
				SW	Well graded sand with zones of poorly graded fine to medium sand, grey (5GY 5/1), large shell fragments
0	31/50/5	8	SS		



BWC GAMBMILL.GPJ 8/30/99

Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 55-2004-11 (06)
PROJECT NAME Pope & Talbot
LOCATION Port Gamble Mill
COORDINATES N 316,434 E 1,211,080
DRILLING METHOD Hollow Stem Auger
SAMPLING METHOD Split Spoon
GROUND ELEVATION 16.30

BORING/WELL NUMBER MW-6
DATE COMPLETED June 18, 1999
TOTAL DEPTH OF BORING 20.0
INITIAL WATER LEVEL ▽ 9.7
STATIC WATER LEVEL ▼ 9.5
LOGGED BY S. Matthews
TOP OF CASING ELEVATION 18.54

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION
0			SS			SW		Asphalt Well graded sand and gravel (SW), dark yellowish brown (10 YR 4/4), fill
						SW		Well graded sand and shell fragments, dark grey (5 GY 5/1), moist lenses of fine sand
2	50/6	12	SS		5			
0	50/6	12	SS		10			Shell fragments increase to 20%
0	20/30/2	12	SS		15			Wood at 15.7-16 ft.
0	15/50/3	10	SS		20			
					25			

DEPTH (ft.): 5, 10, 15, 20, 25

WELL DIAGRAM: Cement; Bentonite seal; Schedule 40 PVC screen 020 slot; Sand pack

BWC_GAMBMILL.GPJ 9/3/99

Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	55-2004-11 (06)	BORING/WELL NUMBER	MW-7
PROJECT NAME	Pope & Talbot	DATE COMPLETED	June 18, 1999
LOCATION	Port Gamble Mill	TOTAL DEPTH OF BORING	30.0
COORDINATES	N 316,155 E 1,211,040	INITIAL WATER LEVEL	▽ 7.0
DRILLING METHOD	Hollow Stem Auger	STATIC WATER LEVEL	▼ 7.0
SAMPLING METHOD	Split Spoon	LOGGED BY	S. Matthews
GROUND ELEVATION	16.61	TOP OF CASING ELEVATION	16.03

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION
0			SS MW-7S			SW		6" concrete Well graded sand with gravel (SW), fine gravel, 20% shell fragments, very dark grey (5 Y 3/1), loose, fill
						SP		Poorly graded sand (SP), medium to coarse sand, dark grey (5Y 3/1), fill
12	17/20	12	SS MW-7D		5	SW		Well graded sand with gravel (SW), shell fragments
						SP		Poorly graded sand (SP), fine to medium sand, light olive brown (2.5 Y 5.4) ▼
6	14/14	12	SS		10	SW		Well graded sand with gravel, coarse sand (30%), fine gravel, shell fragments, dark greenish grey (5 GY 41), saturated
0	12/20	12	SS		15			Well graded sand and shell fragments
0	20/32	12	SS		20			Decreasing grain size
0	11/32	12	SS		25	SP		Poorly graded sand (SP), fine to medium sand with large shell fragments (35%), (5 GY 4/1)
						SM		
0	85/6	12	SS		30			Silty sand with gravel (SM), fine gravel (15%), moist lenses of dense silt
					35			

DEPTH (ft.): 5, 10, 15, 20, 25, 30, 35

WELL DIAGRAM: Cement; Bentonite seal; Schedule 40 PVC screen 020 slot; Sand pack; Pea gravel; Bentonite chips

BWC GAMBMILL.GPJ 8/30/99

Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	55-2004-11 (06)	BORING/WELL NUMBER	MW-8
PROJECT NAME	Pope & Talbot	DATE COMPLETED	June 18, 1999
LOCATION	Port Gamble Mill	TOTAL DEPTH OF BORING	20.0
COORDINATES	N 315,716 E 1,210,882	INITIAL WATER LEVEL	▽ 6.2
DRILLING METHOD	Hollow Stem Auger	STATIC WATER LEVEL	▼ 5.9
SAMPLING METHOD	Split Spoon	LOGGED BY	S. Matthews
GROUND ELEVATION	15.56	TOP OF CASING ELEVATION	14.98

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION
0			SS MW-8S			SP		3" asphalt Poorly graded sand with gravel (SP), fine gravel (15%), brick pieces, fine sand and silt, grey to black (N2.5, N3), fill
0	18/20	11	SS MW-8D		5			Poorly graded sand, fine to medium sand, very dark grey (N3), moist ▽
						SW		Well graded sand (SW), very dark grey (N3), shell fragments
0	17/25		SS		10			
						SP		Poorly graded sand with gravel (SP), fine to medium grained sand, fine gravel (5%), shell fragments, lenses of silt, fine sand and wood
0	14/20		SS		15			
						ML		Clayey silt (ML), dark greenish grey (5G 4/1), dense, dry
0	50/6		SS		20			
					25			

DEPTH (ft.)	WELL DIAGRAM
	Cement
	Bentonite seal
5	
	Schedule 40 PVC Screen 020 slot
10	
	Sand pack
15	
20	
25	

BWVC GAMBMILL GPJ 8/30/99

Boring/Well Designation: MW-9 MILL

Client: Olympic Property Group LLC
Logged By: Gary Tollefson
Date of Drilling: August 8, 2002
Sheet: 1 of 1

Drilling Contractor: Cascade Drilling, Inc.
Method: HSA
Drill Rig: CME 75
Borehole: 8"

Depth	SUBSURFACE PROFILE: Log	USCS Code	Description	SAMPLE: Interval	Recovery	Blows per 6"	Sample	PID (ppm)	Sheen	Well Data	Comments
-3											
-2											
-1											
0			Ground Surface								
1		SW	***Well Graded Sand*** Moist, light brown; mostly fine to medium sand, trace gravel.								
2											
3											
4			***Silty Sand*** Moist to wet, black; mostly fine to medium sand, some silt; occasional wood debris.								
5											
6											
7											
8											
9		SM									09-30-02
10											
11											
12											
13											
14											
15			End of Borehole								
16											
17											

Project No.: 17006.2

Boring/Well Designation: MW-10 MILL

Client: Olympic Property Group LLC
Logged By: Gary Tollefson
Date of Drilling: August 8, 2002
Sheet: 1 of 1

Drilling Contractor: Cascade Drilling, Inc.
Method: HSA
Drill Rig: CME 75
Borehole: 8"

Depth	SUBSURFACE PROFILE: Log	SUBSURFACE PROFILE: USCS Code	SUBSURFACE PROFILE: Description	SAMPLE: Interval	SAMPLE: Recovery	SAMPLE: Blows per 6"	SAMPLE: Sample	PID (ppm)	Sheen	Well Data	Comments
0			Ground Surface								
0–4		SW	***Well Graded Sand*** Moist, light brown; mostly fine to medium sand, trace gravel.								
4–15		SM	***Silty Sand*** Moist to wet, black; mostly fine to medium sand, some silt; occasional wood debris.								09-30-02
15			End of Borehole								

Project No.: 17006.2

Boring/Well Designation: MW-11 MILL

Client: Olympic Property Group LLC
Drilling Contractor: Cascade Drilling, Inc.
Logged By: Gary Tollefson
Method: HSA
Date of Drilling: August 8, 2002
Drill Rig: CME 75
Sheet: 1 of 1
Borehole: 8"

Depth	SUBSURFACE PROFILE: Log	USCS Code	Description	SAMPLE: Interval	Recovery	Blows per 6"	Sample	PID (ppm)	Sheen	Well Data	Comments
0			Ground Surface								
1			***Well Graded Sand*** Moist, light brown; mostly fine to medium sand, trace gravel.								
2		SW									
3											
4			***Silty Sand*** Moist to wet, black; mostly fine to medium sand, some silt; occasional wood debris.								
5											
6											09-30-02
7											
8											
9		SM									
10											
11											
12											
13											
14											
15			End of Borehole								
16											
17											
18											
19											
20											

Project No.: 17006.2

Boring/Well Designation: MW-12 MW-2

Client: Olympic Property Group LLC
Logged By: Gary Tollefson
Date of Drilling: August 8, 2002
Sheet: 1 of 1

Drilling Contractor: Cascade Drilling, Inc.
Method: HSA
Drill Rig: CME 75
Borehole: 8"

Depth	SUBSURFACE PROFILE: Log	USCS Code	Description	SAMPLE: Interval	Recovery	Blows per 6"	Sample	PID (ppm)	Sheen	Well Data	Comments
0			Ground Surface								
1		SW	***Well Graded Sand*** Moist, light brown; mostly fine to medium sand, trace gravel.								
2											
3											
4			***Silty Sand*** Moist to wet, black; mostly fine to medium sand, some silt; occasional wood debris.								
5											
6											
7											09-30-02
8											
9		SM									
10											
11											
12											
13											
14											
15			End of Borehole								
16											
17											
18											
19											
20											

Project No.: 17006.2

Boring/Well Designation: MW-13 MILL

Client: Olympic Property Group LLC
Logged By: Gary Tollefson
Date of Drilling: August 9, 2002
Sheet: 1 of 1

Drilling Contractor: Cascade Drilling, Inc.
Method: HSA
Drill Rig: CME 75
Borehole: 8"

Depth	SUBSURFACE PROFILE: Log	USCS Code	Description	SAMPLE: Interval	SAMPLE: Recovery	Blows per 6"	Sample	PID (ppm)	Sheen	Well Data	Comments
0			Ground Surface								
0–15		SM	***Silty Sand*** Moist, light brown; mostly fine to medium sand, some silt. Increase in moisture, color change to black; occasional wood debris								09-30-02
15			End of Borehole								

Project No.: 17006.2

Appendix C
Consent Decree

Pending

Appendix D
Inadvertent Discovery Plan

Confidential; not included in this submittal

Appendix E
Water Quality Monitoring Plan

November 2023
Port Gamble Bay Habitat Restoration Project

ANCHOR QEA

Water Quality Monitoring Plan

Prepared for OPG Port Gamble, LLC

November 2023
Port Gamble Bay Habitat Restoration Project

Water Quality Monitoring Plan

Prepared for
OPG Port Gamble, LLC
19950 7th Avenue NE, Suite 200
Poulsbo, Washington 98370

Prepared by
Anchor QEA, LLC
1201 3rd Avenue, Suite 2600
Seattle, Washington 98101

Project Number: 212381-03.01
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ABBREVIATIONS

BMP	best management practice
CoC	Chemicals of Concern
Ecology	Washington State Department of Ecology
RSET	Regional Sediment Evaluation Team
WAC	Washington Administrative Code
WQMP	Water Quality Monitoring Plan

1 Introduction

This document presents the *Water Quality Monitoring Plan* (WQMP) for integrated cleanup and habitat restoration actions in upland and nearshore aquatic areas in Port Gamble, Kitsap County, Washington. This WQMP has been prepared to support project compliance with the requirements of Washington State's Water Quality Standards for Surface Waters (Washington Administrative Code [WAC] 173-201A). The WQMP builds on similar water quality monitoring programs that were successfully implemented during previous sediment cleanup actions in Port Gamble (e.g., 2015 to 2017; Anchor QEA 2015) and at other similar sites in Puget Sound. Water quality monitoring standards have been developed consistent with water quality criteria for marine waters designated as "excellent quality," as specified in WAC 173-201A-210 – Marine Water Designated Uses and Criteria.

This WQMP includes the following information:

- Water quality monitoring program (Section 2)
- Contingency measures (Section 3)
- Notification and reporting (Section 4)

2 Water Quality Monitoring Program

OPG Port Gamble, LLC; Pope Resources, a Delaware Limited Partnership; and OPG, LLC will designate a Water Quality Protection Lead to conduct water quality monitoring during in-water construction periods to ensure compliance with state water quality standards for surface water. For safety reasons, water quality monitoring will be restricted to daylight hours. Sections 2.1 through 2.5 describe the specific water quality parameters to be assessed, monitoring locations, monitoring frequency, field procedures, and analytical procedures.

2.1 Monitoring Parameters

As discussed in the Regional Sediment Evaluation Team (RSET) *Sediment Evaluation Framework for the Pacific Northwest* (2016), water column effects associated with in-water construction are intermittent, discontinuous, and relatively short lived. The Washington State Department of Ecology (Ecology) has promulgated statewide water quality standards under the Washington Water Pollution Control Act (Revised Code of Washington 90.48). Water quality criteria are defined for different types of pollutants and the characteristic uses for each class of surface water. The standards for marine waters are applicable to discharges to surface water during sediment excavation and cap and cover placement, include turbidity and pH, and may include chemicals of concern (CoCs) depending on site-specific conditions.

RSET, an organization that includes Ecology and other regulatory agencies in the Pacific Northwest, recently developed a screening tool to identify maximum sediment concentrations of CoCs that would not exceed water quality criteria when resuspended at the point of removal; this tool has been used to determine water quality monitoring requirements at other regional sediment cleanup projects, including the 2015 to 2017 Port Gamble Bay cleanup project (RSET 2016). As discussed by Anchor QEA (2015), there is no need for water quality monitoring of CoCs during sediment removal operations in Port Gamble Bay.

Water quality monitoring data will be collected during in-water construction periods to confirm compliance with turbidity and pH standards. Table 1 includes the water quality standards for the "excellent quality" designation for the monitoring parameters (turbidity and pH), as detailed in Tables 210(1)(e) and 210(1)(f) of WAC 173-201A-210.

Table 1
Water Quality Monitoring Criteria

Monitoring Parameters	Water Quality Criterion
Turbidity	Turbidity must not exceed: · 5 NTUs over background when the background is 50 NTU or less; or · A 10% increase in turbidity when the background turbidity is more than 50 NTUs
pH	pH must be within the range of: · 7.0 to 8.5 with a human-caused variation within the above range of less than 0.5 units

Note:
NTU: nephelometric turbidity unit

The standards in Table 1 will be met at the point of compliance boundary.

2.1.1 Water Quality Monitoring During Material Placement

Elevated turbidity is expected during placement of cap and cover material, consistent with other regional sediment cleanup projects. Project experience has shown that even when using cap and cover materials with very few fines, localized turbidity exceeding water quality standards for surface water is likely, even when employing all available best management practices (BMPs). Consistent with the approach used successfully at other regional sediment cleanup projects, cap and cover placement will continue if there are turbidity exceedances. Placement of these materials will result in long-term gains in protection of beneficial uses, and these activities will rapidly accomplish cleanup and restoration objectives, resulting in a net positive effect on human health and the environment because environmental conditions in the bay would be improved over current conditions.

2.1.2 Water Quality Monitoring During Intertidal Excavation

Intertidal excavation and capping will be performed "in-the-dry" (during low tide periods using land-based equipment) to the extent practicable, and water quality monitoring will not be required for these activities when conducted in-the-dry. Water quality monitoring is included in this plan for the unlikely event that intertidal excavation needs to be performed "in-water" (during high tide periods when the work zone is submerged) using land-based equipment.

2.2 Monitoring Locations and Depths

The monitoring distance for water quality measurements is a 150-foot radius from active in-water intertidal excavation or turbidity curtain, when deployed, and a 300-foot radius from clean material placement activities (i.e., the point of compliance). Each monitoring event will consist of measuring turbidity and pH at three or four locations at the point of compliance, depending on the site, and one

background location (Figure 1).[1] Steps to modify the operation if exceedances are detected at the point of compliance are described in Section 3. When the 300-foot radius is the point of compliance, a 150-foot radius data point will be collected as an early warning station, and the contractor will implement an extra BMP during material placement, as described in Section 3.

The representative background monitoring station will be located approximately 1,000 feet beyond active in-water work areas. Figure 1 shows the proposed background sample locations for the different Work Zones.

Figure 1 also shows a radial compliance boundary and several representative water quality monitoring locations for compliance measurements. The actual positions of compliance and background stations will be adjusted in the field based on actual construction areas using the best professional judgment of the monitoring crew, who will also take into consideration tidal variations and associated currents. The actual positions will be recorded in the field documentation.

At each monitoring station, turbidity and pH measurements will be obtained 3 feet below the water surface, mid-depth within the water column, and 3 feet above the bottom. Water depth will be determined using a lead line at the monitoring location and will be recorded on the field data log sheet. Sample measurements from each of the three depths will be compared to measurements at corresponding depths at the background stations.

2.3 Monitoring Methods and Equipment

Water quality monitoring will typically be conducted from a boat during daylight hours, though there may be locations that could be monitored from docks or land. Monitoring will be performed using a calibrated multi-probe meter (e.g., a Hydrolab, YSI probe, or similar) and/or a calibrated Hach turbidity meter. Turbidity and pH during each monitoring event and respective location will be recorded on a field data sheet.

