APPENDIX E
CONSTRUCTION QUALITY ASSURANCE PLAN

TABLE OF CONTENTS

List of Figures

List of Attachments

LIST OF ACRONYMS AND ABBREVIATIONS

ARAR	applicable or relevant and appropriate requirement
CAP	*Cleanup Action Plan*
CAR	Cleanup Action Report
CD	Consent Decree
CHASP	Construction Health and Safety Plan
Contractor	General Contractor
CQA	construction quality assurance
CQAP	*Construction Quality Assurance Plan*
CQAO	Construction Quality Assurance Officer
CQC	construction quality control
CU	certification unit
CWP	Construction Work Plan
DMMP	Dredged Material Management Program
Ecology	Washington State Department of Ecology
EDR	*Engineering Design Report*
EMNR	enhanced monitored natural recovery
EPP	Environmental Protection Plan
MLLW	mean lower low water
MTCA	Model Toxics Control Act
OMMP	*Operations, Maintenance, and Monitoring Plan*
PR/OPG	Pope Resources, LP/OPG Properties, LLC
RMC	residuals management cover
RTK GPS	Real Time Kinematic Global Positioning System
Site	Port Gamble Bay Cleanup Project Site
SMA	Sediment Management Area
SMS	Sediment Management Standards
TCP	Toxics Cleanup Program
TVS	total volatile solids
WAC	Washington Administrative Code

1 INTRODUCTION

This *Construction Quality Assurance Plan* (CQAP) describes quality assurance protocols and methods that will be used to ensure that remedial actions in Port Gamble Bay ("Site") are implemented in accordance with the cleanup design and associated permitting requirements. This CQAP builds on the accompanying *Engineering Design Report* (EDR), which describes the approach and criteria for the engineering design of sediment cleanup actions at the Site, as set forth in the *Final Cleanup Action Plan* (CAP; Ecology 2013), and in accordance with the requirements of Consent Decree (CD) 13-2-02720-0 between the Washington State Department of Ecology (Ecology) and Pope Resources, LP/OPG Properties, LLC (PR/OPG), entered in December 2013. This CQAP also builds on the Port Gamble Bay Cleanup Project (NWS-2013-1270) Joint Aquatic Resources Permit Application and Biological Assessment prepared in December 2013 and amended in November 2014 (Anchor QEA 2013a, 2013b, 2014). The actions described in this CQAP will be performed by PR/OPG under Ecology oversight, consistent with CD requirements. The accompanying *Operations, Maintenance and Monitoring Plan* (OMMP; Appendix F of the EDR) describes post-construction monitoring and adaptive management to ensure the long-term protectiveness of the remedy.

Implementation of this CQAP will be performed consistent with the requirements of the Model Toxics Control Act (MTCA), Chapter 70.105D in the Revised Code of Washington, as administered by Ecology under the MTCA Cleanup Regulation, Chapter 173-340 of the Washington Administrative Code (WAC). Implementation of this CQAP will also comply with the Sediment Management Standards (SMS) Chapter 173-204 WAC.

Construction activities to be performed at the Site include the following:

- Demolition and removal of creosote-treated structures
- Intertidal excavation
- Subtidal dredging
- Intertidal and subtidal capping
- Subtidal clean cover placement and enhanced monitored natural recovery (EMNR)

Separate from this CQAP, and following Ecology approval of the remedial design and receipt of permits for the remedial actions, 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, dredging, capping, and EMNR 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 remedial action, including Ecology and other 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 – Quality Assurance Program:** Describes the performance objectives and criteria, quality assurance measures, inspection and verification activities, and contingency actions for each construction activity.
- **Section 6 – 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 CD 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 demolition, excavation, dredging, capping, armor layer placement, EMNR material placement, and transport and off-site beneficial reuse and/or 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 demolition, excavation, dredging, capping, armor layer placement, EMNR material placement, and transport and off-site beneficial reuse and/or 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 and Other Agencies

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 EDR and Construction Specifications and Drawings, and this CQAP for consistency with the cleanup standards presented in the CAP and CD, including applicable or relevant and appropriate requirements (ARARs) as set forth in the CAP. 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 PR/OPG (the "Owner" for the purpose of this CQAP) and the Project Engineer. The Ecology Project Coordinator shall notify the Owner if they identify any concerns regarding the implementation of the cleanup action. The Owner, 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 cleanup action scope. Ecology will work cooperatively with other government agencies as necessary.

3.2 Owner

The Owner is ultimately responsible for implementing the cleanup action in accordance with the CD and CAP. The Owner, or a designated representative, will implement the CQAP, review Contractor work products, and be the point of contact with Ecology.

Monitoring activities will be the responsibility of the Owner, who will be acting in coordination with Ecology. Certain aspects of monitoring activities, however, may be performed by the Contractor but overseen by the Owner to ensure that the Contractor's construction and monitoring work is completed as stipulated by project permits, approvals, and contract documents.

3.3 Project Engineer

The Project Engineer is responsible for two main tasks:

1. Preparing the design of the remedial action such that successful implementation of the design will result in achieving the CD and construction activity-specific objectives and requirements
2. Providing consultation and observations during construction to assist with implementation of the remedial action in conformance with the Ecology-approved design documents

During implementation of the remedial 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. Ecology will have final authority to approve design modifications proposed by the Project Engineer.

3.4 Construction Quality Assurance Officer

The CQAO will be responsible for overseeing the implementation of the CQAP. In overseeing implementation of the CQAP, the CQAO is responsible for monitoring construction performance for compliance with construction performance standards and design requirements during implementation of the cleanup action, and is responsible for overseeing the required inspection and verification activities. The CQAO 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 Ecology-approved design documents and the construction operations to recognize deviations from those documents. The CQAO will also have the ability to manage and maintain the integrity of the data generated during implementation of the remedial action.

The CQAO will be responsible for identifying those field conditions that may warrant deviation from the Ecology-approved design documents. In such circumstances, the CQAO will coordinate with the Project Engineer and the Ecology Project Coordinator 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 Ecology.

The CQAO may use inspectors with the requisite expertise and experience to help perform the duties described above.

3.5 General Contractor

One or more construction contractors will be selected to perform construction activities including demolition; excavation; dredging and beneficial reuse/disposal of sediments; placement of cap material, armor, and clean sand cover; and other required cleanup activities. The selected Contractor(s) will have demonstrable experience with demolition, dredging, capping, sediment rehandling, and sediment disposal and placement. The Contractor is responsible to ensure that the work complies with the requirements of the contract Construction Specifications and Drawings pursuant to the remedial action and associated permits.

As part of the remedial action 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 Owner will implement this CQAP to verify that the remedial action is implemented in accordance with the design.

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.

3.5.1 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.

3.5.2 Contractor Construction Quality Control Supervisor

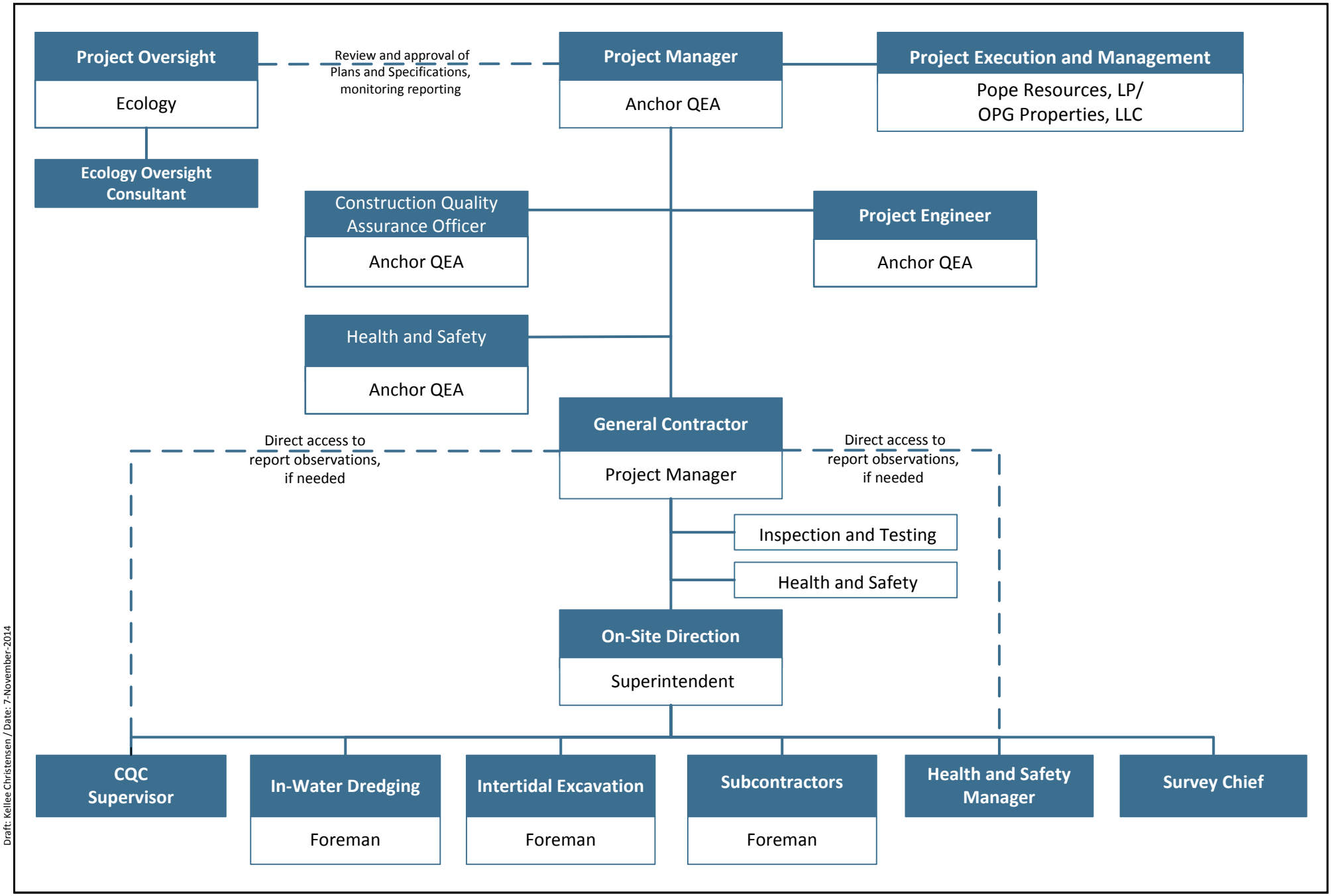
A CQC Supervisor will be provided by the Contractor as required in the Construction Specifications. The CQC Supervisor will develop and implement the CQC Plan through which the Contractor ensures compliance with the requirements of the Construction Specifications and Drawings. The CQC Plan will identify 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.

3.5.3 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.

3.6 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.



Draft: Kellee Christensen / Date: 7-November-2014

ANCHOR QEA

Figure E-1
Organizational Chart
Appendix E: Construction Quality Assurance Plan
Port Gamble Bay and Mill Site

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 Site remedial actions described in the EDR. The Project Manager will be thoroughly familiar with the CD and CAP, applicable environmental laws, and the requirements of the Ecology-approved design documents.

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 remedial 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 Ecology-approved design documents and the construction operations to recognize deviations from those documents and operations. The CQAO will also have the ability to 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 cleanup 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 Owner with its proposal. This will allow the Owner 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 Owner for approval prior to identifying the CQC Supervisor. Additionally, any subcontractors utilized in the work must have demonstrated to the satisfaction of the Owner 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 QUALITY ASSURANCE PROGRAM

The CQA program is described in this section for each major construction activity. For each activity, the following is provided:

- Description of construction activities to be implemented
- Specific performance objectives and criteria for the activity
- Inspection and verification activities
- Quality assurance measures
- Contingency actions

Remedial action construction elements subject to the quality assurance program include the following:

- Demolition and disposal of creosote-treated piles and remnant creosote-treated structures
- Intertidal sediment excavation, temporary upland stockpiling, and final placement of excavated materials in local uplands or approved upland disposal facility as appropriate
- Subtidal sediment dredging, temporary upland stockpiling, and final placement of dredged materials in local uplands or approved upland disposal facility as appropriate followed by residuals management cover (RMC) placement over the dredged area
- Intertidal and subtidal capping using a protective layer of clean silt, sand, gravel, cobble, and/or armor materials
- Placement of an EMNR layer of clean silt and/or sand

For each of these construction elements, inspection and verification activities will be implemented to confirm performance objectives have been met.

During the remedial action, the quality assurance program will progress as follows:

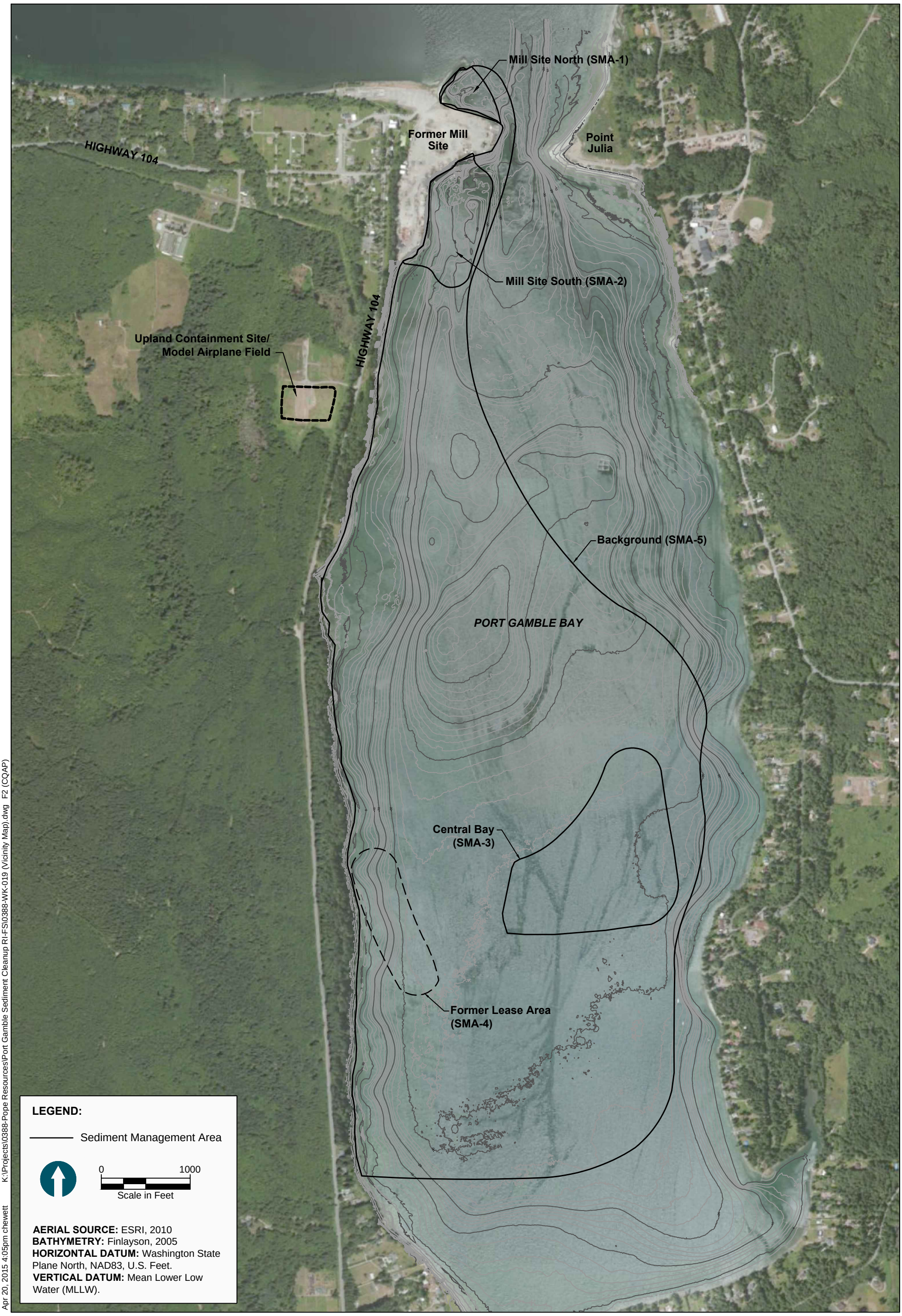
- The Contractor will submit a CQC Plan as detailed in Section 6. The CQC Plan will be subject to Owner approval before cleanup action field work begins.
- The Contractor and the CQAO will conduct inspection and verification activities (i.e., sampling, testing, and monitoring) to ensure compliance with the Ecology-

approved design documents and to ensure that performance objectives have been met. The Owner, 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 Ecology-approved design requirements or protocols will require Ecology review and approval.
- The Contractor will provide documentation to the CQAO to demonstrate that specific components of the Ecology-approved design documents have been properly implemented. The Owner, in consultation with the CQAO, will determine whether the components of the cleanup action are acceptable and complete.

The remainder of this section details each construction element and associated 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. The site has been divided into five sediment management areas (SMAs) as shown in Figure E-2. This section addresses the following main construction elements that will occur within each of the SMAs:

- SMA-1 (Mill Site North) activities include structural removal and demolition, intertidal excavation, subtidal dredging, and capping.
- SMA-2 (Mill Site South) activities include structural removal and demolition, intertidal excavation, subtidal dredging, capping, and EMNR material placement.
- SMA-3 (Central Bay) activities include EMNR material placement.
- SMA-4 was identified for action in the CAP; however, based on the results of testing in this SMA subsequent to the CAP, no specific construction actions will be performed in this area during the cleanup project.
- SMA-5 activities include structural demolition.



Apr 20, 2015 4:05pm chewett K:\Projects\0388-Pope Resources\Port Gamble Sediment Cleanup RI-FS\0388-WK-019 (Vicinity Map).dwg F2 (CQAP)

Figure E-2
Sediment Management Areas
Appendix E: Construction Quality Assurance Plan
Port Gamble Bay and Mill Site

5.1 Structure and Pile Removal and Demolition

This section describes the construction oversight activities, including CQC and CQA tasks, which will be undertaken to verify that structure and pile removal and demolition have been completed in accordance with the Ecology-approved design documents.

5.1.1 Description of Construction Activities

Existing creosote-treated piles, dolphins, and structures will be removed from both intertidal and subtidal areas of the Site; this work will be sequenced to occur shortly before dredging or capping actions, if required within the pile area, to maximize control of pile removal residuals.

Demolition areas will be enclosed within a turbidity curtain to control potential releases that could occur during demolition.

As discussed in the EDR, before initiating full-scale creosote-treated pile removal, the Contractor will conduct an initial pile removal pilot demonstration to evaluate aggressive pile removal methods and identify methods that are effective and practicable. The initial pile removal demonstration will occur within two representative intertidal high-density pile areas of the Site that consist of a range of existing pile conditions. Immediately after the pilot test, the Project Engineer and Contractor will jointly propose a pile removal protocol, with the objective of maximizing the success of the pile extraction and concurrently minimizing pile breakage. Piles that cannot be practicably removed will be cut. An amended cap—consisting of a protective layer of mixed sand, gravel, and cobble material and an organoclay amendment—will be placed over all cut piles located within intertidal SMAs. The proposed pile removal protocol will be reviewed and agreed upon by Ecology, Port Gamble S'Klallam Tribe, and Suquamish Tribe.

5.1.2 Performance Objectives

The following performance objectives apply to demolition:

- Remove creosote-treated piles and structures from the Site to the maximum extent practicable
- Minimize potential residual contamination from creosote-treated pile removal

- Ensure that upland post-extraction processing of creosote-treated timber and piles minimizes spread of sawdust or creosote residues
- Avoid impacts to existing eelgrass beds during demolition work including no disturbance by spudding, anchoring, dredging, and material placement

5.1.3 Inspection and Verification

As part of the CQC program, extraction, breaking, and cutting of piles will be documented, and protective caps placed immediately following these activities. Documentation will include photographs of the demolition activities, as appropriate, and counts will be made of piles pulled and cut off.

Daily and weekly demolition reports will be prepared to track cumulative removal progress as well as demolition production and coverage. In addition, weekly (during active construction) or monthly (during no active construction) progress reports will be prepared and submitted to Ecology.

5.1.4 Contingency Actions

Contingency actions are built into the demolition protocol. To minimize potential residual contamination from creosote-treated pile removal, a post-removal cover of sand, gravel, and cobble material will be placed on top of the demolition area.

5.2 Excavation and Dredging

This section describes the construction oversight activities, including CQC and CQA tasks, which will be undertaken to verify that intertidal excavation and subtidal dredging within SMA-1 and SMA-2 have been completed in accordance with the Ecology-approved design documents.

5.2.1 Description of Construction Activities

Excavation will be performed in SMA-1 and SMA-2 for intertidal areas above elevation +0 foot mean lower low water (MLLW) “in the dry” using land-based equipment to the maximum extent practicable. Subtidal dredging will be performed below +0 foot MLLW

using water-based dredging equipment. Dredged material will be offloaded into a temporary stockpile area on the mill site uplands using methods and best management practices that will, to the maximum extent practicable, minimize the potential for spilling dredged material. Following subtidal dredging, the dredge footprint will be covered with an average 6-inch-thick RMC layer of clean soil or sediment.

Debris and unsuitable material will be screened from the excavated and dredged material, and will be shipped to a licensed upland landfill. After additional characterization sampling of the materials from the temporary stockpiles, the dredged and excavated material will be moved to an appropriate upland beneficial reuse or permitted landfill area for permanent placement.

5.2.2 Performance Objectives

The following performance objectives apply to dredging and excavation:

- Achieve the required dredge elevation or excavation thickness over 95% of the work area
- Control excavation and dredging residuals by placing average 6-inch thick RMC over excavation and dredge areas that will not otherwise be capped (Section 5.3)
- Avoid impacts to existing eelgrass beds during excavation and dredging work including no disturbance by spudding, anchoring, dredging, and material placement

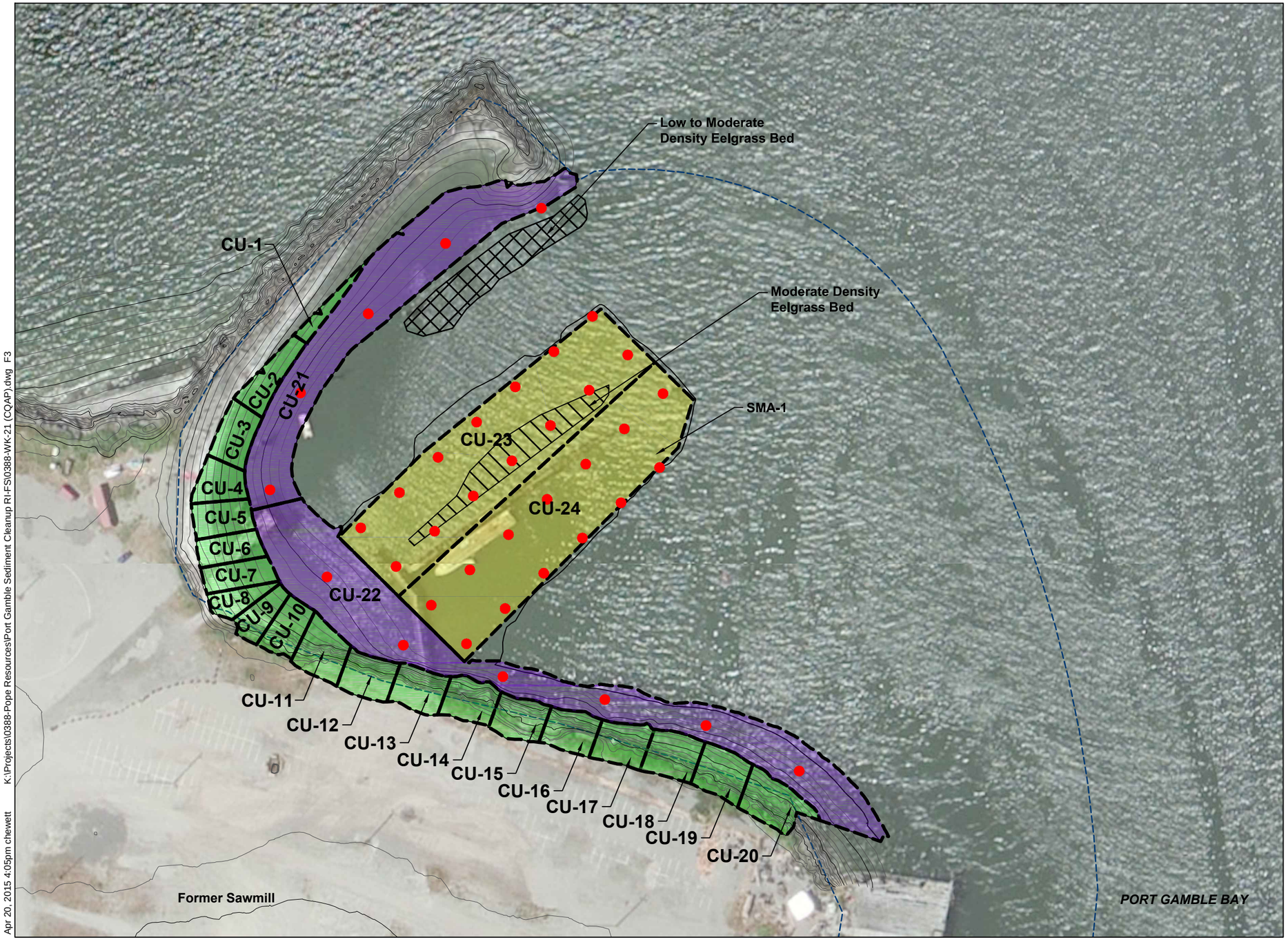
5.2.3 Inspection and Verification

Verification of the completion of excavation and dredging will be performed on a certification unit (CU) basis. A CU is an excavation or dredging subarea within a SMA that will be used for assessing compliance with elevation targets and thickness removal. Intertidal CUs will generally be sized to facilitate excavation and follow-on capping over a single low tide cycle (i.e., "in the dry"), while subtidal CUs will generally be sized to reflect approximately 1 week of dredging. The layout of CUs is shown for SMA-1 and SMA-2 in Figures E-3 and E-4, respectively.

Post-removal surveying will be performed to verify that the limits and extents of removal required by the EDR within a CU have been achieved prior to placement of the RMC layer or cap materials.

As part of the CQC program, post-excavation and post-dredging bathymetric surveys will be conducted. Subtidal survey lines will be set at a 25-foot-grid spacing perpendicular and parallel to the dredge cut where practical. Lead line or pole sounding measurements will be taken at a maximum interval of 10 feet along each transect or at a noted break in grade. Intertidal survey will be conducted on a grid with minimum 5-foot by 5-foot spacing. A Real Time Kinematic Global Positioning System (RTK GPS) will be used to determine the horizontal position of each shallow water survey measurement taken.

Daily and weekly dredging reports will be prepared to track cumulative volume progress as well as dredging production and coverage. In addition, weekly (during active construction) or monthly (during no active construction) progress reports will be prepared and submitted to Ecology.



LEGEND:

SMA-1 Sediment Management Area

Subtidal Dredge Sediment/Wood Waste Deposit with Residuals Cover

Intertidal Excavation (Elevation > 0' MLLW)

Shallow Subtidal Dredge (Approximate Elevation < 0' MLLW and > -5' MLLW)

Creosote Piling and Structure Removal Area

Existing Eelgrass Bed to be Transplanted by Others (No Dredging, Spudding, or Material Placement Prior to Eelgrass Removal by Others

Existing Eelgrass Bed (Do Not Disturb, No Dredging, Spudding or Material Placement)

Example Construction Unit (CU) Areas

Proposed Post-excavation/dredge Surface Monitoring Sample Location

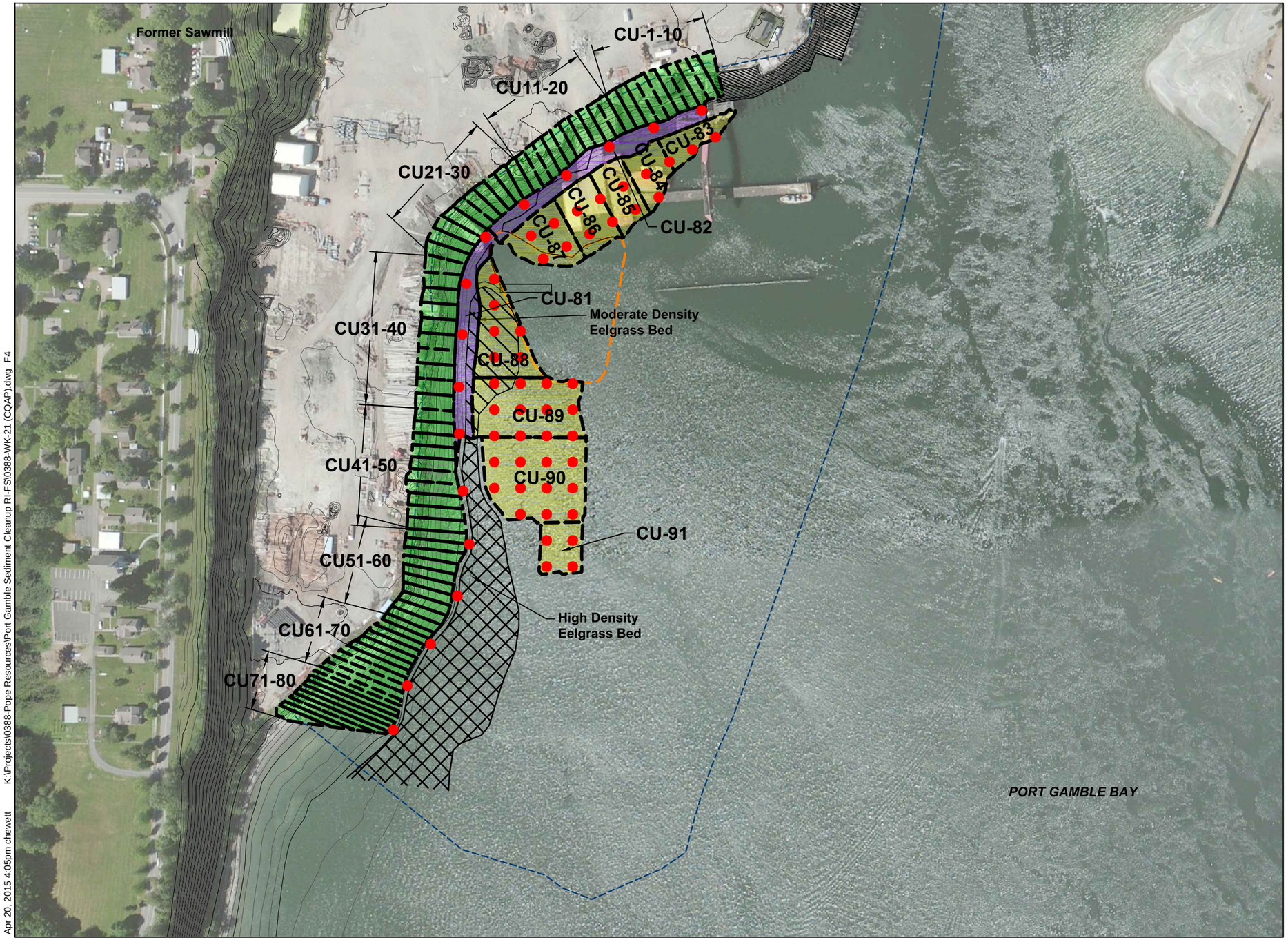
0 100
Scale in Feet

AERIAL SOURCE: ESRI, 2010
SURVEY: Upland survey by Triad Associates, dated July, 2012. Bathymetry by Etrac, dated August 27, 2014.**HORIZONTAL DATUM:** Washington State Plane North, NAD83, U.S. Feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

K:\Projects\0388-Pope Resources\Port Gamble Sediment Cleanup RI-FS\0388-WK-21 (CQAP).dwg F3
Apr 20, 2015 4:05pm chewett

ANCHOR QEA

Figure E-3
Mill Site North (SMA-1) Certification Units
Appendix E: Construction Quality Assurance Plan
Port Gamble Bay and Mill Site



LEGEND:

SMA-1 Sediment Management Area

Subtidal Dredge Sediment/Wood Waste Deposit with Residuals Cover

Intertidal Excavation (Elevation > 0' MLLW)

Shallow Subtidal Dredge (Approximate Elevation < 0' MLLW and > -5' MLLW)

Creosote Piling and Structure Removal Area

Existing Eelgrass Bed to be Transplanted by Others (No Dredging, Spudding, or Material Placement Prior to Eelgrass Removal by Others

Existing Eelgrass Bed (Do Not Disturb, No Dredging, Spudding or Material Placement)

Example Construction Unit (CU) Areas

2007 Dredge and Cap Area

Proposed Post-excavation/dredge Surface Monitoring Sample Location

0 200
Scale in Feet

AERIAL SOURCE: ESRI, 2010
SURVEY: Upland survey by Triad Associates, dated July, 2012. Bathymetry by Etrac, dated August 27, 2014.**HORIZONTAL DATUM:** Washington State Plane North, NAD83, U.S. Feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

K:\Projects\0388-Pope Resources\Port Gamble Sediment Cleanup RI-FS\0388-WK-21 (CQAP).dwg F4
Apr 20, 2015 4:05pm chewett

ANCHOR QEA

Figure E-4
Mill Site South (SMA-2) Certification Units
Appendix E: Construction Quality Assurance Plan
Port Gamble Bay and Mill Site

5.2.4 Quality Assurance Measures

Quality assurance measures for dredging include the following:

- Subtidal post-dredge sediment sampling to document the thickness of generated wood waste residuals in the dredging area (which will be managed by placing a post-dredge RMC shortly after completion of dredging), and to verify that less than 6 inches of un-dredged sediment wood waste inventory (i.e., undisturbed residuals with greater than 15% total volatile solids [TVS]) remain in the dredge area that may require an additional cleanup pass prior to RMC placement

Post-dredge sampling and analysis measures are described below.

5.2.5 Sampling Objectives and Approach

5.2.5.1 Post-Dredge Surface Monitoring

To characterize sediment quality conditions at the post-dredge sediment surface (i.e., post-dredge z-layer), sediment cores will be collected to visually inspect wood waste thickness within the subtidal dredge areas. An example CU layout is provided on Figures E-3 and E-4. Post-dredge surface sample collection and TVS analysis will be performed prior to RMC material placement over the dredge area. Final sampling locations will be identified based on the Contractor-determined CUs.

5.2.6 Monitoring Methods, Locations, and Timing

A brief summary of the monitoring methods, locations, and timing is provided in the following subsections. Detailed procedures for sediment and soil sampling are provided in the *Sampling and Analysis Plan* (Attachment E-1).

5.2.6.1 Post-dredge Sediment Z-layer Monitoring

The post-dredge sediment z-layer samples will be collected from the 0- to 2-foot interval using a piston core or similar device either deployed by diver or from a sampling vessel. Material in the 0- to 2-foot interval will be visually inspected and the thickness of surficial generated residuals in each core (characterized by relatively low density sediments) will be documented. Sediments in successive 6-inch intervals underlying the generated residuals

will be sectioned for TVS analysis. A detailed summary of the sampling methods is provided in Attachment E-1.

5.2.7 Contingency Actions

In areas where a survey vessel is unable to access, lead-line, pole soundings, or land-based conventional upland survey methods will be employed to supplement the data collection. In locations where required excavation or dredging elevations have not been achieved, the Contractor will be required to remove additional material. Similarly, in locations where post-dredge core sampling data reveal that significant thicknesses of undisturbed residuals with greater than 15% TVS remain in the dredge area, the Contractor will be required to remove additional material. All dredge areas will receive a RMC layer as a presumptive contingency measure to ensure the protectiveness of the dredging remedy.

5.3 Cap Construction and EMNR Material Placement

This section describes the construction oversight activities, including CQC and CQA tasks, which will be undertaken to verify that cap construction and EMNR material placement have been completed in accordance with the Ecology-approved design documents.

5.3.1 Description of Construction Activities

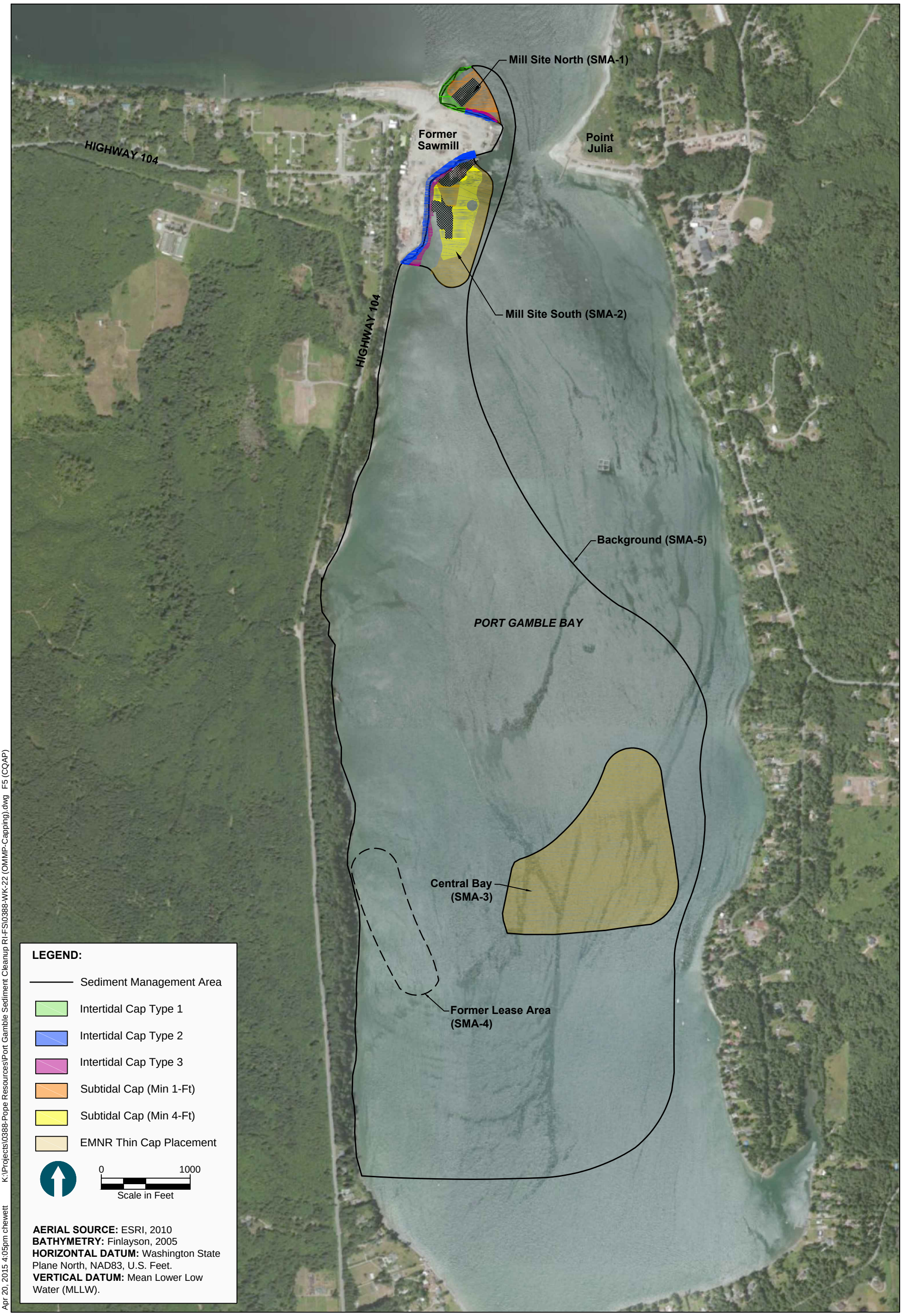
Following excavation of intertidal surface sediments in SMA-1 and SMA-2, an intertidal engineered cap will be placed using a protective layer of clean silt, sand, gravel, cobble, and/or armor materials, as appropriate for specific areas of the Site (Figure E-5).

Subtidal sediment in SMA-2 offshore of approximately -20 feet MLLW that exceeds biological criteria and contains significant wood chip accumulations with TVS concentrations that exceed 15% will be contained below a 4-foot-thick cap (Figure E-5).

Subtidal sediment in SMA-1 that exceeds biological criteria but contains moderate wood waste accumulations (TVS less than 15%) will be capped with an approximately 1-foot-thick cap (Figure E-5).

Approximately 6 inches of clean EMNR silt/sand materials will be placed over subtidal sediment in the remaining parts of SMA-2 and SMA-3 that exceed biological criteria but contain moderate wood waste accumulations (Figure E-5). To the extent practicable, the source of the sand will be clean navigational dredged material, which will enhance the rate of natural recovery, reduce concentrations of wood waste breakdown products, and expedite restoration of a healthy benthic community.

Acceptable EMNR material placement methods will include spreading from a bottom dump barge (where water depth allows access), or placement using mechanical methods from a material barge with either a rehandling bucket, skip box, or similar equipment.



Apr 20, 2015 4:05pm chewett K:\Projects\0388-Pope Resources\Port Gamble Sediment Cleanup RI-FS\0388-WK-22 (OMMP-Capping).dwg F5 (CQAP)

Figure E-5
Capping and EMNR Areas in SMA-1, SMA-2, and SMA-3
Appendix E: Construction Quality Assurance Plan
Port Gamble Bay Cleanup

5.3.2 Performance Objectives

The following performance objectives apply to cap construction and EMNR material placement:

- For caps, ensure that the minimum design thickness has been achieved for at least 95% of the cap surface area.
- For EMNR cover, ensure that the required average thickness of EMNR material has been placed in accordance with the approved engineering design.
- Avoid impacts to existing eelgrass beds during cap construction and EMNR material placement work including no disturbance by spudding, anchoring, and material placement

5.3.3 Inspection and Verification

5.3.3.1 Cap and EMNR Material Verification

The Dredged Material Management Program (DMMP) agencies as well as the Ecology Toxics Cleanup Program (TCP) have determined that dredged material from the Snohomish River federal navigation channel and settling basins is generally suitable for beneficial use in Port Gamble Bay as cap and EMNR material. Other dredged material may also be determined to be suitable, subject to review and approval by the DMMP and Ecology TCP. Pre-approved material, where available, will be specifically referenced in the contract documents as to the source and relevant test results. PR/OPG is currently in the permitting process for the development of a PR/OPG-owned and –operated local sand pit to obtain clean backfill materials for use at the site. 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 and gradation requirements presented in the Construction Specifications.

5.3.3.2 Cap and EMNR Material Placement Verification

The Contractor will be required to conduct bathymetric and topographic surveys before cap construction, and after the cap has been placed. For multi-layer caps (e.g., those that require a surface armor layer and/or a granular filter underlayment), interim surveys will be required to measure the thickness of each layer.

Where electronic tracking methods are used (e.g., bucket maps), the Contractor will be required to make this information available to the Owner.

The Contractor will be required to track the volume and/or weight of cap and EMNR material placed on a daily basis and to make this information available to the Owner as part of their daily reports.

5.3.4 Quality Assurance Measures

The CQA program will include the following measures for capping and EMNR material placement, conducted by the Owner:

- Review Contractor-submitted results for:
  - Particle size (grain size) distribution testing
  - Chemical analysis testing
- Compare the chemical concentrations from laboratory testing to the required chemistry levels presented in the contract documents.
- Conduct on-site visual observations of materials on a periodic basis to evaluate whether a notable change has occurred in the type of material being used for capping and EMNR.
- Review Contractor-provided progress surveys to evaluate whether required cap thickness and coverage is being achieved
- Review Contractor-provided measurements of cap material placed (on a per ton or per cubic yard basis) to compare as-placed quantities to theoretical quantities

5.3.5 Contingency Actions

If the chemistry of the proposed backfill does not meet the requirements of the contract, the Owner will reject these materials and require the Contractor to seek an alternate source for cap or EMNR material.

If, based on visual observations, the cap or EMNR material appears to have changed compared to the material for which particle size and chemistry results have been submitted,

the Owner will require the Contractor to run additional tests to confirm that the cap or EMNR material continues to meet requirements.

If cap thickness is not being achieved, the Owner will review whether sufficient quantity of cap material has been placed. If there is an apparent discrepancy between the theoretical thickness and actual thickness of material placed, the Owner will assess actual thickness using either a confirmatory core or a push probe to measure thickness in place.

If the required cap thickness has not been achieved, the Contractor will be directed to place more cap material in areas noted as deficient.

6 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 the cleanup action to complete the project as specified in the Ecology-approved design documents and to collect the documentation required. The following sections describe documentation that will be required throughout the cleanup action.

6.1 Pre-Construction Documentation

The Contractor will be required to submit a CWP for approval by the Owner and Ecology. The CWP will contain the following elements:

- Project work plans
- CQC Plan
- CHASP
- Construction Environmental Protection Plan (EPP)
- Project Construction Schedule
- Survey Control Plan

Ecology's approval authority for these plans is defined in the CD. 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.

6.1.1 Project Work Plans

The project work plans will describe, in narrative form, the methods to be employed in the cleanup action 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:

- Dredging and excavation
- Demolition and pile removal
- Capping and EMNR material placement

- Spill prevention, control, and countermeasures
- Construction stormwater pollution prevention measures
- Waste management, transportation, and disposal
- Temporary facilities and controls
- Air pollution and odor control
- Marine water quality criteria compliance
- Sediment recontamination control

The project work plans will describe how each of the quality assurance measures and verification activities identified in Section 5 will be addressed in the field.

6.1.2 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 5 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.

6.1.3 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.

6.1.4 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 5.

6.1.5 Project Construction Schedule

A detailed Project Construction Schedule will be submitted by the Contractor for each construction element prior to construction. Periodic schedule updates will be submitted by the Contractor following progress meetings.

6.1.6 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.

6.2 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 6.2.1. 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 6.2.2. Weekly progress reports will be submitted to Ecology. Additional documentation is described in Sections 6.2.3 through 6.2.6. The records described in this section will be maintained in the project files. Monitoring data will be provided electronically to Ecology in the Cleanup Action Report (CAR).

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.

6.2.1 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 dredged or excavated and disposed of on- or off-site
- Area and quantity of debris removed and disposed of off-site
- Area and quantity of materials placed on-site
- Surveys completed and progress survey data
- Weight tickets and/or barge displacement measurements
- 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 Ecology on a weekly basis as part of the Weekly Summary Reports as discussed in Section 6.2.3.

6.2.2 Construction Quality Assurance Officer's Daily Report

The CQAO will maintain a daily field log to record observations, measurements, inspections completed, data received, communications with other members of the project team or Ecology, 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 or Ecology. Water quality results will also be separately recorded and reported as defined in the *Water Quality Monitoring Plan* (Attachment E-2).

6.2.3 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:

- Structure and pile demolition
  - Area worked (supported by Contractor's log)
  - Quantity of demolition
  - Problems encountered
  - Corrective actions
- Excavation and dredging
  - Area worked (supported by Contractor's log)
  - Volume of material removed (supported by Contractor's log)
  - Surveys completed (supported by Contractor's log)
  - Problems encountered
  - Corrective actions
- Capping and EMNR material placement
  - Area worked (supported by Contractor's log)
  - Weight/volume of material placed
  - Problems encountered

  - Corrective actions

- