

Memorandum

August 25, 2025

To: Rachel McDermott, Peter Adolphson, and Michael Blanton, WA State Department of Ecology
Denice Taylor and Alison Osullivan, Suquamish Tribe

From: Clay Patmont, Jason Cornetta, and Eli Patmont, Anchor QEA

cc: Mike Warjone and Leif Hansen, Port Blakely Tree Farms
Lynn Manolopoulos and Nick Wegley, Davis Wright Tremaine
Cindy Bartlett, Geosyntec Consultants

Re: Blakely Harbor Feasibility Study Work Plan Addendum 2: Site-Specific Sediment Wood Waste Sampling and Analysis Plan

Using approaches and procedures described in the *Blakely Harbor Park Site (Site) Remedial Investigation/Feasibility Study Work Plan* (Work Plan; Geosyntec 2022) along with addenda approved by the Washington State Department of Ecology (Ecology), between 2019 and 2023 data were collected to characterize the nature and extent of contamination in upland and aquatic areas of the Site. In August 2024, the draft Remedial Investigation (RI) report presenting these data was submitted to Ecology (Geosyntec 2024) and is currently being revised to address Ecology and Suquamish Tribe (Tribe) review comments.

In September 2024, Ecology approved Addendum 1 to the Feasibility Study (FS) Work Plan, describing sampling and analysis activities to characterize sediment stability and surface sediment natural recovery in aquatic areas of the Site (Anchor QEA 2024). FS Work Plan Addendum 1 sampling and analysis activities were completed in January 2025. These data will be summarized in the forthcoming draft FS.

Based on recent discussions with Ecology and the Tribe and consistent with Ecology (2021) guidance for implementing the Sediment Management Standards (SMS) regulation, Chapter 173-204 Washington Administrative Code (WAC), additional sampling and analysis activities will be performed to gather data from locations of the Site where bioassays were not previously performed including where wood waste compositions are highest. To inform selection of the bioassay sample locations and to collect additional data on wood waste impacts for the FS, bulk sediment and porewater samples will be collected and analyzed for bulk grain size, total organic carbon (TOC), total volatile solids (TVS), and wood volumetric percentage, along with porewater salinity, pH, ammonia, and hydrogen sulfide (H₂S). This information will be used to develop appropriate site-specific sediment cleanup levels and to develop and evaluate remedial alternatives in the forthcoming FS.

This Addendum 2 to the FS Work Plan describes site-specific sediment wood waste sampling and analysis. FS Work Plan Addendum 2 sampling is currently targeted for September 2025.

Site-Specific Wood Waste Sampling Objective

RI confirmatory bioassays were not performed on nearshore Site sediment, at or adjacent to the location of the former Port Blakely sawmill facility, with the highest surface sediment TOC and TVS concentrations. The RI was designed to define the nature and extent of contamination (Geosyntec 2024), and this Addendum 2 to the FS Work Plan will further delineate the extent and potential impact of wood waste in areas identified in the RI with the greatest wood waste accumulation, provide information necessary to develop the site-specific wood waste cleanup level, and support evaluation of remedial alternatives in the FS.

Sampling Design and Methods

Figure 1 depicts Site surface sediment TOC concentrations along with the FS Work Plan Addendum 2 wood waste cleanup level sampling transects. A total of 35 sediment samples will be collected in inner Blakely Harbor. Sediment samples will be collected at elevations of approximately +5, 0, and -5 feet mean lower low water (MLLW) within the anticipated primary groundwater seepage zone, with deeper locations (-10 to -35 feet MLLW) if encountered along the transect. Target sampling coordinates are summarized in Table 1. Samples will be collected during low tide conditions (within two hours of the projected low tide) when porewater salinity is anticipated to be at its lowest (i.e., minimum tidal dilution). Each of the 35 surface (0 to 10 centimeter) sediment samples will be analyzed for bulk grain size, TOC, TVS, and wood volumetric percentage, along with porewater salinity, pH, ammonia, and H₂S using methods described below.

Grain size, TOC, and TVS analyses will follow methods and data quality objectives described in the Work Plan (Geosyntec 2022) and addenda approved by Ecology. Analytical Resources (Tukwila, WA) will perform sediment grain size, TOC and TVS analyses using methods accredited by Ecology:

- Grain Size: ASTM D6913
- TOC: EPA 9060A
- TVS: PSAMP 1986

Wood volumetric percentage will be estimated following the Anchor QEA Standard Operating Procedure (SOP) for Wood Volume Analysis of Surface Sediment (Attachment A). This SOP provides a semiquantitative determination of the volumetric percentage of sediment wood particles greater than approximately 0.5 millimeters, consistent with Ecology (2013) wood waste cleanup guidance.

Porewater salinity, pH, and ammonia concentrations will be determined in the field using a calibrated multi-parameter probe. The Anchor QEA Geochemical Laboratory (Portland, OR) will perform ex situ porewater H₂S analyses using the diffusive gradients in thin film (DGT) method. The DGT method characterizes bioavailable H₂S concentrations in sediment, removing the influence of colloidal sulfide forms to provide a direct comparison with toxicity benchmarks (Podger 2013).

Sampling stations and specific bioassay tests will be selected based on the analytical results as approved by Ecology. Spheros-EcoAnalysts, Inc. (Port Gamble, WA) will perform the sediment bioassays along with reference samples collected from Carr Inlet and laboratory control samples, following methods and data quality objectives described in the Work Plan (Geosyntec 2022) and addenda approved by Ecology.

Consistent with prior Ecology-approved Work Plans for the Site and Ecology guidance (Ecology 2021), provisional Puget Sound Estuary Program (PSEP) bioassay tests will include *Eohaustorius estuarius* (acute toxicity testing; contingent on sediment sample with fines less than 60% by composition and interstitial salinity being less than or equal to 32 parts-per-thousand [ppt]; if these parameters are not met then Ecology will determine the path forward) and *Neanthes arenaceodentata* (survival and growth; contingent on interstitial salinity of sediment greater than 20 ppt; if this parameter is not met, then Ecology will determine the path forward).

Spawning will be attempted on three larval species (*Crassostrea gigas*, *Dendraster excentricus*, and *Mytilus galloprovincialis*). If more than one of these larval species successfully spawns at the start of the test, the order of preference for the PSEP larval development test (single species) will be:

- *Crassostrea gigas*
- *Dendraster excentricus*
- *Mytilus galloprovincialis*

Holding times for initiating bioassays will be 15 days or less after sediment sampling. As discussed above, bioassay sample collection is currently targeted for September 2025.

Data Use and Evaluation

Data collected under this Addendum 2 to the FS Work Plan will be combined with RI data to further delineate the extent and potential impact of wood waste in areas identified in the RI with the greatest wood waste accumulation. A site-specific sediment wood waste cleanup level will be developed, as applicable, based on a number of considerations, including sediment chemistry and bioassay results, and following Ecology policy and guidance. The Addendum 2 data will also be used to support evaluation of remedial alternatives in the FS.

Quality Assurance, Data Validation, and Data Management

At least one duplicate analysis will be performed for every 20 samples analyzed. As described in the Work Plan (Geosyntec 2022) and addenda approved by Ecology, analytical data will be validated to verify that data quality objectives have been met. All analytical data (grain size, TOC, TVS, and porewater H₂S) will undergo Stage 2A validation by the Geosyntec project chemist. Data validation reports detailing any data quality issues and additional qualifiers will be provided with the draft FS report.

All finalized and validated data will be formatted and submitted to Ecology for entry into the Environmental Information Management System. Geosyntec will manage the overall project database and will oversee data management to ensure that analytical data are incorporated into the project database with appropriate qualifiers following acceptance of the data validation.

Project Management

The Anchor QEA Project Manager and Field Coordinator for this FS Work Plan Addendum 2 is Eli Patmont (epatmont@anchorqea.com).

References

Anchor QEA, 2024. *Blakely Harbor Feasibility Study Work Plan Addendum: Sediment Stability and Surface Sediment Natural Recovery Sampling and Analysis Plan*. Prepared by Anchor QEA, Inc. on behalf of Port Blakely Tree Farms for submittal to Washington State Department of Ecology. July 2024.

Ecology, 2013. *Wood Waste Cleanup: Identifying, Assessing, and Remediating Wood Waste in Marine and Freshwater*. Publication No. 09-09-044. September 2013.

Ecology, 2021. *Sediment Cleanup User's Manual (SCUM) Guidance for Implementing the Cleanup Provisions of the Sediment Management Standards, Chapter 173-204 WAC*. Publication No. 12-09-057. Revised December 2021.

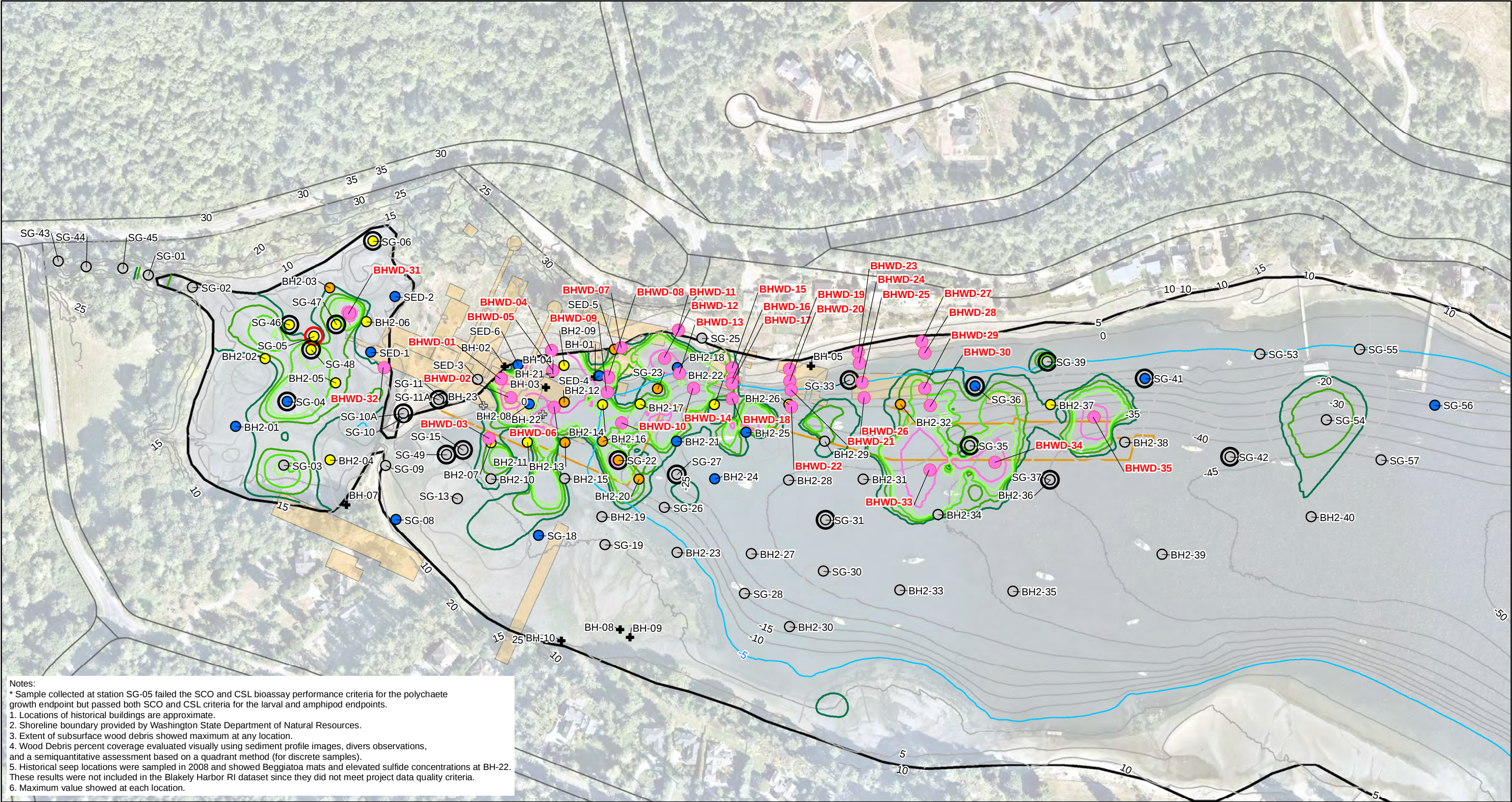
Geosyntec Consultants, Inc., 2022. *Final Remedial Investigation/Feasibility Study Work Plan: Blakely Harbor Park Site*. Prepared by Geosyntec Consultants, Inc. on behalf of Port Blakely Tree Farms for submittal to the Washington State Department of Ecology. January 2022.

Geosyntec Consultants, Inc., 2024. *Agency Review Draft Remedial Investigation Report, Blakely Harbor Park Site, Bainbridge Island, Washington*. Prepared by Geosyntec Consultants, Inc. on behalf of Port Blakely Tree Farms for submittal to the Washington State Department of Ecology. August 2024.

Podger, D., 2013. *Sulfide Effects on Aquatic Organisms: Literature Review*. Washington State Department of Ecology. 12 pp.

Table 1. Blakely Harbor FS Work Plan Addendum 2 Sampling Coordinates

Station ID	Easting (feet; NAVD1983)	Northing (feet; NAVD1983)
BHWD-01	1225470	222110
BHWD-02	1225496	222059
BHWD-03	1225438	221950
BHWD-04	1225606	222186
BHWD-05	1225609	222132
BHWD-06	1225612	222033
BHWD-07	1225792	222194
BHWD-08	1225758	222114
BHWD-09	1225756	222074
BHWD-10	1225793	221991
BHWD-11	1225946	222241
BHWD-12	1225909	222165
BHWD-13	1225949	222125
BHWD-14	1225986	222084
BHWD-15	1226090	222139
BHWD-16	1226091	222111
BHWD-17	1226090	222097
BHWD-18	1226090	222058
BHWD-19	1226243	222137
BHWD-20	1226245	222104
BHWD-21	1226248	222080
BHWD-22	1226249	222035
BHWD-23	1226428	222182
BHWD-24	1226431	222152
BHWD-25	1226438	222100
BHWD-26	1226444	222059
BHWD-27	1226599	222210
BHWD-28	1226606	222179
BHWD-29	1226607	222084
BHWD-30	1226621	222038
BHWD-31	1225063	222286
BHWD-32	1225156	222140
BHWD-33	1226620	221865
BHWD-34	1226795	221886
BHWD-35	1227060	222007



Notes:
* Sample collected at station SG-05 failed the SCO and CSL bioassay performance criteria for the polychaete growth endpoint but passed both SCO and CSL criteria for the larval and amphipod endpoints.
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.
3. Extent of subsurface wood debris showed maximum at any location.
4. Wood Debris percent coverage evaluated visually using sediment profile images, divers observations, and a semiquantitative assessment based on a quadrant method (for discrete samples).
5. Historical seep locations were sampled in 2008 and showed Beggiatoa mats and elevated sulfide concentrations at BH-22. These results were not included in the Blakely Harbor RI dataset since they did not meet project data quality criteria.
6. Maximum value showed at each location.

Legend

Wood Waste Sediment Cleanup Level Surface Sediment Sampling Stations

Total Organic Carbon (Percentage)

- <3.5%
- 3.5% - 7%
- 7% - 14%
- >14%

Wood Debris % (All)

- <10%
- 10 to 20%
- 20 to 30%
- 30 to 40%
- 40 to 50%
- > 50%

Bioassay Fail Location

Bioassay Pass Location

Seep Location

Historical Seep Location

Shoreline

Contour (-5 foot MLLW)

Contours (Feet MLLW)

Historical Wharf Structure

Road

Structures From 1917 Map and Figure 2 in GeoEngineers, 2019

0 62.5 125 250 Feet

N

Site-Specific Wood Waste Sediment Cleanup Level Surface Sediment Sampling Stations

FS Work Plan Addendum 2
Blakely Harbor Park Site
(Bainbridge Island, WA)

Geosyntec
consultants

Figure

1

MVI/Sea

August 2025

Attachment A

Standard Operating Procedure – Wood Volume Analysis of Surface Sediment

Standard Operating Procedure – Wood Volume Analysis of Surface Sediment

Standard Operating Procedure Acknowledgment Form

Project Number: 243197-01.01 Project Name: Blakely Harbor Feasibility Study Work Plan Addendum

My signature below certifies that I have read and understand the procedures specified in this Standard Operating Procedure.

Date	Name (print)	Signature	Company

Purpose

The purpose of this Standard Operating Procedure (SOP) is to establish uniform procedures for conducting wood volume analysis in concert with surface sediment sampling. This SOP describes the equipment, field procedures, materials, and documentation procedures necessary to perform wood volume analysis. The details within this SOP should be used in conjunction with associated project planning documents.

Health and Safety Warnings

Health and safety hazards for the work associated with this SOP, including physical, chemical, and biological hazards, are addressed in the project Health and Safety Plan (HASP). The HASP will be followed during all activities conducted by Anchor QEA staff.

Staff Qualifications

Field staff executing these procedures will have read, must be familiar with, and must comply with the requirements of this SOP and all associated project planning documents. Field staff will be under the direct supervision of qualified professionals who are experienced in performing the tasks described in this SOP, as approved by the project manager.

Field Records

The field records associated with the activities described in this SOP are critical project documents that will be used in data interpretation. Field logs may be included in the subsequent reports presenting the results of the field program.

Field team members will keep a daily record of significant events, observations, and measurements in the field logs. Field logs and records include:

- Daily Log (or field logbook, as dictated by project planning documents)
- Sediment Collection and Processing Log, including wood volume measurement calculation

Equipment and Supplies

The following is a list of equipment that may be necessary to carry out the activities in this SOP. Additional equipment may be required, depending on field conditions.

- Approved project-specific planning documents, including work plan, HASP, and other project SOPs
- Appropriate personal protective equipment (PPE) and clothing as defined in the HASP
- Decontamination equipment
- Sampling vessel equipped with necessary navigation and communication equipment
- Digital camera

- Water pump and hoses
- Appropriate field sieve equipment
- Surgical forceps
- Handheld magnifying glass
- Whiteboard and marker
- Ruler or tape measure
- Field logbook, field data collection form, and pens
- Decontamination equipment

Sampling Procedures

This section provides step-by-step procedures for the collection of surface sediment grab samples associated with wood volume analysis. Surface sediment samples (0 to 10-centimeters [cm]) will be collected using a stainless-steel VanVeen grab, power grab, ponar sampler, or similar device deployed from a vessel or by hand at low tide in accordance with the Remedial Investigation/Feasibility Study Work Plan for the Blakely Harbor Park Site (Geosyntec Consultants, Inc. 2022).

Collection of Wood from the Surface Sediment Grab

- Log sediment grab samples following the Remedial Investigation/Feasibility Study Work Plan for the Blakely Harbor Park Site (Geosyntec Consultants, Inc. 2022), selecting a representative portion of the sampler for wood sampling (e.g., subsample coring).
- Wash sediment from the 0- to 10-centimeter interval obtained from the wood sampling area through a 1-millimeter (mm) sieve nested over a 0.5-mm sieve, or into a container (if sieving with the 0.5-millimeter sieve will be done as a separate step). The 0.5- and 1-mm range follows Washington State Department of Ecology (Ecology 2013) wood waste guidance, equivalent in size to coarse-grained sand.
- Sediment adhering to the outside of the sampler should not be mixed with the sample.
- When being sieved, sediments may be gently sprayed with water from above, gently agitated by hand in a washtub of water, or washed using a combination of these techniques.
- If rocks or non-organic anthropogenic debris are caught in the sieve, rinse thoroughly over the sieve, carefully remove from the sample, and document on the sample log.
- Once the initial sieving is completed, hold the screen box at an angle and gently wash the remaining material into one corner/edge.
- Assess material retained by the 0.5- or 1-mm sieve to determine whether it is wood. Determination of fine wood relative to other similar sized materials (i.e., sand) may include the following:
 - Visual appearance using a magnifying glass
 - Texture or color (sand grains should feel more granular or gritty when rubbed between the fingers as opposed to fine wood material; wood may have a distinct color)

- Hardness (firm or stiff vs. soft or spongy)
- The identification of wood will be subject to the judgement of the field team. Anchor QEA and Ecology field staff (when present) will confer in the field and agree on which material is wood and therefore to be included in the volumetric measurement described below.
- Remove the remaining material determined not to be wood.
- Carefully rinse and transfer the clean separated wood material (including all size ranges greater than 0.5-mm) to an appropriately sized graduated cylinder.
- Be sure to check the screen carefully for wood fragments trapped in the mesh wires, using forceps if needed, taking care not to damage the screen.
- If nested over a 0.5-mm sieve, repeat the previous steps. If nested over a container, transfer material to a 0.5-mm sieve positioned over another container and repeat previous steps.
- All sediment post-sieving will be collected and stored following investigation derived waste (IDW) procedures for the project.

Volumetric Measurement of Wood

- Calculate the volume of a 10-cm section of the wood sampling area based on the cross-sectional wood sampling area within the grab sampler (e.g., core subsample area).
- Add a volume of potable water [A] (equivalent to the volume of a 10-cm section of the wood sampling area – calculated above) to the graduated cylinder containing the separated wood.
- Record total volume of the cylinder [B], reading from the bottom of a concave meniscus (some plastic graduated cylinders have a flat meniscus) and ensuring that all wood is submerged in the water (use a spoon, trowel, or similar tool to submerge the wood if needed).
- Subtract the volume of water added to the wood [A] (equivalent to a 10-cm section of the wood sampling area) from the total recorded volume [B] (wood and water). This is the approximate volume of wood in the sample interval [C].
- Divide the volume of wood by the volume of water added to determine what volumetric percentage of the interval is wood.
 - $(\text{volume of wood [C]} / (\text{sample volume [A]})) = \text{percent wood by volume}$

Once wood volume measurements are complete, all wood will be added to the project IDW.

Quality Assurance/Quality Control

It is the responsibility of the field team leader to periodically check and ensure that sample collection and processing procedures are in conformance with those stated in this SOP.

References

Ecology (Washington State Department of Ecology), 2013. Wood Waste Cleanup: Identifying, Assessing, and Remediating Wood Waste in Marine and Freshwater Environments. Publication No. 09-09-044. September 2013.

Geosyntec Consultants, Inc., 2022. Final Remedial Investigation/Feasibility Study Work Plan: Blakely Harbor Park Site. Prepared by Geosyntec Consultants, Inc. on behalf of Port Blakely Tree Farms for submittal to the Washington State Department of Ecology. January 2022