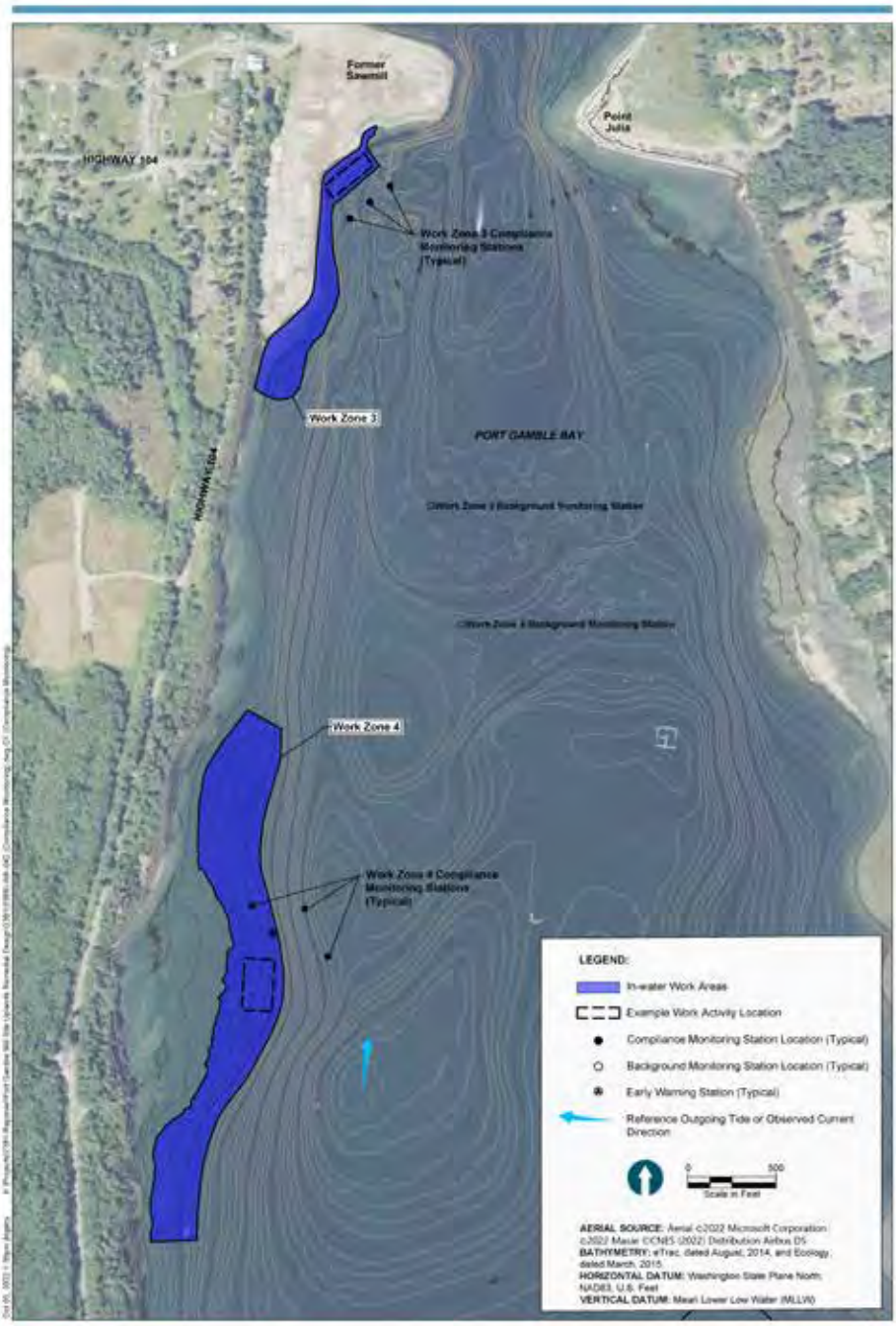
All locations for water column measurements will be in relationship to the location of the construction activity at the time of sampling (i.e., 150 or 300 feet down current of the construction activity). Distances from construction activity will be verified using a range finder. Actual differential global positioning system coordinates, times, and depths of all water column sample locations will be recorded.

[1] The outer extent of the compliance boundaries and background locations are shown in Figure 1; however, the actual location within these boundaries is dependent on construction activities.

Monitoring equipment will be calibrated daily and allowed to equilibrate prior to use. Calibration information will be recorded in the field notebooks. Monitoring equipment will be handled according to the manufacturer's recommendations. Unusual or questionable readings will be noted, and duplicate readings will be collected.

At the conclusion of each monitoring event, field data sheets and results of the monitoring event will be retained in the project file.

Figure 1
Approximate Water Quality Monitoring Stations



ANCHOR QEA

Figure G-1
Approximate Water Quality Monitoring Stations
Appendix G: Water Quality Monitoring Plan
Port Gamble Bay Cleanup Site

2.4 Monitoring Frequency and Schedule

The frequency and schedule of water quality monitoring during in-water work periods will occur at three different levels, as described in the following:

- *Intensive* – Collection of turbidity and pH measurements will occur every 4 hours during in-water work, with at least two measurements per day for the first 3 days.
- *Routine* – If no confirmed exceedances occur during the Intensive monitoring period, collection of turbidity and pH measurements will occur once daily during in-water work for 3 additional days or if turbidity plumes become visually evident within the 150-foot compliance area.
- *Limited* – If no confirmed exceedances occur during the Routine monitoring period, collection of turbidity and pH measurements will occur once per week during in-water work.

The occurrence of confirmed exceedances, visual turbidity observations at the point of compliance, or a significant change in construction equipment or operations (e.g., moving construction from one Work Zone to another Work Zone) will trigger a transition back to Intensive monitoring.

2.5 Quality Assurance

The quality assurance objective for this project is to ensure that the data collected are of known and acceptable quality so that the goals of the water quality program can be achieved. Appropriate field quality control procedures will be followed. These procedures include performing routine field instrument calibration and following standard instrument operation procedures.

3 Contingency Measures

The following conditions will require an immediate stop-work response:

- Evidence of a significant oil sheen
- Evidence of distressed or dying fish

In the event of a confirmed water quality exceedance, the contractor will be directed to adjust and/or increase their BMPs, and intensive monitoring will be continued. A subsequent confirmed exceedance of water quality criteria may also trigger a stop-work response following consultation with Ecology.

Additional steps may be required in the event of water quality measurements that exceed relevant criteria at the compliance boundary. Visual turbidity observed within 150 feet of the work area (or turbidity curtain, when deployed) will trigger a measurement of turbidity and pH at the compliance station. If turbidity or pH measured at the compliance station do not meet the criteria listed in Section 2.1, the following sequence of responses will be initiated:

1. If an initial exceedance is measured at the early warning station, the contractor will be notified that they may need to supplement their BMPs, and a measurement will be collected at the compliance station.
2. If an initial exceedance is measured at the compliance station, the sampler will wait 5 to 10 minutes and retake measurements at the station. The field team will visually assess the station vicinity for potential outside influences.
3. If water quality passes the turbidity and pH standards, the monitoring crew will move to the next station.
4. If the station water turbidity or pH standard exceedance is confirmed (two measurements in 5 to 10 minutes), the contractor and Ecology will be notified, and options to modify the contractor's operations will be assessed.
5. The contractor will modify operations as necessary to meet turbidity and pH standards.
6. The sampler will wait 30 minutes to 1 hour and retake measurements at the compliance station.
7. If additional exceedances are confirmed at any compliance station after 30 minutes to 1 hour, the contractor and Ecology will be notified, and the contractor may be issued a stop-work order.

A significant change in construction equipment or operations (e.g., changing methods for material placement) will trigger a transition back to Intensive monitoring as described in Section 2.4.

3.1 Additional Construction BMP for 300-foot Point of Compliance

When the 300-foot point of compliance is used for clean cover placement, the contractor will take an additional measure as a BMP as follows:

- During cover placement, the contractor will open the placement bucket within 1 to 2 feet above the water surface. Cover material will not be allowed to free fall greater than 2 feet above the water surface.

Alternatively, the contractor may elect to use the standard 150-foot point of compliance for water quality, in which case the BMP described above will not be considered a requirement but may be an elective measure selected by the contractor to help manage water quality.

4 Notification and Reporting

If a confirmed water quality exceedance is recorded, notification will be conducted as follows:

1. Report the exceedance to the assigned Ecology representative listed below. Notify the contractor to modify their operations.

   Corey King
   Washington State Department of Ecology
   ckin461@ECY.WA.GOV
   (360) 280-5684

2. Modify the contractor's operations and recheck water quality.
3. As determined following consultation with Ecology, discontinue any further in-water work if a confirmed exceedance occurs after the contractor modifies their operations.
4. Immediately report any observed distressed or dying fish to Ecology's 24-hour Spill Response Office at 800-258-5990.

Copies of the field data logs will be transmitted to the Ecology representative on a weekly basis during construction.

After the project is completed, water quality monitoring data will be summarized in the project completion documents, which will include data summary tables, actual sample locations, descriptions of field activities and deviations from the WQMP, and copies of the actual field logs as an appendix. The completion documents will be submitted in accordance with project permit requirements.

5 References

Anchor QEA (Anchor QEA, LLC), 2015. *Water Quality Monitoring Plan, Port Gamble Bay Cleanup Project*. Prepared for Washington State Department of Ecology. May 2015.

Ecology (Washington State Department of Ecology), 2020. *Cleanup Action Plan Upland Areas of the Port Gamble Bay and Mill Site*. September 2020.

RSET (Regional Sediment Evaluation Team), 2016. *Sediment Evaluation Framework for the Pacific Northwest*. Prepared by U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, Washington Department of Ecology, Washington Department of Natural Resources, Oregon Department of Environmental Quality, Idaho Department of Environmental Quality, National Marine Fisheries Service, and U.S. Fish and Wildlife Service. July 2016.

Appendix G
Construction Quality Assurance Plan

January 2024
Port Gamble Integrated Cleanup and Habitat Restoration Design

ANCHOR QEA

Appendix G
Construction Quality Assurance Plan

Prepared for Washington State Department of Ecology and Port Gamble Natural Resource Trustees

January 2024
Port Gamble Integrated Cleanup and Habitat Restoration Design

Construction Quality Assurance Plan

Prepared for
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206-287-9130

Project Number: 212381-03.01
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FIGURES

Figure E-1 Organizational Chart

ABBREVIATIONS

Bay	Port Gamble Bay
CAP	Cleanup Action Plan
CD	Consent Decree
CHASP	Construction Health and Safety Plan
CoC	Chemical of concern
Contractor	General Contractor
CQA	construction quality assurance
CQAO	Construction Quality Assurance Officer
CQAP	Construction Quality Assurance Plan
CQC	construction quality control
CWP	Construction Work Plan
Ecology	Washington State Department of Ecology
EDR	Engineering Design Report
EPP	Environmental Protection Plan
ICRAR	Integrated Cleanup and Restoration Action Report
Mill Site	former upland sawmill site
MTCA	Model Toxics Control Act
SOW	Statement of Work
TEQ	toxic equivalent

1 Introduction

This Construction Quality Assurance Plan (CQAP) describes quality assurance protocols and methods that will be used to ensure that integrated cleanup and habitat restoration actions in upland and nearshore aquatic areas in Port Gamble, Kitsap County, Washington are implemented in accordance with the engineering design and associated permitting requirements. This CQAP is an appendix to the Port Gamble Integrated Cleanup and Habitat Restoration Design Engineering Design Report (Integrated EDR; Anchor QEA 2022), which describes the approach and criteria for the engineering design of integrated cleanup and habitat restoration actions at the former sawmill site (Mill Site) and Port Gamble Bay (Bay).

Aquatic cleanup actions in the Bay are set forth in the Bay Cleanup Action Plan (CAP; Ecology 2013), and in accordance with Washington State Model Toxics Control Act (MTCA) Consent Decree (CD) 13-2-02720-0 between OPG Port Gamble LLC; Pope Resources, a Delaware Limited Partnership; and OPG Properties LLC (collectively, the Companies) and the Washington State Department of Ecology (Ecology). Similarly, upland cleanup actions at the Mill Site are set forth in the Mill Site uplands CAP (Ecology 2020), and in accordance with MTCA CD 20-0-01674-18 between the Companies and Ecology. Finally, habitat restoration actions are set forth in the Bay Habitat Restoration Statement of Work (SOW; Ecology 2022), and in accordance with the pending Natural Resource Damage CD between the Companies and the Port Gamble S'Klallam Tribe; the Suquamish Tribe; the Skokomish Indian Tribe; the Jamestown S'Klallam Tribe; the Lower Elwha Klallam Tribe; the U.S. Department of the Interior; and Ecology (collectively, the Natural Resource Trustees).

The actions described in this CQAP will be performed by the Companies under Ecology and Natural Resource Trustee oversight, consistent with the requirements of the three CDs referenced above. The Operations, Maintenance and Monitoring Plan will be developed after construction is finished. The Operations, Maintenance and Monitoring Plan will describe post-construction monitoring and adaptive management to ensure the long-term performance of integrated cleanup and habitat restoration actions. Implementation of this CQAP will be performed consistent with the requirements of MTCA and the Washington State Sediment Management Standards.

Integrated cleanup and habitat restoration construction activities to be performed at the Bay and Mill Site include the following:

- Excavation and stockpiling of upland and shoreline intertidal soils and sediments
- Construction of upland and shoreline intertidal engineered caps, backfill, and shallow subtidal cover placement
- On-site and off-site material disposal
- Planting and restoration of riparian zone habitat

Separate from this CQAP and following Ecology and Natural Resources Trustee approval of the Integrated EDR and receipt of permits for construction activities, the selected General Contractor (Contractor) will develop more detailed construction work plans (CWPs) that describe the construction schedule; construction health and safety plan (CHASP); quality control plans; excavation and capping plans; borrow source characterization; and environmental protection plans (EPPs).

The remainder of this CQAP is organized into the following sections:

- Section 2 – Definitions and Use of Terms: Defines key terms of the Quality Management System.
- Section 3 – Project Organization and Responsibilities: Presents the roles and responsibilities of the parties involved in the integrated cleanup and habitat restoration action, including Ecology and other and Natural Resources Trustees as well as other regulatory agencies.
- Section 4 – Contractor and Construction Quality Assurance Officer (CQAO) Qualifications: Describes the qualifications and experience required for the Contractor and any selected subcontractors, as well as the qualifications of the CQAO and supporting inspection personnel.
- Section 5 – Description of Construction Activities: Describes construction activities to be performed in Work Zone 1 through Work Zone 4.
- Section 6 – Quality Assurance Program: Describes the performance objectives and criteria, quality assurance measures, inspection and verification activities, and contingency actions for each construction activity.
- Section 7 – Documentation and Reporting: Describes the reporting requirements for construction quality assurance (CQA) activities. These requirements include daily and weekly summary reports, inspection data sheets, problem identification and corrective measures reports, design acceptance reports, and final documentation. A description of the provisions for final storage of all records consistent with the requirements of the CDs is also included in this section.

2 Definitions and Use of Terms

Construction quality control (CQC) and CQA are defined as follows:

- CQC is the planned system of inspections and testing by the Contractor's team (or their subcontractors) to monitor and control the characteristics of an item, service, removal, or installation in relation to design requirements. The CQC activities provide for a collection of construction condition measurements.
- CQA is the planned and systematic means and actions that provide confidence that construction materials, methods, and results meet or exceed design criteria and requirements. The CQA activities provide for collection of mutual and independent third-party measurements of construction conditions, as well as review and confirmation of the quality of data collected as part of the CQC activities.

In the context of this document, CQC refers to the following:

- Those actions taken by the Contractor's team (or their subcontractors) to determine compliance of the various components of the excavation, capping, cover placement, riparian planting and transport and off-site disposal activities with the requirements of the approved design

In the context of this document, CQA refers to the following:

- Means and actions to independently assess conformity of the various components of the excavation, capping, cover placement, riparian planting and transport and off-site disposal activities with the requirements of the approved design

3 Project Organization and Responsibilities

The roles and responsibilities of the parties involved in the cleanup action activities are described in Sections 3.1 through 3.6 and presented in Figure E-1.

3.1 Washington State Department of Ecology

Ecology is the regulatory authority and is the responsible agency for overseeing and authorizing the cleanup action activities described herein. In this capacity, Ecology will review information described in the Integrated EDR (Anchor QEA 2022) and Construction Specifications and Drawings, and this CQAP for consistency with the cleanup standards presented in the CAPs, including applicable or relevant and appropriate requirements as set forth in the CAPs. The Ecology Project Coordinator, or a designee, will exercise project oversight for Ecology, coordinate comments developed by Ecology and other agencies, and communicate agency observations with the Companies (for the purpose of this CQAP) and the Project Engineer. The Ecology Project Coordinator shall notify the Companies if they identify any concerns regarding the implementation of the integrated cleanup and habitat restoration action. The Companies, or a designated representative, will propose response measures or recommendations, as appropriate, to Ecology and the Ecology Project Coordinator. Ecology, as appropriate, will make final decisions to resolve such issues or problems that may change the scope of the integrated cleanup and habitat restoration action. Ecology will work cooperatively with the other Natural Resource Trustees and other government agencies as necessary.

3.2 Natural Resource Trustees

In addition to Ecology, the Port Gamble S'Klallam Tribe, the Suquamish Tribe, the Skokomish Indian Tribe, the Jamestown S'Klallam Tribe, the Lower Elwha Klallam Tribe, the U.S. Department of the Interior are the Natural Resource Trustees responsible for overseeing and authorizing the habitat restoration activities described herein. In this capacity, Trustees will review information described in the Integrated EDR (Anchor QEA 2022), Construction Specifications and Drawings, and this CQAP for consistency with the SOW (Ecology 2022). Through a designated Trustee Representative, the Natural Resource Trustees will exercise project oversight, review and comment on the Integrated EDR (Anchor QEA 2022) and this CQAP and communicate observations with the Companies and the Project Engineer. The Trustee Representative shall notify the Companies if they identify any concerns regarding the implementation of the integrated cleanup and habitat restoration action. The Companies, or a designated representative, will propose response measures or recommendations, as appropriate, to the Trustee Representative.

3.3 The Companies

OPG Port Gamble LLC; Pope Resources, a Delaware Limited Partnership; and OPG Properties LLC are ultimately responsible for implementing the integrated cleanup and habitat restoration action in

accordance with the CDs. The Companies, or a designated representative, will implement the CQAP, review Contractor work products, and be the point of contact with the Ecology Project Coordinator and Trustee Representative.

Monitoring activities will be the responsibility of the Companies, who will be acting in coordination with the Ecology Project Coordinator and Trustee Representative. Certain aspects of monitoring activities, however, may be performed by the Contractor but overseen by the Companies to ensure that the Contractor's construction and monitoring work is completed as stipulated by project permits, approvals, and contract documents.

3.4 Project Engineer

The Project Engineer is responsible for two main tasks:

1. Preparing the design of the integrated cleanup and habitat restoration action such that successful implementation of the design will result in achieving CD and construction activity-specific objectives and requirements.
2. Providing consultation and observations during construction to assist with implementation of the integrated cleanup and habitat restoration action in conformance with Ecology and Natural Resource Trustee-approved design documents.

During implementation of the integrated cleanup and habitat restoration action, noncompliant construction activities will be referred to the Project Engineer. The Project Engineer is responsible for determining whether the noncompliant construction is unacceptable, or acceptable with a design modification. The Ecology Project Coordinator and Trustee Representative will have final authority to approve design modifications related to the integrated cleanup and habitat restoration action proposed by the Project Engineer, consistent with CD requirements.

3.5 Construction Quality Assurance Officer

The CQAO will be responsible for overseeing the implementation of the CQAP and is responsible for monitoring construction performance for compliance with construction performance standards and design requirements during implementation of the integrated cleanup and habitat restoration actions. The CQAO is responsible for overseeing required inspection and verification activities and will review documentation submitted by and work completed by the Contractor for adherence to performance standards and design requirements. The CQAO will be sufficiently familiar with the approved design documents and the construction operations to recognize deviations from those documents. The CQAO will also manage and maintain the integrity of the data generated during implementation of the integrated cleanup and habitat restoration action.

The CQAO will be responsible for identifying those field conditions that may warrant deviation from the approved design documents. In such circumstances, the CQAO will coordinate with the Project Engineer as well as the Ecology Project Coordinator and Trustee Representative to identify and agree upon any necessary changes to meet the overall objectives of the design. Any agreed-upon changes will be documented in the weekly progress reports to the Ecology Project Coordinator and Trustee Representative.

The CQAO may use inspectors with the requisite expertise and experience to help perform the duties described above.

3.6 General Contractor

One or more construction contractors will be selected to perform construction activities including excavation and beneficial reuse/disposal of soil or intertidal sediment; placement of cap material, armor, and clean subtidal sand cover; habitat restoration on the southern Mill Site shoreline and other required integrated cleanup and habitat restoration activities. The selected Contractor(s) will have demonstrable experience with excavation. capping, soil or intertidal sediment disposal and placement, and habitat restoration. The Contractor is responsible for its own means and methods in the execution of its work and is responsible for ensuring that the work complies with the requirements of the contract Construction Specifications and Drawings pursuant to the integrated cleanup and habitat restoration action approved design and associated permits.

As part of the integrated cleanup and habitat restoration implementation, the Contractor will be responsible for developing and implementing the CQC Plan, including the required monitoring, sampling, testing, and reporting needed to implement the project in accordance with the Construction Specifications and Drawings. Independent of the Contractor's quality control program, the Companies will implement this CQAP to verify that the integrated cleanup and habitat restoration action is implemented in accordance with the approved design and associated permits.

The Contractor will use key personnel to help with the tasks described above, including an on-site Superintendent, CQC Supervisor, and Health and Safety Manager.

3.6.1 Contractor On-site Superintendent

Direction of the work for the Contractor will be through an on-site Superintendent who will be responsible for executing the work in full compliance with the Construction Specifications and Drawings. The Superintendent will work to resolve work-related problems and day-to-day project management. The Superintendent may utilize one or more foremen to directly supervise the major construction activities. The Superintendent will exercise supervision over subcontractors if subcontractors are utilized.

3.6.2 Contractor Construction Quality Control Supervisor

A CQC Supervisor will be provided by the Contractor as required in the Construction Specifications. The CQC Supervisor will develop and implement the CQC Plan through which the Contractor ensures compliance with the requirements of the Construction Specifications and Drawings. The CQC Plan will identify the duties and responsibilities assigned by the Contractor to the CQC Supervisor and additional quality control staff, as needed to monitor that the remedial action is implemented in accordance with the Construction Specifications and Drawings. The CQC Plan will state the chain of command for the CQC team, including identification of responsibilities for each member, to ensure that any actions related to the quality of work will be executed in an accurate and expeditious manner.

3.6.3 Contractor Health and Safety Manager

The Contractor will employ a Health and Safety Manager to develop and implement a CHASP. The CHASP will contain details of the chain of command and personnel responsibilities, as discussed in the Construction Specifications. The Health and Safety Manager will be required to have the appropriate current federal and state health and safety training necessary to perform the work.

3.7 Subcontractors

The Contractor will either perform construction elements or use subcontractors to perform selected phases of the work for which special expertise is required. The subcontractors are responsible to the Contractor for the quality of their work, protection of the environment, and adherence to the CQC Plan, EPP, and CHASP. The subcontractors' principals will each designate a job foreman with responsibility to see that the work is conducted in accordance with the contract requirements and the Construction Specifications and Drawings.

4 Contractor and Construction Quality Assurance Officer Qualifications

Qualifications of the CQAO, supporting inspection personnel, and the Contractor's firm and personnel, including minimum training and experience that will be required, are provided in this section.

4.1 Project Manager

The Project Manager will have demonstrated experience in managing environmental projects of a complexity and magnitude similar to or greater than the integrated cleanup and habitat restoration project described in the Integrated EDR (Anchor QEA 2022). The Project Manager will be thoroughly familiar with the CDs, CAPs, SOW, applicable environmental laws, and the requirements of the approved design documents and associated permits.

4.2 Construction Quality Assurance Officer and Inspector Qualifications

The CQAO will be identified prior to start of work. The CQAO will have demonstrated experience managing construction projects with similar quality assurance requirements. The CQAO will be required to have the appropriate current federal and state health and safety training necessary to perform the work. Additionally, the CQAO will be sufficiently familiar with the approved design documents and associated permits as well as construction operations to recognize deviations from those documents and operations. The CQAO will also manage and maintain the integrity of the data generated during the project. Additional inspectors may be used by the Contractor to help the CQAO. These inspectors will have experience inspecting construction activities for environmental projects and will have current federal and state health and safety training.

4.3 Contractor Qualifications

The Contractor will be selected through a competitive qualifications-based selection process. Each potential Contractor proposing on the project will be required to provide a Statement of Qualifications to the Companies with its proposal. This will allow the Companies to evaluate whether the proposer is qualified, in terms of experience and capability, to perform the work.

The Contractor will employ (as part of its permanent organization) senior, knowledgeable, and experienced personnel to oversee the project. The journeyman operators, surveyors, and other Contractor personnel performing key jobs must also have the demonstrated ability and skills to satisfactorily perform their respective assignments.

The CQC Supervisor must have documented qualifications and experience to perform independent checks on the Contractor's operations as necessary to determine compliance with the Construction Specifications and Drawings. These documented qualifications will be submitted to the Companies

for approval prior to identifying the CQC Supervisor. Additionally, any subcontractors utilized in the work must have demonstrated to the satisfaction of the Companies that they are qualified and have satisfactorily performed the type of work for which they will be engaged. However, responsibility for the subcontractor performance rests with the Contractor. All Contractor and subcontractor personnel working on this project will be required to have current federal and state health and safety training, as applicable to the work they will be doing on this project.

5 Description of Construction Activities

Details of the proposed construction activities within each Work Zone in the project area are included within the Construction Drawings, Specifications, and further described in the Integrated EDR (Anchor QEA 2022). There are four Work Zones within the Bay and Mill Site, along with a local disposal area at the Model Airplane Field (Work Zone 5). Construction activities are summarized as follows:

- **Work Zone 1**: This work zone will be excavated to 2-feet below ground surface (bgs) within the extents shown on the Construction Drawings. Following excavation to 2-feet bgs, a 5-point composite confirmation sample will be collected from the bottom of the excavation and analyzed for dioxin/furan toxicity equivalence (TEQ) to confirm soils exceeding the 12 ng/kg cleanup level have been removed in this area. Following receipt of confirmation sampling results verifying that excavation has been successfully completed, the area will be backfilled with clean material to grade.
- **Work Zone 2**: This work zone will be excavated in specified lifts and stockpiled in accordance with the Construction Drawings and Specifications. Following physical surveys verifying that the required excavation limits have been successfully achieved, the prism will be backfilled and capped. The excavated material will be managed as discussed in Section 6.1.4 of this CQAP. The excavation will be backfilled with clean materials and capped in accordance with the Construction Specifications. The cap will consist of a geotextile marker layer placed on the existing ground surface, 1.5 feet of clean imported backfill material, 6 inches of topsoil, and finished with hydroseeding. The cap in this work zone extends beyond the excavation footprint as shown in the Construction Drawings.[1]
- **Work Zone 3**: This work zone consists of four separate areas (Intertidal Area, Beach Backshore Area, Riparian Area, and Upland Placement Area). Shoreline excavation and capping will be conducted in discrete sections in this work zone such that the size of the area allows for work to be completed in a single low-tide cycle before the area is submerged by the rising tide.
  - The Intertidal Area will be excavated to lay back the intertidal beach to an average 8 horizontal to 1 vertical (8H:1V) slope. Excavated materials will be stockpiled, sampled, and managed as discussed in Section 6.1.4 of this CQAP. The Intertidal Area will be capped with a minimum 3-foot cap consisting of 1-foot of angular armor materials, 1-foot of rounded cobble/gravel, and 1-foot sand/gravel habitat substrate. A 1,500 CY habitat feeder berm will also be constructed at the southern end of the Mill Site shoreline in the beach backshore (approximately +12 feet mean lower low water), as shown on the Construction Drawings.

[1] The entirety of Work Zone 2 will be capped but the material within the excavation boundary will not be subject to the same institutional controls as other areas receiving the cap.

  - The Beach Backshore Area will be laid back at a slope of 20H:1V beginning at the crest of the slope of the Intertidal Area. The two lower layers of the intertidal cap (salvaged/import angular armor and rounded beach substrate) will extend beneath the entirety of the 30-foot-wide beach backshore slope and be overlaid by 1 foot of clean sand to support beach grass plantings.
  - The Riparian Area consists of hardscape materials that will be removed. After removal of the hardscape materials, a marker geotextile will be placed followed by two feet of clean material (sandy soil) throughout the 150-foot-wide riparian zone, followed by rototilling 4-inches of compost into the surface (top 1-foot of the 2-foot sandy soil layer), and placing 3 inches of mulch to create a surface suitable for tree and shrub plantings. Vegetation will be planted and irrigated as described in the Construction Drawings and Specifications.
  - The Upland Placement Area is primarily intended to be a disposal area for clean excavated soils from the intertidal shoreline, as described in the Integrated EDR. Existing impermeable ground surface within the Upland Placement Area will be perforated to and overlain with marker geotextile and capped with 1.5 feet of clean sand overlain with 0.5 feet of topsoil, followed by hydroseeding.
- **Work Zone 4**: An average 6-inch sand layer will be placed over a minimum of 11 acres in the Western Bay, as shown on the Construction Drawings. As practicable, clean dredge sands from the nearby Driftwood Key navigation channel will be used. Work plans for transplanting eelgrass in this area will be developed following completion of construction.
- **Work Zone 5:** The Model Airplane Field Limited Purpose Landfill will be used for disposal of suitable soils that meet disposal criteria. Placement and capping will be performed as described in the Construction Drawings and Specifications, followed by hydroseeding.

6 Quality Assurance Program

The CQA program is described in this section for each major construction activity. For each activity, the following is provided:

- Specific performance objectives and criteria for the activity
- Inspection and verification activities
- Quality assurance measures
- Contingency actions

Construction elements subject to the quality assurance program include all activities described in Section 5 of this CQAP. For each of these construction elements, inspection and verification activities will be implemented to confirm performance objectives have been met.

During the construction activities, the quality assurance program will progress as follows:

- The Contractor will submit a CQC Plan as detailed in Section 7. The CQC Plan will be subject to approval by the Companies before construction begins.
- The Contractor and the CQAO will conduct inspection and verification activities (i.e., stockpile sampling, testing, and monitoring) to ensure compliance with the approved design documents and to ensure that performance objectives have been met. The Companies, in consultation with the CQAO, will have final approval authority for all such inspections and for verifying that corrective actions, if any are warranted, are implemented.
- Any changes to approved design requirements or protocols will require approval by the Ecology Project Coordinator and Trustee Representative.
- The Contractor will provide documentation to the CQAO to demonstrate that specific components of the approved design documents have been properly implemented. The Companies, in consultation with the CQAO, will determine whether the components of the cleanup action are acceptable and complete.

The remainder of this section details performance objectives and criteria, along with quality assurance measures and specific inspection and verification activities that will be performed to confirm that performance objectives have been met in all Work Zones, as shown on the Construction Drawings.

6.1 Excavation and Stockpiling

This section describes the construction oversight activities, including CQC and CQA tasks, which will be undertaken to verify that excavation and stockpiling have been completed in accordance with the approved design documents.

6.1.1 Performance Objectives

The following performance objectives apply to excavation and stockpiling:

- Achieve the required excavation prism to remove soil dioxin/furan TEQ concentrations greater than 530 ng/kg or concentrations greater than 260 ng/kg in the top 6 feet bgs in Work Zone 2, and soil dioxin/furan TEQ concentrations greater than 12 ng/kg in Work Zone 1.
- Segregate excavated soil where various dioxin/furan concentrations are anticipated as detailed in the design drawings.
- Achieve the required average slope of approximately 8H:1V in the Intertidal Area and Beach Backshore Area of Work Zone 3.
- Minimize potential residual contamination.
- Prevent contamination through migration via groundwater and stormwater.

6.1.2 Inspection and Verification

Post-excavation surveying will be performed to verify that the limits and extents of excavation required in the Construction Drawings have been achieved. Survey will be conducted on a grid with minimum 5-foot by 5-foot spacing. A Real Time Kinematic Global Positioning System will be used to determine the horizontal position of each survey measurement taken. Additionally, within Work Zone 2, surveys will be conducted after each excavation lift to verify that the required elevation has been achieved for that lift.

Daily and weekly excavation reports will be prepared to track cumulative volume progress as well as production and coverage. The weekly report will contain the actual excavated volumes for that week and the cumulative totals since the start of excavation.

6.1.3 Quality Assurance Measures

Quality assurance measures for excavation and stockpiling include the following:

- GPS equipment aboard construction equipment
- Post excavation surveying
- Intermediate surveys of excavation lifts in Work Zone 2
- Stockpile surveying

6.1.4 Stockpile Management and Material Disposal

This section describes site preparation and general best management practices, excavated materials management and water management plan for stockpiling in Work Zones 1, 2 and 3.

6.1.4.1 Site Preparation and General Best Management Practices

As discussed in section 5.1 of the Integrated EDR (Anchor QEA 2022), specific temporary stockpile configurations within the designated work areas will be at the discretion of the contractor. However, all temporary stockpile areas will be appropriately contained to prevent uncontrolled runoff from leaving the area (runoff will be allowed to infiltrate within the stockpile areas). Methods for containing the stockpiles will be described in the CWP, which will be a required contractor submittal and will detail operations, including set up and breakdown, stormwater management, and maintenance and cleaning of upland work areas.

6.1.4.2 Excavated Materials Management

As discussed in section 5.1.1 of the Integrated EDR (Anchor QEA 2022), excavated materials will be segregated into approximate 1,500-cy stockpiles for ex situ sampling and chemical of concern (CoC) analysis. One ten-point composite sample will be collected and analyzed per each approximately 1,500-cy pile. Results of this testing will be used to verify that CoC concentrations meet suitability requirements, which will determine their ultimate disposition based on criteria described in section 2.4 of the Integrated EDR (Anchor QEA 2022). Discrete stockpile areas will not be co-mingled until characterization of stockpiles has been completed. Clean rock materials identified as suitable for replacement on the shoreline as armor material will be stockpiled separately and will not be subject to testing.

6.1.4.3 Water Management

As discussed in section 5.1.2.1 of the Integrated EDR (Anchor QEA 2022), the infiltration from stockpiles into groundwater is protective of groundwater, adjacent sediments, and surface water. Accordingly, the primary water management tool for the stockpile area will be infiltration. As necessary, the Contractor will demolish or perforate impermeable surfaces within the stockpile areas to allow for infiltration of interstitial water from sediments, as well as run-on from rainfall.

Management of water produced during any dewatering needed in the Work Zone 2 excavation area will also be managed via direct infiltration. Where infiltration rates cannot accommodate water from the stockpile area or excavation, excess water will be collected in one or more sumps or tanks. Sumps or tanks will provide temporary storage until water can be allowed to infiltrate.

6.2 Material Placement and Cap Construction

This section describes the construction oversight activities, including CQC and CQA tasks, which will be undertaken to verify that material placement and cap construction have been completed in accordance with the approved design documents.

6.2.1 Performance Objectives

- Achieve the minimum design thickness and proposed side slopes of material placement in all Work Zones
- Avoid impacts to existing eelgrass beds during material placement in Work Zone 4, including no disturbance by spudding, anchoring, and material placement
- Meet the specified tolerance limits for sand placement in Work Zone 4

6.2.2 Inspection and Verification

Pre-approved materials, where available, are referenced in the contract documents as to the source and relevant test results. Other local upland sources, including commercial sources, may also be selected by the Contractor, provided that the Contractor demonstrates that the proposed material meets chemical quality, gradation, and other requirements (e.g., rounded) presented in the Construction Specifications.

The Contractor will conduct a topographic survey following completion of excavation actions in each Work Zone and after backfill and cap materials have been placed. For the multi-layer Intertidal Area cap in Work Zone 3, interim surveys will be required to verify the thickness of each layer prior to placement of the overlying layer. The Contractor will also be required to track volume and/or weight of material placed on a daily basis and to make this information available to the Companies as part of their daily reports.

The material placement thickness in Work Zones 2 and 3 will be confirmed by comparing pre- and post-construction surveys. An additional verification will be conducted by calculating material quantities placed and determining the average thickness. The materials will be visually inspected during placement to ensure consistency throughout the cap areas. Areas containing sand backfill (Beach Backshore Area of Work Zone 3 and all of Work Zone 4) may also be verified by advancing a steel probe, measuring the thickness from the surface to the probe-determined contact with the underlying sediments and soils.

As practicable, the sand cover in Work Zone 4 will be constructed using clean dredge material from the nearby Driftwood Key navigation channel, which is expected to contain eelgrass seed and an optimal bacterial community to maximize restoration function development. Otherwise, clean marine (preferred) or local upland quarry sources will be used. If an alternative to Driftwood Key is necessary, material will be tested and be approved by the Ecology Project Coordinator and Trustee Representative prior to placement. Materials will be placed using a clamshell bucket or equivalent by slightly opening the bucket and spreading the material over the area to be covered, releasing it above the water surface. The northern and southern sand cover placement areas, depicted in Figure 3 of the EDR, incorporate approximate 100-foot offsets of cover placement from the edges of the meadow and northern patch to avoid potential impacts to existing eelgrass beds. The average 6-inch

placed thicknesses will be verified by calculating material quantities placed and by advancing a steel probe, measuring the thickness from the surface to the probe-determined contact with the underlying sediment.

6.2.3 Quality Assurance Measures

This CQA program includes the following measures for backfill material placement and capping, conducted by the Companies:

- Review Contractor-submitted results for:
  - Particle size (grain size) distribution testing
  - Chemical analysis testing
  - Other requirements (e.g., rounded habitat materials in Work Zone 3)
- Compare CoC concentrations from laboratory testing to the required suitability criteria presented in the contract documents.
- Conduct on-site visual observations of materials on a periodic basis to verify the suitability of materials for backfill and capping.
- Review Contractor-provided progress surveys to verify required cap or subtidal material placement thickness and coverage.
- Review Contractor-provided measurements of cap or subtidal material placed (on a per ton or per cubic yard basis).
- Supplement bathymetric survey and as-placed volume information with targeted probing and sampling, where appropriate, to provide further verification of placed thickness addressing potential subgrade settlement below the cap and/or subtidal material placement layer, which may confound bathymetric survey comparisons.

6.2.4 Contingency Measures

If the physical or CoC test results of the proposed backfill, cap, or any other materials to be placed does not meet the requirements of the contract, the Companies will reject these materials and require the Contractor to seek an alternate source for these materials.

If, based on visual observations, the material appears to have changed compared to the material for which particle size and chemistry results have been submitted, the Companies will require the Contractor to run additional tests to confirm that the material continues to meet requirements.

If the required cap, backfill or placement thickness has not been achieved, the Contractor will be directed to place more material in areas noted as deficient or remove over placement beyond the allowable thicknesses.

6.3 Riparian Zone Restoration

The CQAO will visually inspect and observe construction and planting of the riparian restoration zone to verify planting is performed in accordance with the Construction Drawings and Specifications.

6.4 Water Quality Monitoring

Water quality monitoring will be performed during in-water construction activities (e.g., in Work Zone 4) as described in the Water Quality Monitoring Plan (Appendix G of the Integrated EDR).

7 Documentation and Reporting

Documentation and reporting for CQA activities will include pre-construction documentation, construction documentation, and post-construction documentation as detailed below. The Contractor and the CQAO will work closely on a daily basis during construction to complete the project as specified in the approved design documents and to collect the documentation required. The following sections describe documentation that will be required throughout the integrated cleanup and habitat restoration action.

7.1 Pre-construction Documentation

The Contractor will be required to submit a CWP for approval by the Companies, the Ecology Project Coordinator, and Trustee Representative. The CWP will contain the following elements:

- Project work plans
- CQC Plan
- CHASP
- Construction EPP
- Project Construction Schedule
- Survey Control Plan

Ecology and Trustee approval authorities for these plans are defined in the CDs. CQA and CQC procedures will be addressed in various elements of the CWP. A brief description of the contents of each plan component of the CWP is provided below.

7.1.1 Project Work Plans

The project work plans will describe, in narrative form, the methods to be employed during each construction activity including equipment types, modes of operation, schedules, sequence of activities, and other aspects necessary to describe how and when the specified work will be performed. The project work plans will have specific sections detailing how the following elements will be completed:

- Excavation
- Sloping
- Material placement
- Capping
- Spill prevention, control, and countermeasures
- Construction stormwater pollution prevention measures
- Waste management, transportation, and disposal
- Temporary facilities and controls

- Air pollution and odor controls
- Soil recontamination controls
- Groundwater controls

The project work plans will describe how each of the quality assurance measures and verification activities identified in Section 6 will be addressed in the field.

7.1.2 Construction Quality Control Plan

The CQC Plan will present the system through which the Contractor ensures that construction activities are being implemented in compliance with the requirements of the contract and specifically how each of the quality assurance measures and verification activities identified in Section 6 will be addressed in the field. The CQC Plan will identify personnel, procedures, methods, instructions, inspections, records, and forms to be used in the CQC system. Specifically, the CQC Plan will include a description of procedures for maintaining and updating daily activity logs, procedures for reporting out-of-spec conditions, recordkeeping procedures for personnel, equipment maintenance and calibration, and daily and weekly reporting requirements.

7.1.3 Construction Health and Safety Plan

The Contractor will submit its CHASP presenting the necessary health and safety requirements for job site activities, and the measures and procedures to be employed for protection of on-site personnel. The plan will cover the controls, work practices, personal protective equipment, and other health and safety requirements that will be implemented by the Contractor in connection with the cleanup action construction activities. The Contractor shall use personnel that are trained to maintain the necessary health and safety protocols for this type of cleanup work.

7.1.4 Construction Environmental Protection Plan

The Contractor will be required to submit an EPP describing the environmental protection measures and monitoring activities that will accompany all construction activities. The EPP will cover potential environmental releases as a result of the Contractor operations, as well as monitoring and corrective actions necessary to control such releases. The EPP will contain separate sections addressing contamination prevention, containment and cleanup, erosion and turbidity control, sound level control, air pollution and dust control, and water quality monitoring as they pertain to the pertinent construction activities described in Section 6.

7.1.5 Project Construction Schedule

A detailed Project Construction Schedule will be submitted by the Contractor for each construction element prior to construction. The schedule will include anticipated time frames for receipt of stockpile characterization CoC sampling results and salinity sparging prior to on or off-site disposal.

Periodic schedule updates will be submitted by the Contractor following progress meetings. Additional requirements for the construction schedule are included in the specifications.

7.1.6 Survey Control Plan

The Contractor will submit a Survey Control Plan prior to construction. The plan will detail the specific procedures, equipment, and personnel to be used for all landside and in-water surveying work. The plan will also discuss the quality assurance and quality control measures to confirm surveying results. Additional surveying requirements are included in the specifications.

7.2 Construction Documentation

During construction activities, the Contractor will be required to provide a variety of documentation to the CQAO, including testing results of materials received, weight tickets for shipments of materials removed or imported, survey results, and documentation of pay items completed. The Contractor will also maintain a daily log of activities, as described in Section 7.2.1. The CQAO will maintain a field report of daily activity and complete an internal weekly report. The contents of the report are described in Section 7.2.2. Weekly progress reports will be submitted to the Ecology Project Coordinator and Trustee Representative. Additional documentation is described in Sections 7.2.3 through 7.2.6. The records described in this section will be maintained in the project files. Monitoring data will be provided electronically to the Ecology Project Coordinator and Trustee Representative, and will be summarized in the Integrated Cleanup and Restoration Action Report (ICRAR).

If, during the course of construction, modification of the approved design is required, modifications will be documented in writing. Undocumented modifications of the design or other deviations from the approved design will not be permitted. Construction surveys, including as-built surveys, will be documented on drawings using the same datum, unit, and scale as design drawings. Record drawings will allow for a direct visual assessment of the quality and completeness of construction.

7.2.1 Contractor's Daily Quality Control Report

During construction activities, the Contractor shall prepare a Daily Quality Control Report and submit it to the CQAO. The Contractor's daily report will record the following information at a minimum:

- Date
- Weather conditions
- Identification of personnel on-site and appropriate professional certifications
- Description of activities completed as identified by stationing and offset
- Any changes to best management practices or environmental controls
- Materials delivered or used
- Equipment used

- Period covered by the report and hours worked
- Area and quantity of materials excavated, stockpiled, and/or disposed of off-site
- Area and quantity of materials placed on-site
- Surveys completed and progress survey data
- Weight tickets
- Results of any quality control inspections, tests, or other monitoring activities
- On-site/off-site loading facility activities
- Problems encountered and resolution of problems
- Downtime and delays to the operation
- Health and safety status

The Daily Quality Control Reports will be sent to the Ecology Project Coordinator and Trustee Representative on a weekly basis as part of the Weekly Summary Reports as discussed in Section 7.2.3.

7.2.2 Construction Quality Assurance Officer's Daily Report

The CQAO will maintain a daily field log to record observations, measurements, inspections completed, and data received; communications with other members of the project team, the Ecology Project Coordinator, Trustee Representative; any water quality exceedances; additional environmental controls that were implemented; problems encountered; and resolutions. The daily field log will be supported by submittals received from the Contractor, such as survey results and weigh tickets, chain of custody forms for water quality monitoring samples collected, laboratory data received, inspection reports, and written communication from members of the project team, Ecology Project Coordinator, or Trustee Representative. Water quality results will also be separately recorded and reported as described in the Water Quality Monitoring Plan (Appendix G of the Integrated EDR).

7.2.3 Weekly Summary Reports

The CQAO, in cooperation with the Contractor, will prepare weekly summaries of progress. These summaries will facilitate the preparation of the Weekly Summary Reports. The Weekly Summary Report will identify progress organized by activity, as follows:

- Excavation
  - Area worked (supported by Contractor's log)
  - Volume of material removed (supported by Contractor's log)
  - Surveys completed (supported by Contractor's log)
  - Schedule confirmation (i.e., confirm that production is compliant with the scheduled activity)
  - Problems encountered

    - Corrective actions
- Backfill and/or capping material placement
    - Area worked (supported by Contractor's log)
    - Weight/volume of material placed
- Numbers and species of vegetation planted
- Schedule confirmation (i.e., confirm that production is compliant with scheduled activity)
- General problems encountered
- Corrective actions
- Environmental controls
- Samples collected
- Summary of visual results

7.2.4 Weekly Construction Meetings

Weekly progress meetings will be coordinated with the Ecology Project Coordinator and Trustee Representative including pre-notification of the time and place of meetings. Conference call access will be provided as needed and meeting minutes will be prepared and made available to attendees.

7.2.5 Import Material Characterization

Prior to any on-site placement of import materials, except for using clean dredge material from the nearby Driftwood Key navigation channel to construct sand cover in Work Zone 4[2], the Contractor shall submit a Borrow Site Characterization Report to the CQAO. The characterization report will include identification of the source (including a map documenting the origin of the material), site inspection, and material sample and characterization (physical and chemical testing, as specified) to ensure that the import material will meet the chemical and physical specifications of its intended use.

7.2.6 Post-construction Documentation

Within 120 days of completion of each construction season, the Companies will submit a summary of information that will be presented in the Draft ICRAR. Within 120 days of notification by the Ecology Project Coordinator and Trustee Representative that all of the cleanup and restoration action requirements have been fulfilled (excluding long-term post-construction monitoring requirements), the Companies will submit the Draft ICRAR. The Draft ICRAR will contain the following information:

- Introduction
    - Site location
    - Environmental setting
    - Relevant operational history

[2] Dredge material from the Driftwood Key navigation channel has been previously characterized and approved by the Ecology Project Coordinator and Trustee Representative for placement in Work Zone 4.

  - Summary of previous investigations and actions
- Integrated cleanup and restoration action background
  - Basis for the integrated cleanup and restoration action (i.e., the CDs, CAPs, and SOW)
  - Cleanup and restoration performance standards
  - Summary of design basis
  - Summary of deviations from the design, if any
- Construction activities
  - Description of excavation activities
  - Description of backfill material placement
  - Description of cap placement
  - Description of transport, offloading, and off-site disposal
  - Description of material reuse
  - Description of construction monitoring activities
  - Description of completion and demobilization
- Chronology of events
  - Description of the timing of construction activities, identifying milestones with reference to a tabular summary of a more detailed construction timeline
- Performance standards and CQC
  - Description of performance objectives and verification activities performed to confirm the integrated cleanup and restoration action was implemented in accordance with the Construction Specifications and Drawings
  - Description of actual construction performance relative to performance objectives, including a summary of the results of CQA measurements and analyses
  - Description of contingency actions implemented, if any were necessary
  - Description of Ecology Project Coordinator and Trustee Representative oversight activities
- Final inspection and certifications
  - Description of final inspections, including the scope of inspections and noting any deficiencies identified and corrective actions implemented
  - Summary of health and safety monitoring during the implementation of the integrated cleanup and restoration action with notation of deviations or incidents, if applicable
  - Identification of any institutional or engineering controls that are implemented to maintain the integrity of the integrated cleanup and restoration action, including identification of parties responsible for maintaining and enforcing controls
  - If applicable, summary of close out requirements for off-site offloading facility
- Operation and maintenance activities
  - Description of post-construction monitoring and maintenance requirements

  - Description of contingency measures that would be implemented if post-construction monitoring indicates such measures are warranted
- Observations and lessons learned
  - Identification of problems encountered, if any, in implementing the integrated cleanup and restoration action and corrective actions
  - Identification of successes in implementing the integrated cleanup and restoration action
  - Analysis of lessons learned that may be applied to future activities
- Project contact information
  - Identification of individuals (contact names, addresses, and phone numbers) for design and construction contractors, Ecology oversight contractors, and key personnel at the Companies, Ecology, Trustees, and other agencies

The ICRAR will also include copies of as-built drawings, summaries of waste disposal and analytical results, the Final Water Quality Monitoring Report, and the certification statements required by the CDs.

The Companies will submit a Final ICRAR within 90 days of receipt of Ecology Project Coordinator and Trustee Representative comments on the Draft ICRAR.

8 References

Anchor QEA, LLC, 2022. *Engineering Design Report*. Port Gamble Integrated Cleanup and Habitat Restoration Design. October 2022.

Ecology (Washington State Department of Ecology), 2013. *Final Cleanup Action Plan*. Exhibit A to the Port Gamble Bay Consent Decree No. 13-2-02720-0.

Ecology, 2020. *Cleanup Action Plan - Upland Areas of the Port Gamble Bay and Mill Site*. September 2020.

Ecology, 2022. Bay Habitat Restoration Statement of Work.

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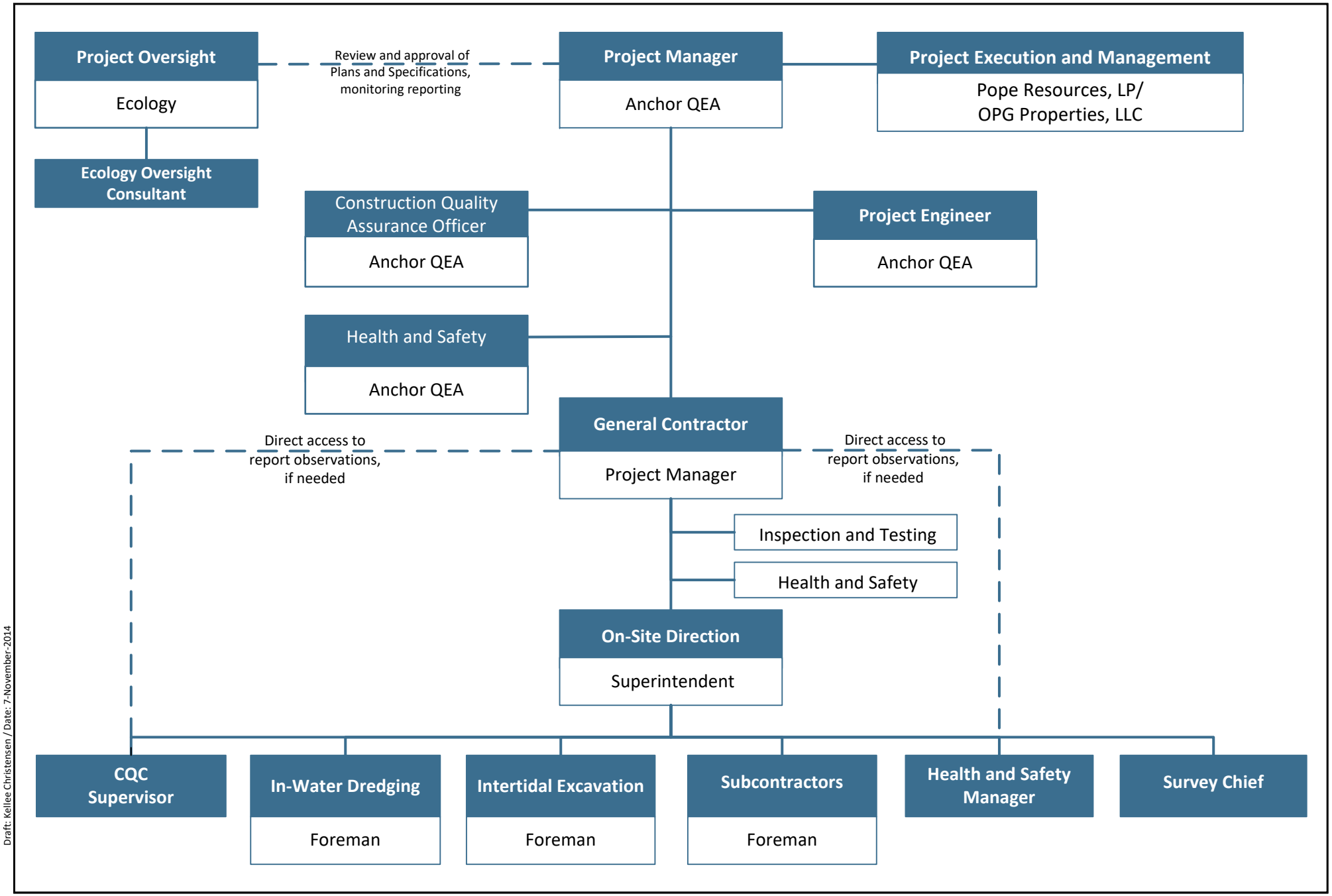

Draft: Kellee Christensen / Date: 7-November-2014

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Figure F-1
Organizational Chart
Appendix F: Construction Quality Assurance Plan
Port Gamble Bay and Mill Site

Appendix H
Water Quality Monitoring Plan

November 2023
Port Gamble Bay Habitat Restoration Project

ANCHOR QEA

Water Quality Monitoring Plan

Prepared for OPG Port Gamble, LLC

November 2023
Port Gamble Bay Habitat Restoration Project

Water Quality Monitoring Plan

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Seattle, Washington 98101

Project Number: 212381-03.01
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ABBREVIATIONS

BMP	best management practice
CoC	Chemicals of Concern
Ecology	Washington State Department of Ecology
RSET	Regional Sediment Evaluation Team
WAC	Washington Administrative Code
WQMP	Water Quality Monitoring Plan

1 Introduction

This document presents the *Water Quality Monitoring Plan* (WQMP) for integrated cleanup and habitat restoration actions in upland and nearshore aquatic areas in Port Gamble, Kitsap County, Washington. This WQMP has been prepared to support project compliance with the requirements of Washington State's Water Quality Standards for Surface Waters (Washington Administrative Code [WAC] 173-201A). The WQMP builds on similar water quality monitoring programs that were successfully implemented during previous sediment cleanup actions in Port Gamble (e.g., 2015 to 2017; Anchor QEA 2015) and at other similar sites in Puget Sound. Water quality monitoring standards have been developed consistent with water quality criteria for marine waters designated as "excellent quality," as specified in WAC 173-201A-210 – Marine Water Designated Uses and Criteria.

This WQMP includes the following information:

- Water quality monitoring program (Section 2)
- Contingency measures (Section 3)
- Notification and reporting (Section 4)

2 Water Quality Monitoring Program

OPG Port Gamble, LLC; Pope Resources, a Delaware Limited Partnership; and OPG, LLC will designate a Water Quality Protection Lead to conduct water quality monitoring during in-water construction periods to ensure compliance with state water quality standards for surface water. For safety reasons, water quality monitoring will be restricted to daylight hours. Sections 2.1 through 2.5 describe the specific water quality parameters to be assessed, monitoring locations, monitoring frequency, field procedures, and analytical procedures.

2.1 Monitoring Parameters

As discussed in the Regional Sediment Evaluation Team (RSET) *Sediment Evaluation Framework for the Pacific Northwest* (2016), water column effects associated with in-water construction are intermittent, discontinuous, and relatively short lived. The Washington State Department of Ecology (Ecology) has promulgated statewide water quality standards under the Washington Water Pollution Control Act (Revised Code of Washington 90.48). Water quality criteria are defined for different types of pollutants and the characteristic uses for each class of surface water. The standards for marine waters are applicable to discharges to surface water during sediment excavation and cap and cover placement, include turbidity and pH, and may include chemicals of concern (CoCs) depending on site-specific conditions.

RSET, an organization that includes Ecology and other regulatory agencies in the Pacific Northwest, recently developed a screening tool to identify maximum sediment concentrations of CoCs that would not exceed water quality criteria when resuspended at the point of removal; this tool has been used to determine water quality monitoring requirements at other regional sediment cleanup projects, including the 2015 to 2017 Port Gamble Bay cleanup project (RSET 2016). As discussed by Anchor QEA (2015), there is no need for water quality monitoring of CoCs during sediment removal operations in Port Gamble Bay.

Water quality monitoring data will be collected during in-water construction periods to confirm compliance with turbidity and pH standards. Table 1 includes the water quality standards for the "excellent quality" designation for the monitoring parameters (turbidity and pH), as detailed in Tables 210(1)(e) and 210(1)(f) of WAC 173-201A-210.

Table 1
Water Quality Monitoring Criteria

Monitoring Parameters	Water Quality Criterion
Turbidity	Turbidity must not exceed: • 5 NTUs over background when the background is 50 NTU or less; or • A 10% increase in turbidity when the background turbidity is more than 50 NTUs
pH	pH must be within the range of: • 7.0 to 8.5 with a human-caused variation within the above range of less than 0.5 units

Note:
NTU: nephelometric turbidity unit

The standards in Table 1 will be met at the point of compliance boundary.

2.1.1 Water Quality Monitoring During Material Placement

Elevated turbidity is expected during placement of cap and cover material, consistent with other regional sediment cleanup projects. Project experience has shown that even when using cap and cover materials with very few fines, localized turbidity exceeding water quality standards for surface water is likely, even when employing all available best management practices (BMPs). Consistent with the approach used successfully at other regional sediment cleanup projects, cap and cover placement will continue if there are turbidity exceedances. Placement of these materials will result in long-term gains in protection of beneficial uses, and these activities will rapidly accomplish cleanup and restoration objectives, resulting in a net positive effect on human health and the environment because environmental conditions in the bay would be improved over current conditions.

2.1.2 Water Quality Monitoring During Intertidal Excavation

Intertidal excavation and capping will be performed "in-the-dry" (during low tide periods using land-based equipment) to the extent practicable, and water quality monitoring will not be required for these activities when conducted in-the-dry. Water quality monitoring is included in this plan for the unlikely event that intertidal excavation needs to be performed "in-water" (during high tide periods when the work zone is submerged) using land-based equipment.

2.2 Monitoring Locations and Depths

The monitoring distance for water quality measurements is a 150-foot radius from active in-water intertidal excavation or turbidity curtain, when deployed, and a 300-foot radius from clean material placement activities (i.e., the point of compliance). Each monitoring event will consist of measuring turbidity and pH at three or four locations at the point of compliance, depending on the site, and one

background location (Figure 1).[1] Steps to modify the operation if exceedances are detected at the point of compliance are described in Section 3. When the 300-foot radius is the point of compliance, a 150-foot radius data point will be collected as an early warning station, and the contractor will implement an extra BMP during material placement, as described in Section 3.

The representative background monitoring station will be located approximately 1,000 feet beyond active in-water work areas. Figure 1 shows the proposed background sample locations for the different Work Zones.

Figure 1 also shows a radial compliance boundary and several representative water quality monitoring locations for compliance measurements. The actual positions of compliance and background stations will be adjusted in the field based on actual construction areas using the best professional judgment of the monitoring crew, who will also take into consideration tidal variations and associated currents. The actual positions will be recorded in the field documentation.

At each monitoring station, turbidity and pH measurements will be obtained 3 feet below the water surface, mid-depth within the water column, and 3 feet above the bottom. Water depth will be determined using a lead line at the monitoring location and will be recorded on the field data log sheet. Sample measurements from each of the three depths will be compared to measurements at corresponding depths at the background stations.

2.3 Monitoring Methods and Equipment

Water quality monitoring will typically be conducted from a boat during daylight hours, though there may be locations that could be monitored from docks or land. Monitoring will be performed using a calibrated multi-probe meter (e.g., a Hydrolab, YSI probe, or similar) and/or a calibrated Hach turbidity meter. Turbidity and pH during each monitoring event and respective location will be recorded on a field data sheet.

All locations for water column measurements will be in relationship to the location of the construction activity at the time of sampling (i.e., 150 or 300 feet down current of the construction activity). Distances from construction activity will be verified using a range finder. Actual differential global positioning system coordinates, times, and depths of all water column sample locations will be recorded.

[1] The outer extent of the compliance boundaries and background locations are shown in Figure 1; however, the actual location within these boundaries is dependent on construction activities.

Monitoring equipment will be calibrated daily and allowed to equilibrate prior to use. Calibration information will be recorded in the field notebooks. Monitoring equipment will be handled according to the manufacturer's recommendations. Unusual or questionable readings will be noted, and duplicate readings will be collected.

At the conclusion of each monitoring event, field data sheets and results of the monitoring event will be retained in the project file.

Figure 1
Approximate Water Quality Monitoring Stations

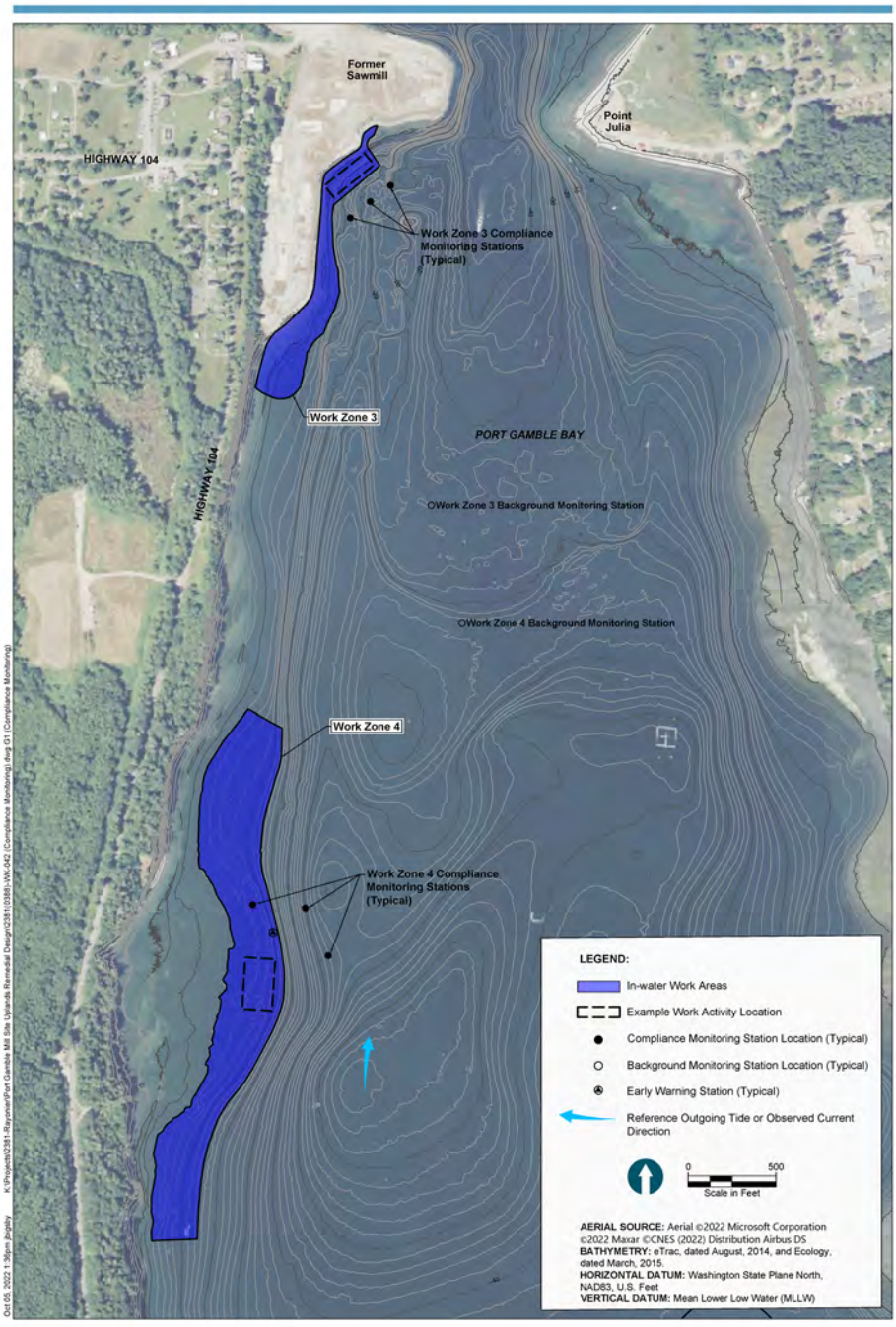

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Figure G-1
Approximate Water Quality Monitoring Stations
Appendix G: Water Quality Monitoring Plan
Port Gamble Bay Cleanup Site

2.4 Monitoring Frequency and Schedule

The frequency and schedule of water quality monitoring during in-water work periods will occur at three different levels, as described in the following:

- *Intensive* – Collection of turbidity and pH measurements will occur every 4 hours during in-water work, with at least two measurements per day for the first 3 days.
- *Routine* – If no confirmed exceedances occur during the Intensive monitoring period, collection of turbidity and pH measurements will occur once daily during in-water work for 3 additional days or if turbidity plumes become visually evident within the 150-foot compliance area.
- *Limited* – If no confirmed exceedances occur during the Routine monitoring period, collection of turbidity and pH measurements will occur once per week during in-water work.

The occurrence of confirmed exceedances, visual turbidity observations at the point of compliance, or a significant change in construction equipment or operations (e.g., moving construction from one Work Zone to another Work Zone) will trigger a transition back to Intensive monitoring.

2.5 Quality Assurance

The quality assurance objective for this project is to ensure that the data collected are of known and acceptable quality so that the goals of the water quality program can be achieved. Appropriate field quality control procedures will be followed. These procedures include performing routine field instrument calibration and following standard instrument operation procedures.

3 Contingency Measures

The following conditions will require an immediate stop-work response:

- Evidence of a significant oil sheen
- Evidence of distressed or dying fish

In the event of a confirmed water quality exceedance, the contractor will be directed to adjust and/or increase their BMPs, and intensive monitoring will be continued. A subsequent confirmed exceedance of water quality criteria may also trigger a stop-work response following consultation with Ecology.

Additional steps may be required in the event of water quality measurements that exceed relevant criteria at the compliance boundary. Visual turbidity observed within 150 feet of the work area (or turbidity curtain, when deployed) will trigger a measurement of turbidity and pH at the compliance station. If turbidity or pH measured at the compliance station do not meet the criteria listed in Section 2.1, the following sequence of responses will be initiated:

1. If an initial exceedance is measured at the early warning station, the contractor will be notified that they may need to supplement their BMPs, and a measurement will be collected at the compliance station.
2. If an initial exceedance is measured at the compliance station, the sampler will wait 5 to 10 minutes and retake measurements at the station. The field team will visually assess the station vicinity for potential outside influences.
3. If water quality passes the turbidity and pH standards, the monitoring crew will move to the next station.
4. If the station water turbidity or pH standard exceedance is confirmed (two measurements in 5 to 10 minutes), the contractor and Ecology will be notified, and options to modify the contractor's operations will be assessed.
5. The contractor will modify operations as necessary to meet turbidity and pH standards.
6. The sampler will wait 30 minutes to 1 hour and retake measurements at the compliance station.
7. If additional exceedances are confirmed at any compliance station after 30 minutes to 1 hour, the contractor and Ecology will be notified, and the contractor may be issued a stop-work order.

A significant change in construction equipment or operations (e.g., changing methods for material placement) will trigger a transition back to Intensive monitoring as described in Section 2.4.

3.1 Additional Construction BMP for 300-foot Point of Compliance

When the 300-foot point of compliance is used for clean cover placement, the contractor will take an additional measure as a BMP as follows:

- During cover placement, the contractor will open the placement bucket within 1 to 2 feet above the water surface. Cover material will not be allowed to free fall greater than 2 feet above the water surface.

Alternatively, the contractor may elect to use the standard 150-foot point of compliance for water quality, in which case the BMP described above will not be considered a requirement but may be an elective measure selected by the contractor to help manage water quality.

4 Notification and Reporting

If a confirmed water quality exceedance is recorded, notification will be conducted as follows:

1. Report the exceedance to the assigned Ecology representative listed below. Notify the contractor to modify their operations.

   Corey King
   Washington State Department of Ecology
   ckin461@ECY.WA.GOV
   (360) 280-5684

2. Modify the contractor's operations and recheck water quality.
3. As determined following consultation with Ecology, discontinue any further in-water work if a confirmed exceedance occurs after the contractor modifies their operations.
4. Immediately report any observed distressed or dying fish to Ecology's 24-hour Spill Response Office at 800-258-5990.

Copies of the field data logs will be transmitted to the Ecology representative on a weekly basis during construction.

After the project is completed, water quality monitoring data will be summarized in the project completion documents, which will include data summary tables, actual sample locations, descriptions of field activities and deviations from the WQMP, and copies of the actual field logs as an appendix. The completion documents will be submitted in accordance with project permit requirements.

5 References

Anchor QEA (Anchor QEA, LLC), 2015. *Water Quality Monitoring Plan, Port Gamble Bay Cleanup Project*. Prepared for Washington State Department of Ecology. May 2015.

Ecology (Washington State Department of Ecology), 2020. *Cleanup Action Plan Upland Areas of the Port Gamble Bay and Mill Site*. September 2020.

RSET (Regional Sediment Evaluation Team), 2016. *Sediment Evaluation Framework for the Pacific Northwest*. Prepared by U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, Washington Department of Ecology, Washington Department of Natural Resources, Oregon Department of Environmental Quality, Idaho Department of Environmental Quality, National Marine Fisheries Service, and U.S. Fish and Wildlife Service. July 2016.

Appendix I
Monitoring and Maintenance Plan

January 2024
Port Gamble Integrated Cleanup and Habitat Restoration

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Monitoring and Maintenance Plan

Prepared for Washington State Department of Ecology; Port Gamble Natural Resource Trustees; OPG Port Gamble LLC; Pope Resources; and OPG Properties LLC

January 2024
Port Gamble Integrated Cleanup and Habitat Restoration

Monitoring and Maintenance Plan

Prepared for
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ABBREVIATIONS

Bay	Port Gamble Bay
CAP	Cleanup Action Plan
CD	Consent Decree
Companies	Port Gamble LLC; Pope Resources; and OPG Properties LLC
Ecology	Washington State Department of Ecology
EDR	Engineering Design Report
Mill Site	former Port Gamble sawmill site
MMP	Monitoring and Maintenance Plan
MTCA	Washington State Model Toxics Control Act
NRD	Natural Resource Damage
OMMP	Operations, Maintenance, and Monitoring Plan

1 Introduction

This document presents the post-construction *Monitoring and Maintenance Plan* (MMP) for integrated cleanup and habitat restoration actions in upland and nearshore aquatic areas in Port Gamble, Kitsap County, Washington. Integrated cleanup and habitat restoration actions in Port Gamble will be implemented concurrently to achieve efficiencies and maximize protection.

Aquatic cleanup requirements for Port Gamble Bay (Bay) are set forth in the Bay Cleanup Action Plan (CAP; Ecology 2013) and Washington State Model Toxics Control Act (MTCA) Consent Decree (CD) 13-2-02720-0 between OPG Port Gamble LLC; Pope Resources, a Delaware Limited Partnership; and OPG Properties LLC (collectively, the Companies) and the Washington State Department of Ecology (Ecology). Similarly, upland cleanup requirements for the former Port Gamble sawmill site (Mill Site) are set forth in the Mill Site uplands CAP (Ecology 2020) and MTCA CD 20-0-01674-18 between the Companies and Ecology. Finally, habitat restoration actions are set forth in the Bay Habitat Restoration Statement of Work (Anchor QEA 2023) and the pending Natural Resource Damage (NRD) CD between the Companies and the Port Gamble S'Klallam Tribe; the Suquamish Tribe; the Skokomish Indian Tribe; the Jamestown S'Klallam Tribe; the Lower Elwha Klallam Tribe; the U.S. Department of the Interior; and Ecology (collectively, the Natural Resource Trustees).

The Bay *Operations, Maintenance, and Monitoring Plan* (Bay OMMP; Anchor QEA 2018) describes post-construction monitoring and maintenance in the Bay, including detailed work plans for engineered sediment caps to ensure they remain stable and chemically protective over time. The Bay OMMP also includes post-construction surface sediment monitoring to verify that cleanup objectives are achieved. The *Sampling and Analysis Plan* and *Quality Assurance Project Plan* that accompanies the Bay OMMP specifies procedures to ensure that sample collection, handling, and analysis will result in data of sufficient quality to evaluate the effectiveness of remedial actions. Ecology will continue to be the regulatory authority and responsible agency overseeing cleanup actions within the Bay and Mill Site.

The Engineering Design Report (EDR) for integrated cleanup and habitat restoration actions (Integrated EDR) presents a narrative discussion of performance standards, updated Bay and Mill Site cleanup remedy designs, NRD restoration designs, and how cleanup and restoration actions will meet professional engineering standards of practice and regulatory requirements. This MMP, which is an appendix to the Integrated EDR, describes post-construction monitoring, maintenance, and adaptive management of cleanup and habitat restoration actions beyond those described in the Bay OMMP (Anchor QEA 2018) to further ensure long-term protectiveness and habitat development.

1.1 Organization of the Monitoring and Maintenance Plan

The remainder of this MMP is organized as follows:

- Section 2 – Cleanup Cap Monitoring and Corrective Action
- Section 3 – Habitat Monitoring and Maintenance
- Section 4 – References

Section 2 describes upland cleanup cap monitoring and potential corrective actions consistent with requirements set forth in the Mill Site uplands CAP (Ecology 2020) and MTCA CD 20-0-01674-18 between the Companies and Ecology. Section 3 describes initial habitat monitoring and maintenance that will be implemented for 10 years following completion of habitat construction ("Establishment Period") to ensure successful habitat restoration projects. Habitat maintenance, monitoring, and stewardship requirements beyond the 10-year Establishment Period are described in the pending NRD CD. Section 4 presents references cited in the text.

2 Cleanup Cap Monitoring and Corrective Action

This section describes physical integrity performance monitoring of upland and intertidal cleanup caps and potential corrective actions under oversight by Ecology. Physical integrity performance monitoring of subtidal cleanup caps, along with Bay-wide sediment and shellfish tissue quality confirmation monitoring, will continue as described in the Bay OMMP (Anchor QEA 2018).

2.1 Cap Monitoring

Following the initial post-construction (as-built) surveys of engineered upland and intertidal cleanup caps as described in Appendix F - *Construction Quality Assurance Plan* of the Integrated EDR, long-term monitoring of cap areas will be performed to ensure their continued integrity. Both a topographic survey and concurrent visual inspection will be performed to evaluate the integrity of caps relative to as-built post-construction conditions. Topographic surveys of all upland cap areas as well as intertidal cap areas above approximately +0 feet mean lower low water (MLLW) will be performed using established control points to identify changes in cap elevations. Topographic surveys will be conducted by a licensed surveyor and will meet or exceed criteria set forth in the Bay OMMP (Anchor QEA 2018).

The Year 0 as-built survey is currently targeted to occur in fall 2024. Subsequent surveys will occur in Year 1 (2025), Year 2 (2026), Year 4 (2028), Year 7 (2031), and Year 10 (2034). The need for and scope of long-term cap monitoring beyond Year 10 will be developed as a collaborative effort between the Companies and Ecology based on the results of monitoring through Year 10 and may be triggered by specific storm or seismic events (e.g., a wind event with a recurrence interval of 20 years or more, or a seismic event greater than a magnitude of 5.5).

Survey methods will be similar between the as-built and each long-term monitoring survey to allow detailed comparisons. Changes in elevations will be evaluated to identify areas of net settlement, erosion, or deposition relative to post-construction conditions. A potential cap area of concern for potential settlement or erosion will be identified when the apparent total cap thickness relative to as-built conditions is less than the minimum 2-foot-thickness specification defined in the Integrated EDR for beach backshore and intertidal cap areas.

Following receipt of initial post-construction (as-built) surveys, the Companies will submit to Ecology and the Trustees a draft MMP *Sampling and Analysis Plan and Quality Assurance Project Plan* that specifies cap monitoring details (e.g., specific control points and survey transects). Following approval, the Companies will perform long-term monitoring under Ecology and Trustee oversight. Monitoring reports are described in Section 3.4.

2.2 Potential Corrective Actions

Intertidal cap monitoring will continue in 2025 and 2030 using approved OMMP physical integrity monitoring procedures. Contingent intertidal sediment quality monitoring will be performed as necessary based upon the results of the physical integrity monitoring. If monitoring indicates that remedial action performance standards may not be achieved, the Companies will submit recommendations for further monitoring to Ecology for review, consistent with the requirements described in the Bay and Mill Site CDs and CAPs. If further monitoring data reveal that cap performance standards are not being achieved, a response plan will describe additional response actions to be taken to ensure the successful performance of the work. In conjunction with Ecology, the Companies will evaluate the extent and significance of the exceedance or trigger. The need for additional response actions will take into consideration all monitoring results relative to an overall assessment of the successful performance of the remedial action. Through these discussions, an appropriate course of action will be developed and implemented, as necessary. The specific problem causing the need for a contingency will dictate which additional response actions may be most appropriate. Possible additional response actions for erosion of cap material may include, but are not limited to, those listed for the following scenarios:

- Perform additional monitoring to further assess erosion and to determine the extent, cause, and potential solution to the verified erosion.
- Perform additional sediment quality sampling within those erosion areas where there may be a potential for underlying material to be exposed.
- Discuss operations that might contribute to erosion and modifications to these operations that may be required to maintain remedy effectiveness.
- Place additional material with less erosion potential to supplement caps.

3 Habitat Monitoring and Maintenance

As described in the Integrated EDR, habitat construction actions in the Bay include the Southern Mill Site shoreline restoration and Western Bay nearshore thin layer sand cover projects, as generally depicted on Figures 1 to 3. Further details of restoration construction are provided in Appendix E – *Construction Drawings* of the Integrated EDR.

This section describes initial habitat monitoring and maintenance that will be implemented during the 10-year post-construction Establishment Period under oversight by the Trustees. Implementation of the monitoring plan will determine if restoration objectives are being met, or whether maintenance needs to be modified. It will also determine whether contingency measures or adaptive management strategies need to be implemented, and if they are implemented, whether they are successful.

Western Bay eelgrass transplanting details are not described in this MMP but will be detailed in separate documents to be approved by the Trustees under the pending NRD Consent Decree.

3.1 Habitat Monitoring

Post-construction monitoring in habitat restoration areas will include the following components:

- Southern Mill Site Shoreline Restoration
  - Intertidal Stability
  - Intertidal Substrate
  - Riparian Vegetation
  - Backshore Vegetation
- Western Bay Nearshore Thin Layer Sand Cover
  - Subtidal Stability
  - Porewater Protection
  - Benthic Invertebrates

For each of these components, success criteria summarized in Table 1 will be used during the 10-year post-construction Establishment Period to determine if habitat restoration goals are being met. These criteria are adapted from monitoring guidelines used successfully at other similar Puget Sound habitat restoration projects. Each criterion can be measured and has contingency measures that can be applied during the monitoring period. Key habitat restoration monitoring elements summarized in Table 1 include:

- Performance Standards
- Monitoring Tasks
- Monitoring Methods

- Monitoring Schedule

An initial round of post-construction habitat monitoring will be performed immediately following completion of construction (Year 0) and will serve as the baseline for future comparisons. Follow-on habitat restoration monitoring will be performed concurrent with Bay OMMP monitoring (e.g., summer sampling; Anchor QEA 2018) to maximize overall efficiencies. Sampling and analysis methods will conform to those previously approved by Ecology and/or the Trustees for the Bay.

Following receipt of initial post-construction (as-built) surveys, the Companies will submit to Ecology and the Trustees a draft MMP *Sampling and Analysis Plan and Quality Assurance Project Plan* that specifies habitat monitoring details (e.g., specific control points and survey transects). Following approval, the Companies will perform long-term monitoring under Ecology and Trustee oversight. Monitoring reports are described in Section 3.4.

3.2 Southern Mill Site Habitat Maintenance

Post-construction habitat maintenance in the Southern Mill Site shoreline restoration area (Figure 1) will include the following components:

- **Watering**. Watering will be necessary depending on the date of planting and the amount of rainfall throughout the year. Monitoring of rainfall and soil moisture will be used to determine the need for watering during the first 2 years after plant installation. Watering will be accomplished using a watering truck or temporary irrigation.
- **Mulching**. Mulching will occur during initial plant installation. Supplemental mulching may occur during weeding activities, as necessary.
- **Weeding**. Weeding around shrubs and trees will be particularly important during the summers of the first 2 years of the Establishment Period to ensure establishment and prevent stress to the plants from competition for resources. Weeding will also be performed during the entire Establishment Period to ensure the Southern Mill Site shoreline restoration area meets vegetation performance standards (Table 1). Weeding frequency will be gauged by necessity but will generally occur at least twice during the spring (e.g., May and June), and then once more during the summer months (August or September). Weeds will be removed by hand and mechanical means (including possible use of tools like "weed wrenches"), to the extent practicable. If some weeds persist despite these hand and mechanical methods, and they prevent meeting establishment criteria for the native plants, then selected herbicide use by a licensed herbicide applicator will be used, in consultation with the Trustees. Common invasive weed species that will be particularly targeted for removal include:
  - English ivy (*Hedera helix*)
  - Himalayan blackberry (*Rubus armeniacus*)
  - Japanese knotweed (*Reynoutria japonica*)

  - Reed canary grass (*Phalaris arundinacea*)
  - Scot's broom (*Cytisus scoparius*)
  - Spartina (*Spartina alterniflora*)
  - Tansy ragwort (*Jacobaea vulgaris*)
- **Dead Plant Removal**. Dead native plant material will be left in place unless it poses a hazard and will only be removed after scheduled monitoring to allow for the accurate assessment of planting success needed for the monitoring program (Table 1).
- **Debris Removal**. Anthropogenic material that potentially impairs habitat functions will be removed from the sites on an as-needed basis.

3.3 Potential Contingency Measures and Adaptive Management

Contingency measures for each habitat restoration success criterion are summarized in Table 1. Contingency measures are activities designed to help meet success criteria, such as replanting upland vegetation or installing supplemental irrigation. Prior to any contingency measure being implemented, an investigation as to why the criterion was not met will be conducted. If a success criterion is not met because of installation flaws or lack of routine maintenance, then contingency measures will be implemented.

If overall habitat restoration success criteria summarized in Table 1 are not being met because of changed environmental conditions or insufficient routine maintenance, then an adaptive management approach will be used[1]. Prior to any adaptive management measures being implemented, the cause for the failure to meet a success criterion will be investigated. If any success criterion is not met in Year 4 (2028), the Companies and the Trustees will evaluate the following:

- Whether the cause of not meeting success criteria be identified.
- Whether it is technically feasible to modify or adjust the physical, chemical, or biological features of the restoration project such that a parameter could subsequently achieve an acceptable level of development.
- Whether the cost of the proposed modification is proportionate to the projected success of the effort.

A cost-benefit analysis for contingency measures will incorporate a range of alternatives as appropriate. The Companies and Trustees will meet in good faith and use their best efforts to reach consensus on appropriate adaptive management actions, and the Companies will implement those actions. If no agreement can be reached, the Companies shall, at a minimum, implement the

[1] The adaptive management period will end 10 years after completion of active construction (i.e., contractor demobilization).

contingency measures described in Table 1. Adaptive management measures will continue through the Establishment Period.

3.4 Initial Maintenance and Monitoring Reports

After each monitoring event, as described in Sections 2.1 and 3.1, a draft data summary memorandum will be submitted to Ecology and the Trustees within 90 days of receiving all validated laboratory data for each monitoring event. The memorandum will include the following:

- Summary of maintenance activities that were conducted.
- Summary of monitoring (sampling and analysis).
- A narrative description of methods and contingency measures taken.
- Data tables and species lists.
- Photographs/maps showing extent of vegetation coverage with dominant vegetation types.
- Identification of planted versus naturally recruited vegetation.
- Interpretation of results, evaluation relative to success criteria.
- Recommendations.

Ecology and the Trustees will review the submitted draft data summary memorandum and will either provide comments and request additional information or approve the draft data summary memorandum, at which point it becomes final. Within 90 days of completion of the Establishment Period, the Companies will provide a *Notice of Completion of Habitat Development and Initial Monitoring Obligations* to the Trustees for review and approval in accordance with the pending NRD CD.

4 References

Anchor QEA, 2018. *Operations, Maintenance, and Monitoring Plan: Appendix F of Engineering Design Report – Port Gamble Bay Cleanup Project*. Prepared for Washington State Department of Ecology and Pope Resources, LP/OPG Properties LLC. January 2018.

Anchor QEA, 2023. *Port Gamble Bay Habitat Restoration Statement of Work*. Revised draft. Prepared for the Port Gamble Natural Resource Trustees, Rayonier, LLC, and Pope Resources, LP/OPG Properties, LLC. March 2023.

Ecology (Washington State Department of Ecology), 2013. *Cleanup Action Plan, Port Gamble Bay*. Exhibit A to Consent Decree No. 13-2-02720-0. October 2013.

Ecology, 2020. *Cleanup Action Plan, Upland Areas of the Port Gamble Bay and Mill Site*. Exhibit A to Consent Decree No. 20-0-01674-18. September 2020.

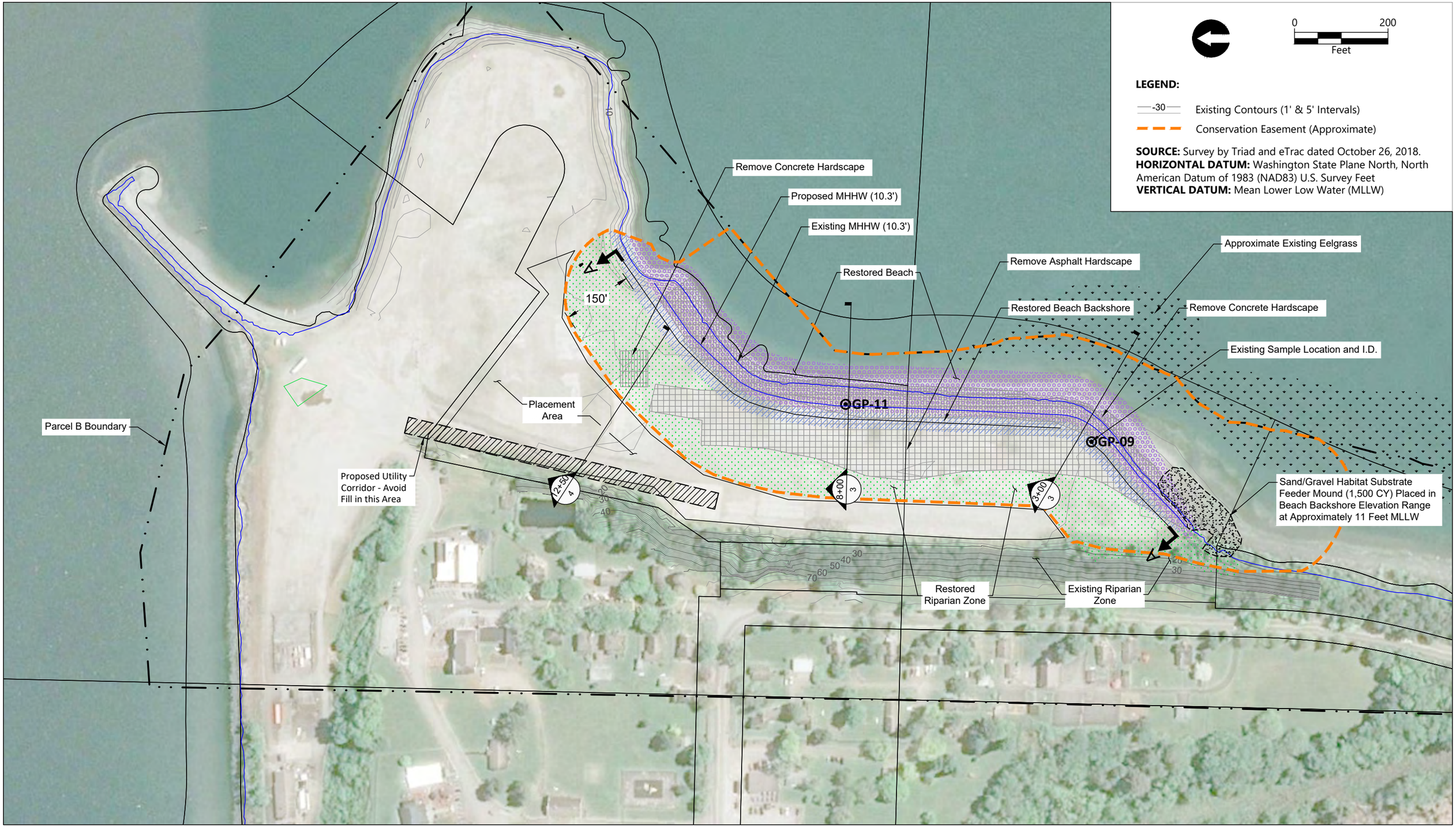
Tables

Table 1
Habitat Restoration Monitoring and Success Criteria

	Southern Mill Site Shoreline Restoration				Western Bay Nearshore Thin Layer Sand Cover			
	Intertidal Stability	**Intertidal Substrate**	**Riparian Vegetation**	**Backshore Vegetation**	**Subtidal Stability**	**Porewater Protection**	**Eelgrass Transplanting**	**Benthic Invertebrates**
Performance Standards	Relative to Year 0, < 0.5-foot mean elevation loss and < 10% transects > 1.0-foot mean elevation loss over time, averaged across restoration area (top of bank to MLLW)	Relative to Year 0, no significant (P > 0.05) increase in mean grain size over time, averaged across intertidal restoration area	Native* riparian vegetation > 80% areal coverage, > 75% survival, and < 5% invasive plant coverage, averaged across riparian shoreline buffer area	< 5% invasive plant coverage, averaged across backshore area	Mean cap thickness > design thickness (6 or 12 inches) and < 10% of cap area with < 70% of design thickness (4 or 8 inches), averaged across cap area	Mean porewater hydrogen sulfide concentration no different (P > 0.05) from regional reference area or below 0.07 milligrams per liter, averaged across cap area	Restore eelgrass meadows as practicable	Mean abundance of Crustacea, Mollusca, and Polychaeta no different (P > 0.05) from regional reference area, averaged across cap area(s)
Monitoring Tasks	Post-construction shoreline slope elevation profiles along transects established as part of Year 0 (as-built) survey	Substrate sampling and analysis along transects established as part of the Year 0 (as-built) survey	Percent cover and survival of native* species; percent cover of invasive species	Percent cover and survival of native* species; percent cover of invasive species	Sediment core sampling through caps	Sediment grab sampling	Surveys of survival infilling/patch spread, reproductive shoots, and colunteer patches	Sediment grab sampling
Monitoring Methods	Beach transect surveys (at 15 established profile locations) performed perpendicular to the slope direction along the shoreline from the top of the bank down to -2 feet MLLW	0- to 2-foot composite sediment samples collected at 8 established sampling locations aligned along every other transect); grain-size distribution analysis	Aerial photography or surveys (line intercept, point intercept-spherical densiometer, quadrats, or photo points)	Aerial photography or surveys (line intercept, point intercept-spherical densiometer, quadrats, or photo points)	Five 18-inch sediment cores advanced on grid to determine interface depth between cap and underlying sediment	Five surface sediment (0- to 4-inch) grab samples collected on cap grid and at regional reference area; ex situ diffuse gradient in thin film porewater hydrogen sulfide analysis	Towed video monitoring surveys in transplant areas from MLLW to -20 feet MLLW; photosynthetically available radiation (PSAR) and temperature monitoring at one representative station	Five surface sediment (0- to 4-inch) grab samples collected on cap grid and at regional reference area; benthic invertebrates identified to lowest practical taxonomic level and enumerated
Monitoring Schedule	Summer surveys in Years 0, 1, 2, 4, 7, and 10 (during the same month); potential need for contingency actions first considered in Year 4	Summer surveys in Years 0, 1, 2, 4, 7, and 10; potential need for contingency actions first considered in Year 4	Summer surveys in Years 0, 1, 2, 4, 7, and 10; survival surveys only through Year 4	Summer surveys in Years 0, 1, 2, 4, 7, and 10	Summer surveys in Years 0, 1, 2, 4, 7, and 10	Summer surveys in Years 0, 1, 2, 4, 7, and 10; potential need for contingency actions first considered in Year 4	Translplanting in Years 1, 3, 5, and 7; June (minimum 10-day duration) PSAR and temperature monitoring and July towed video surveys in Years 0, 2, 4, 6, 8, and 9	Summer surveys in Years 0, 1, 2, 4, 7, and 10; potential need for contingency actions first considered in Year 4
Contingency Measures *(the adaptive management period will end ten years after th e completion of construction (i.e. contractor demobilization)*	Evaluate reasons for loss of elevation and consider contingency actions such as replacing the feeder berm or adding additional material with different specifications	Evaluate reasons for increased grain size and consider contingency actions such as replacing the feeder berm or adding additional material with different specifications	Evaluate reasons for lower native cover and/or survival and consider contingency actions such as replanting with alternate species or installing supplemental irrigation	Evaluate reasons for lower native cover and/or survival and consider contingency actions such as replanting with alternate species or installing supplemental irrigation	Evaluate reasons for loss of cap and consider contingency actions such as adding additional material with different specifications	Evaluate reasons for elevated hydrogen sulfide levels and consider contingency actions such as adding additional material with different specifications	Modify transplanting in Years 3, 5, and 7, focusing on the most promising transplant locations and methods	Evaluate reasons for lower benthic invertebrate density and consider contingency actions such as adding additional material with different specifications

Note:
MLLW: mean lower low water
P: statistical probability
*Native: Natural distribution in Western Washington including the Puget Sound Lowlands, and inclusive of planted and naturally colonized plants on the site

Figures



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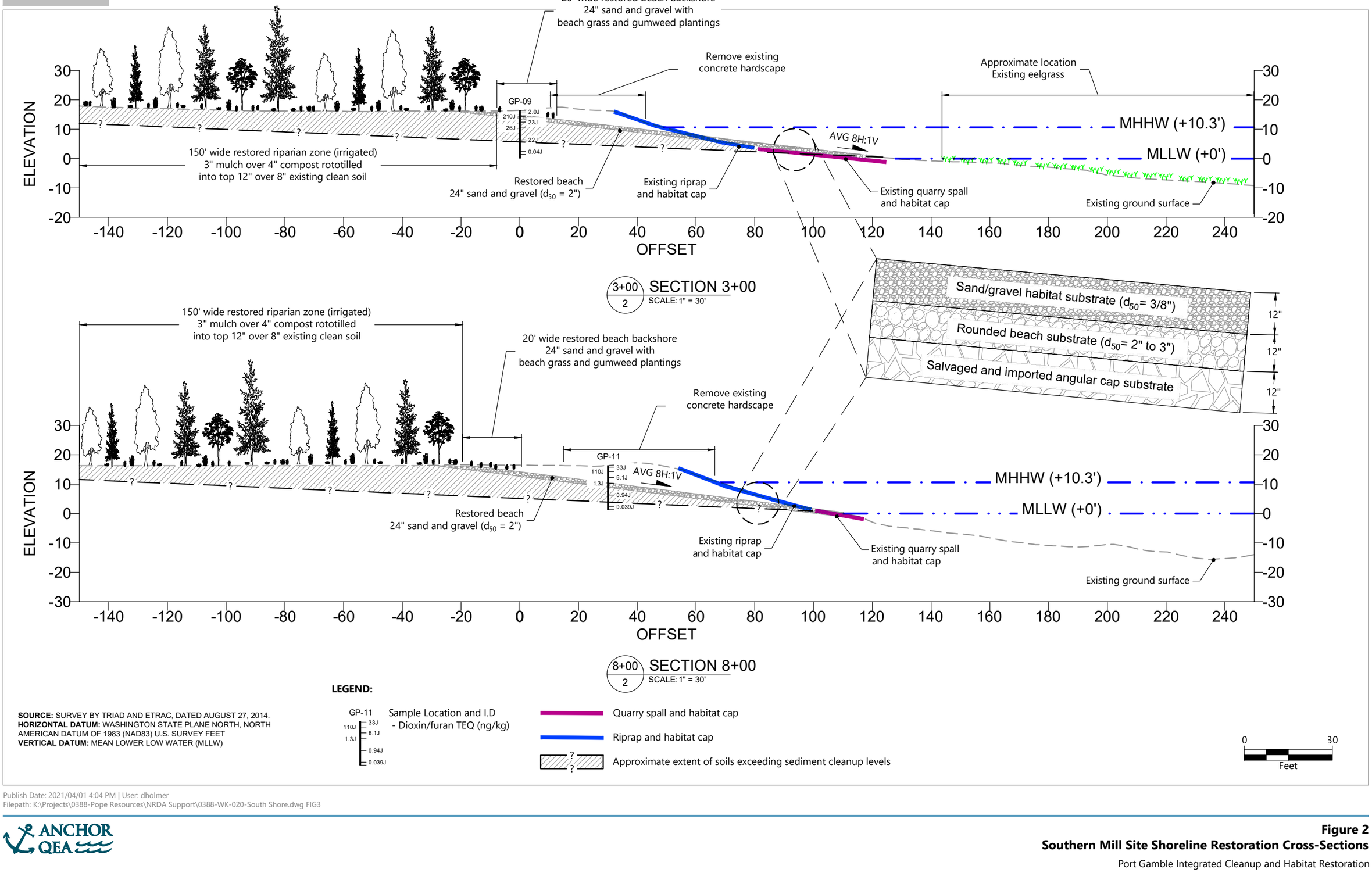
Filepath: K:\Projects\0388-Pope Resources\NRDA Support\0388-RP-005-South Shore.dwg FIG2

ANCHOR QEA

Figure 1
Southern Mill Site Shoreline Restoration Plan View
Port Gamble Integrated Cleanup and Habitat Restoration



SOURCE: SURVEY BY TRIAD AND ETRAC, DATED AUGUST 27, 2014.
HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH, NORTH AMERICAN DATUM OF 1983 (NAD83) U.S. SURVEY FEET
VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW)

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Filepath: K:\Projects\0388-Pope Resources\NRDA Support\0388-WK-020-South Shore.dwg FIG3

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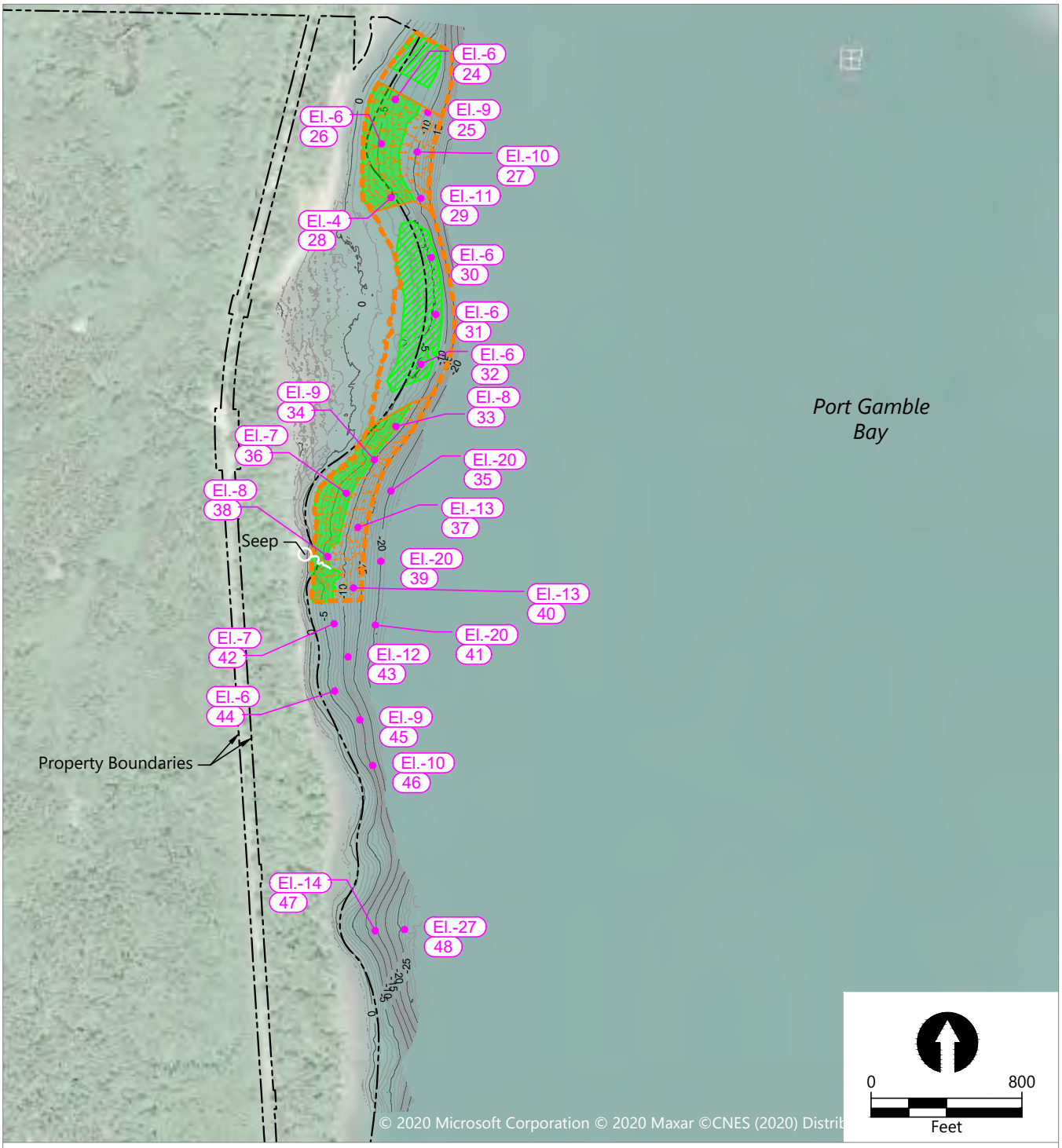
Figure 2
Southern Mill Site Shoreline Restoration Cross-Sections
Port Gamble Integrated Cleanup and Habitat Restoration



SOURCE: Survey by eTrac dated June 30, 2020.
HORIZONTAL DATUM: Washington State Plane North, North American Datum (NAD83), U.S. Survey Feet
VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

- Current Eelgrass Beds (July 2021)
- Sand Cover Placement Area
- Prospective Eelgrass Restoration Area
- 5 — Existing Contours (1' & 5' Intervals)
- 2020 Wood Debris Sampling Stations Re-Sampled in 2021
- Conservation Easement (Approximate)

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Filepath: K:\Projects\0388-Pope Resources\2020 Long Term Monitoring\0388-RP-010 (2021 Resample).dwg Figure 6

ANCHOR QEA

Figure 3
Western Port Gamble Bay Restoration Plan
Port Gamble Integrated Cleanup and Habitat Restoration

Appendix J
Engineer's Cost Estimate

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ATTACHMENTS

Attachment I-1 Engineer's Opinion of Probable Construction Costs

ABBREVIATIONS

EDR	Engineering Design Report
WSDOT	Washington State Department of Transportation

1 Purpose and Organization

This appendix has been prepared to support the Engineering Design Report (EDR) for integrated cleanup and habitat restoration actions in upland and nearshore aquatic areas in Port Gamble, Kitsap County, Washington. Construction activities described in the EDR are itemized by Work Zones and include hardscape removal, upland and intertidal excavations, backfilling, capping, and planting and irrigation.

This appendix summarizes the assumptions used to develop the Engineer's Opinion of Probable Construction Costs presented in the EDR. This cost estimate was developed based on previous experience at the site, experience at other contaminated sediment sites in the Puget Sound area, discussions with contractors and vendors, and best professional judgment. Costs are based on the design elements in the Construction Drawings (Appendix E of the EDR). All costs are presented in 2022 dollars. Post-construction costs are not included in this estimate.

Attachment I-1 presents the Engineer's Opinion of Probable Construction Costs. The remainder of this appendix discusses the basis and rationale for developing the Opinion of Probable Construction Costs.

2 Unit Cost Development

The development of the Engineer's Opinion of Probable Construction Costs was based on the following:

- Discussion with contractors and vendors.
- Review of construction cost estimates for similar recently completed projects, including the 2015–2017 Port Gamble in-water cleanup.
- Anchor QEA's engineering best professional judgment based on past project experience with similar remedial actions and associated pricing, as well as project-specific considerations that influence key cost factors (e.g., production rates).
- Engineering cost guidance (RS Means).

Material unit costs can vary depending on local availability at the time of construction.

2.1 Direct Construction Tasks

This section describes the activities used to develop costs for direct construction (see Attachment I-1).

2.1.1 General Direct Construction Tasks

Direct construction tasks include all construction activities anticipated to be conducted by the contractor. The following direct construction tasks are included in this Engineer's Opinion of Probable Construction Costs:

- **Mobilization and demobilization** includes the costs associated with one event of mobilizing and demobilizing personnel land equipment, procedural costs, contractor work plan development and other submittals, and the contractor site office and administration. Special bonding and insurance are also assumed to be included under this task.
- **Site preparation** includes the costs associated preparing the work site—clearing and grubbing upland areas prior to excavation, preparation, setup, and maintenance of the upland staging area, and installation and maintenance of temporary fencing and temporary erosion sediment controls.

2.1.2 Mill Site Upland Specific—Work Zones 1 and 2

- **Excavation, transportation, and disposal** activities include costs for excavation, water management, stockpile management, and transportation and disposal to an approved commercial landfill. Water management assumes that the selected contractor would be responsible for the final dewatering design and that extracted water would be low turbidity and not require treatment. Removal volumes assume 1.5:1 horizontal to vertical side slopes.
- **Material placement** activities include costs for material procurement, material transport to the site, placement of clean imported backfill, placement and compaction of excavated material reused for backfill (e.g., below 12 nanograms per kilogram dioxin/furan toxic equivalent), and upland cap layer. Material placement volumes assume 20% of the excavated material is suitable for reuse as backfill, 40% of the material is suitable for disposal at the Port Gamble Model Airplane Field Limited Purpose Landfill, and 40% of the material will require disposal at an off-site commercial landfill.
- **Environmental controls** include costs for environmental protection during construction by providing stormwater management, haul road maintenance and general housekeeping.
- **Survey** costs include contactor post-excavation and post-placement (as-built) topographic surveys.

2.1.3 Mill Site Shoreline Restoration—Work Zone 3

- **Demolition and clearing** activities include costs to remove any utility vaults, demolish and remove asphalt and concrete pavement for off-site recycling or disposal, and any miscellaneous demolition. The estimated quantity of asphalt and concrete pavement to be removed is 2,000 tons.

- **Excavation transportation and disposal** activities include costs for excavation of intertidal and beach backshore areas to subgrade, and stockpiling excavated cap materials for reuse.
- **Material placement** activities include costs for material procurement, material transport to the site, and placement of capping and backfill materials for the intertidal area, beach backshore, and riparian areas. Material placement costs also include placement of suitable excavated shoreline material in the upland placement area. Costs assume 50% of the excavated Work Zone 3 material will meet Port Gamble Mill Site soil cleanup levels suitable for relocation to the upland placement area. This estimate is based on a geostatistical model of soil data presented in Appendix A. Final suitability determination will be based on stockpile confirmation sampling.
- **Shoreline nourishment and bank protection** includes costs for material procurement, transportation, and placement of feeder habitat sand/gravel mound.
- **Planting and irrigation** activities include costs for temporary irrigation of the riparian area, planting of native vegetation (deciduous or coniferous trees and shrubs), planting beachgrass (includes gumweed plantings), herbivore and waterfowl exclosure, wood-rail fencing, and habitat restoration area signage.
- **Environmental controls** include costs for environmental protection during construction by providing stormwater management, haul road maintenance, and general housekeeping.
- **Survey** costs include contactor post-excavation and post-placement (as-built) topographic surveys.

2.1.4 South Bay—Work Zone 4

- Mobilization and demobilization include a shared cost (50%) for one event of mobilizing and demobilizing equipment and materials at Driftwood Key Club and Port Gamble South Bay (Work Zone 4). These costs do not include dredging permits for Driftwood Key.
- Transport and placement includes cost for clean sand transport from Driftwood Key and placement of these materials in Work Zone 4, as described in the EDR. No costs for eelgrass transplanting have been included. This work will be performed as part of a separate contract following material placement in Work Zone 4.

2.1.5 Model Airplane Field—Work Zone 5

- **Mobilization and site preparation** includes costs for separate mobilization and demobilization of equipment and materials at the Model Airplane Field. In addition, activities for costs associated with preparing the work site—clearing and grubbing upland areas prior to placement are also included.
- **Material management** activities include placement of excavated materials from Work Zones 1, 2, and 3 that meet Kitsap Public Health District suitability criteria, placement of 2-foot cap layer, jute matting on side slopes, and hydroseeding. Costs assume that 40% of the material

excavated from Work Zone 2 and 50% of the material excavated from Work Zone 3 is suitable from placement at the Model Airplane Field. This estimate is based on a geostatistical model of soil data presented in Appendix A. Final suitability determination will be based on stockpile confirmation sampling.

- **Environmental controls** include costs for environmental protection during construction by providing temporary traffic control and an allowance for best management practices and temporary erosion and sedimentation control such as wheel wash.
- **Survey** costs include contactor post-placement and post-placement (as-built) topographic surveys.

2.2 Indirect Construction Tasks

Indirect construction tasks include several activities that are necessary to the project but are not performed by the contractor. These indirect construction tasks include project management, construction management and inspection, supplemental design and permitting costs, archaeological and water quality monitoring, stockpile characterization, and post-construction reporting. Costs for these indirect construction activities were estimated based on project experience at similar remediation sites in the Puget Sound region.

No costs for Washington State Department of Ecology or Natural Resource Trustee oversight have been included in the Engineer's Opinion of Probable Construction Costs.

3 Costing Assumptions Used for Each Construction Task

General and specific costing assumptions are summarized in this section. Further details are contained in the Drawings (Appendix E to the EDR) and in Attachment I-1.

3.1 General Costing Assumptions

The following are general assumptions used in the cost estimate:

- **Daily work schedule:** It is assumed that work will be performed in one shift per day (up to 12 hours), 5 days a week. Note that this assumption is for cost purposes only; final work hours will be determined by the contractor and documented in the construction work plan.
- **Sales tax:** Sales tax is included at 9.2% to account for Washington State (6.5%) and Kitsap County Unincorporated Areas (2.7%) taxes.
- **Contingency:** A 20% contingency is applied to both total direct construction and total indirect construction costs, based on consideration of potential cost uncertainty. Additional factors that cannot be forecasted at this time—such as scope unknowns (i.e., significant changes in site conditions), price uncertainty (i.e., varying market conditions, increasing inflation, fuel, and labor changes), or any other unforeseen circumstances (i.e., additional

design requirements)—may influence contractor bidding prices and impact the final project costs outside, in excess, or below this contingency.

All costs in this Engineer's Opinion of Probable Construction Costs are presented in 2022 U.S. dollars.

3.2 Specific Design Costing Assumptions

The following specific design assumptions are incorporated into the Engineer's Opinion of Probable Construction Costs:

- **Mill Site Upland—Work Zones 1 and 2**
  - Required cut thicknesses or elevations for Work Zones 1 and 2 are as shown in the Construction Drawings (Appendix E to the EDR).
  - Post-excavation upland surface will be capped, and the layers include a geotextile marker layer, clean permeable soil, and topsoil topped with hydroseed. For costing purposes, the clean permeable soil and backfill material is assumed to conform to readily available medium-coarse grained sand, and topsoil and hydroseed is assumed to conform to standard Washington State Department of Transportation (WSDOT) specifications.
- **Mill Site Shoreline Restoration—Work Zone 3**
  - Required cut thicknesses or elevations and planting details in the riparian area for Work Zone 3 are as shown in the Construction Drawings (Appendix E to the EDR).
  - Hardscape in the restoration footprint will be processed and sent for off-site recycling or disposal. For costing purposes, it is assumed that the 2,000 tons of excavated hardscape is 95% asphalt and 5% concrete material.
  - Upland excavation equipment will be used to excavate the intertidal area to achieve and average slope of approximately 8:1 horizonal to vertical. Excavation of intertidal sediments will be performed during low tides to reduce resuspension.
  - Excavated shoreline materials (intertidal and beach backshore) will be stockpiled into 1,500-cubic-yard stockpiles for chemical of concern sampling. Approximately 50% of the excavated material is assumed to meet Port Gamble Mill Site soil cleanup levels, and will be placed in the Work Zone 3 upland placement area. Clean rock materials excavated from the shoreline and identified as suitable for replacement on the shoreline as armor material will be stockpiled separately and will not be tested.
  - Post-excavation cap material grading limits for salvaged armor rock or imported armor rock, rounded habitat substrate and sand/gravel substrate are presented in the EDR. For costing purposes, clean sand for placement in the beach backshore, riparian and upland placement areas are assumed to conform to medium-coarse grained sand. Topsoil, compost, mulch, and hydroseed are also assumed to conform to the standard WSDOT specifications.

- **South Bay—Work Zone 4**
  - The required placement boundary and thickness for Work Zone 4 are shown in the Construction Drawings (Appendix E to the EDR).
  - Placement material is assumed to be clean dredged material from the outer navigation channel at Driftwood Key Club.
  - The cost for Work Zone 4 includes a separate mobilization and demobilization cost that is assumed to be 50% of cost of mobilizing and demobilizing for the maintenance dredging project at Driftwood Key Club.
- **Model Airplane Field—Work Zone 5**
  - The placement boundary for Work Zone 5 is shown in the Construction Drawings (Appendix E to the EDR).
  - After placement of excavated material from Work Zones 1, 2, and 3, the surface will be capped, including a geotextile marker layer, clean permeable soil, topsoil topped with hydroseed and jute mat on the side slopes. For costing purposes, the clean permeable soil is assumed to conform to medium-coarse grained sand, and topsoil, hydroseed and jute mat are assumed to conform to standard WSDOT specifications.
- **Project management:** This includes cost for project coordination meetings, project technical leadership, and project management support (an average of 8 hours per week) for the assumed duration of 9 months of construction.
- **Construction management:** This includes cost for technical leadership and management support (an average of 8 hours a week) for the assumed duration of 9 months of construction.
- **Full time construction inspection:** This includes cost for a full-time construction manager/inspector at the project site (8 hours a day up to 200 days) during the assumed period of 9 month of construction.
- **Additional design and permitting:** These costs are assumed for additional design efforts based on permitting requirements.
- **Archaeological and water quality monitoring:** This cost assumes thirty, 8-hour, staff days for monitoring periodically during excavation and during initial subtidal material placement in the bay. It is assumed that no water quality monitoring will be required during intertidal excavation performed in the dry.
- **Agency oversight:** Costs for agency oversight have not been included in the Engineer's Option on Probable Construction Costs.
- **Ex situ stockpile characterization:** This cost includes stockpile characterization testing estimate based on analytical costs for one 10-point composite sample per 1,500 cubic yards of excavation.
- **Post-construction completion report:** This includes cost for project closure documents.

Excavation volumes for Work Zones 2 and 3 were calculated using Autodesk Civil 3D software. Excavation will be performed consistent with the best management practices identified in the EDR. Unit costs for construction activities were estimated based on review of similar cleanup projects in Puget Sound, and the 2015–2017 cleanup project at Port Gamble. Unit costs for material purchase of specified material gradation are based on 2022 vendor estimates. The unit cost for compost presented in the Engineer's Opinion of Probable Construction Costs is based on review of construction bids of similar sized projects.

Attachment J-1
Engineer's Opinion of Probable Construction Costs

Appendix I
Opinion of Probable Construction Cost Estimate

Item No.	Item Description	Quantity	Unit	Unit Cost (2022$)	Estimated Total Cost (2022$)
GENERAL DIRECT CONSTRUCTION COSTS					
1	Mobilization and Site Preparation				$ 460,000
a	Mobilization & Demobilization, Contractor Work Plans	1	LS	$ 310,000	$ 310,000
b	Site Preparation for Excavation, Stockpile Area Preparations and Erosion Control, and Temporary Fencing	1	LS	$ 150,000	$ 150,000
	General Direct Construction Costs Subtotal				$ 460,000
	Construction Contingency	20%	PERCENT		$ 92,000
	General Direct Construction Costs with Contingency				$ 552,000
	Sales Tax	9.2%	PERCENT		$ 50,784
	General Direct Construction Costs (with Contingency and Sales Tax)				**$ 600,000**
MILL SITE UPLAND SPECIFIC (WORK ZONES 1 &2)—DIRECT CONSTRUCTION COSTS					
2	Excavation, Transportation and Disposal				$ 1,698,448
a	Excavation and Decontamination of Equipment	20,391	CY	$ 12.38	$ 252,484
b	Concrete/ Asphalt Perforation	15,302	SY	$ 4.60	$ 70,341
c	Water Management and Treatment	1	LS	$ 215,000	$ 215,000
d	Stockpile Management	20,391	CY	$ 3.40	$ 69,408
e	Commercial Landfill Disposal of Unsuitable Soils (Load, Transport and Dispose)	11,869	TON	$ 91.94	$ 1,091,216
3	Material Placement				$ 791,030
a	Sand for Backfill (purchase, deliver, place and compact)	16,066	CY	$ 23.53	$ 377,984
b	Excavated Material (place and compact)	4,119	CY	$ 7.08	$ 29,142
c	Upland Cap Layer				
c.1	Sand (purchase, deliver, and place)	7,651	CY	$ 21.53	$ 164,695
c.2	Topsoil (purchase, deliver, and place)	2,550	CY	$ 54.93	$ 140,076
c.3	Geotextile Marker Layer	15,302	SY	$ 2.87	$ 43,963
c.4	Hydroseed (purchase, deliver, and place)	15,302	SY	$ 2.30	$ 35,170
4	Environmental Controls				$ 35,000
a	Stormwater Management, Haul Road Maintenance, and General Housekeeping	3.5	MO	$ 10,000	$ 35,000
5	Survey				$ 20,000
a	Post-Excavation Survey	1	EA	$ 10,000	$ 10,000
b	Post-Placement Survey	1	EA	$ 10,000	$ 10,000
	Mill Site Upland Specific Direct Construction Costs Subtotal				$ 2,544,479
	Construction Contingency	20%	PERCENT		$ 508,896
	Mill Site Upland Specific Direct Construction Costs with Contingency				$ 3,053,374
	Sales Tax	9.2%	PERCENT		$ 280,910
	Total Mill Site Upland Specific Direct Construction Costs (with Contingency and Sales Tax)				**$ 3,330,000**

Appendix I
Opinion of Probable Construction Cost Estimate

Item No.	Item Description	Quantity	Unit	Unit Cost (2022$)	Estimated Total Cost (2022$)
MILL SITE SHORELINE RESTORATION (WORK ZONE 3) SPECIFIC—DIRECT CONSTRUCTION COSTS					
6	Demolition and Clearing				$ 44,367
a	Remove Utility Vault	1	LS	$ 2,269	$ 2,269
b	Asphalt Pavement Demolition	115,721	SF	$ 0.23	$ 26,260
c	Concrete Pavement Demolition	6,091	SF	$ 0.74	$ 4,492
d	Miscellaneous Demolition	1	LS	$ 11,346	$ 11,346
7	Excavation, Transportation, and Disposal				$ 718,899
a	Excavate Intertidal Area to Subgrade	15,436	CY	$ 24.57	$ 379,299
b	Excavate Beach Backshore Subgrade	8,612	CY	$ 12.38	$ 106,640
c	Stockpile Excavated Remedial Cap Materials	5,434	CY	$ 3.40	$ 18,498
d	Resize Debris for off-Site disposal	2,000	TON	$ 27.23	$ 54,462
e	Commercial Landfill Disposal of hardscape (asphalt and concrete)	2,000	TON	$ 80.00	$ 160,000
8	Material Placement				$ 1,839,827
a	Intertidal Area Layers				
a.1	Armor Rock (purchase, deliver, and place)	766	CY	$ 55.25	$ 42,313
a.2	Rounded Habitat Substrate (purchase, deliver, and place)	4,679	CY	$ 48.66	$ 227,657
a.3	Sand/Gravel Substrate (purchase, deliver, and place)	4,679	CY	$ 54.35	$ 254,274
a.4	Place Stockpiled Remedial Cap Material (Salvaged Armor Rock)	3,913	CY	$ 8.66	$ 33,867
b	Beach Backshore Layers				
b.1	Armor Rock (purchase, deliver, and place)	253	CY	$ 55.25	$ 13,979
b.2	Sand/Gravel Substrate (purchase, deliver, and place)	1,775	CY	$ 54.35	$ 96,449
b.3	Sand (purchase, deliver, and place)	1,775	CY	$ 21.53	$ 38,203
b.4	Place Stockpiled Remedial Cap Material (Salvaged Armor Rock)	1,522	CY	$ 8.66	$ 13,171
c	Riparian Area Layers				
c.1	Sand (purchase, deliver, and place)	17,747	CY	$ 21.53	$ 382,026
c.2	Compost (purchase, deliver, and place)	2,958	CY	$ 73.45	$ 217,249
c.3	Mulch (purchase, deliver, and place)	2,218	CY	$ 52.19	$ 115,781
c.4	Geotextile Marker Layer	26,620	SY	$ 2.87	$ 76,482
d	Upland Placement Area Layers				
d.1	Excavated Shoreline Materials (place and compact)	12,024	CY	$ 7.08	$ 85,082
d.2	Sand (purchase, deliver, and place)	0	CY	$ 21.53	$ -
d.3	Topsoil (purchase, deliver, and place)	3,541	CY	$ 54.93	$ 194,468
d.4	Geotextile (purchase, deliver and, place)	0	SY	$ 2.87	$ -
d.5	Hydroseed (purchase, deliver and, place)	21,243	SY	$ 2.30	$ 48,827
9	Shoreline Nourishment and Bank Protection				$ 81,521
a	Feeder Mound Habitat Sand/Gravel	1,500	CY	$ 54.35	$ 81,521
10	Planting and Irrigation				$ 791,968
a	Native Deciduous or Coniferous Tree (1 gallon—Deliver and Install)	579	EA	$ 28.00	$ 16,212

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Opinion of Probable Construction Cost Estimate

Item No.	Item Description	Quantity	Unit	Unit Cost (2022$)	Estimated Total Cost (2022$)
b	Native Deciduous Tree (5 gallon—Deliver and Install)	148	EA	$ 100.00	$ 14,800
c	Native Coniferous Tree (5 gallon—Deliver and Install)	452	EA	$ 110.00	$ 49,720
d	Native Shrub (1 gallon—deliver and install)	4,863	EA	$ 23.00	$ 111,849
e	Native Beach Backshore Planting (10-cubic-inch tubes—deliver and install)	13,254	EA	$ 6.43	$ 85,223
f	Wood-rail fencing	1,667	LF	$ 30.00	$ 50,010
g	Herbivore exclosure fencing (tree and shrub protection)	17,807	LF	$ 4.49	$ 79,953
h	Waterfowl exclosure (beach backshore planting area)	45,913	SF	$ 1.49	$ 68,410
i	Protected habitat restoration signage	19	EA	$ 150.00	$ 2,850
j	Temporary Irrigation (150-foot-wide riparian area only)	230,103	SF	$ 1.36	$ 312,940
11	Environmental Controls				$ 50,000
a	Stormwater Management, Haul Road Maintenance, and General Housekeeping	5	MO	$ 10,000	$ 50,000
12	Survey—Shoreline Restoration				$ 20,000
a	Post- Excavation Survey	1	EA	$ 10,000	$ 10,000
b	Post-Placement Survey (As-Built Survey)	1	EA	$ 10,000	$ 10,000
	Shoreline Restoration Specific Direct Construction Costs Subtotal				$ 3,546,583
	Shoreline Restoration Specific Construction Contingency	20%	PERCENT		$ 709,317
	Shoreline Restoration Specific Direct Construction Costs with Contingency				$ 4,255,900
	Sales Tax	9.2%	PERCENT		$ 391,543
	Total Shoreline Restoration Specific Construction Costs (with Contingency and Sales Tax)				**$ 4,650,000**
SOUTH BAY (WORK ZONE 4)—DIRECT CONSTRUCTION COSTS					
13	Driftwood Key Club—South Bay				$ 673,000
a	Mobilization/Demobilization	1	LS	$ 127,500	$ 127,500
b	Thin Cap—10 acres (Wood Debris >10%) (transport and place)	11,000	CY	$ 23	$ 253,000
c	Driftwood Key Dreding	6,500	CY	$ 45	$ 292,500
14	Survey—South Bay				$ 20,000
a	Pre- Placement Survey	1	EA	$ 10,000	$ 10,000
b	Post-Placement Survey (As-Built Survey)	1	EA	$ 10,000	$ 10,000
	South Bay Direct Construction Costs Subtotal				$ 693,000
	Construction Contingency	20%	PERCENT		$ 138,600
	South Bay Direct Construction Costs with Contingency				$ 831,600
	Sales Tax	9.2%	PERCENT		$ 76,507
	Total South Bay Direct Construction Costs (with Contingency and Sales Tax)				**$ 908,000**
MODEL AIRPLANE FIELD (WORK ZONE 5)—DIRECT CONSTRUCTION COSTS—UPLAND MILL SITE DISPOSAL ONLY					
15	Mobilization/Demobilization and Site Preparation				$ 30,000
a	Mobilization/Demobilization and Site Preparation	1	LS	$ 30,000.00	$ 30,000
16	Material Management				$ 420,382
a	Load, Transport, and Place Landfill Material (12–45 ppt)	20,384	CY	$ 10.34	$ 210,835
b	Sand (purchase, deliver, and place)	3,798	CY	$ 21.53	$ 81,761

Appendix I
Opinion of Probable Construction Cost Estimate

Item No.	Item Description	Quantity	Unit	Unit Cost (2022$)	Estimated Total Cost (2022$)
c	Jute Matting (purchase, deliver, and place)	2,532	SY	$ 7.49	$ 18,962
d	Topsoil (purchase, deliver, and place)	1,266	CY	$ 54.93	$ 69,539
e	Hydroseed (purchase, deliver, and place)	7,596	SY	$ 2.30	$ 17,460
f	Geotextile Marker Layer	7,596	SY	$ 2.87	$ 21,825
17	Environmental Controls				$ 105,000
a	Temporary Traffic Control	25	Day	$ 3,000	$ 75,000
b	TESC Maintenance—Wheel Wash	1	LS	$ 30,000	$ 30,000
18	Survey				$ 5,000
a	Pre-Placement Survey	1	EA	$ 2,500	$ 2,500
b	Post-Placement Survey	1	EA	$ 2,500	$ 2,500
	Model Airplane Field Direct Construction Costs Subtotal				$ 560,382
	Construction Contingency	20%	PERCENT		$ 112,076
	Model Airplane Field Direct Construction Costs with Contingency				$ 672,458
	Sales Tax	9.2%	PERCENT		$ 61,866
	Total Model Airplane Field Direct Construction Costs (with Contingency and Sales Tax)				**$ 734,000**
INDIRECT CONSTRUCTION COSTS FOR MILL SITE, SHORELINE RESTORATION, AND MODEL AIRPLANE FIELD					
19	Project Management	1	LS	$ 100,000	$ 76,000
20	Full-Time Construction Manager and Inspection	1	LS	$ 360,000	$ 340,000
21	Supplemental Design and Permitting	1	LS	$ 70,000	$ 300,000
22	Archaeological and Water Quality Monitoring	1	LS	$ 48,000	$ 48,000
23	Ex Situ Stockpile Characterization	31	EA	$ 1,150	$ 36,000
24	Post-Construction Completion Report	1	LS	$ 40,000	$ 40,000
	Indirect Construction Costs Subtotal				**$ 840,000**
	Indirect Construction Contingency	**20%**	**PERCENT**		**$ 168,000**
	Total Remedial Cost				**$ 1,010,000**

	Total Project Cost				**$ 11,230,000**

Appendix I
Opinion of Probable Construction Cost Estimate

Item No.	Item Description	Quantity	Unit	Unit Cost (2022$)	Estimated Total Cost (2022$)

Notes:

1. In providing opinions of probable construction cost, the Client understands that the Consultant (Anchor QEA, LLC) has no control over the cost or availability of labor, equipment, or materials, or over market condition or the Contractor's method of pricing, and the Consultant's opinions of probable construction costs are made on the basis of the Consultant's professional judgment and experience. The Consultant makes no warranty, express or implied, that the bids or the negotiated cost of the work will not vary from the Consultant's opinion of probable construction cost.
2. Costs are presented in present-day US dollars (i.e., 2022).
3. Ecology oversight and long-term monitoring costs (for the Mil Site, restoration [Bay and Shoreline], and MAF) are not included in this opinion of probable cost as assumptions for these activities will be developed consistent with the Long-Term Maintenance and Monitoring Plan in a subsequent design phase.
4. Eelgrass transplanting and monitoring costs are not included in this opinion of probable cost estimate.
5. Unit cost for purchase of placement materials, including sand for cap and backfill, rounded habitat and sand/gravel of specified material gradation are based on vendor estimates. Unit cost for compost presented is based on review of construction bids of similar sized projects. A lower cost can be assumed depending on availability of product at Port Townsend and if pre-purchased.

CY: cubic yard
EA: each
LS: lump sum
MO: month
O.C.: on center
SF: square feet
SY: square yard
TON: US short ton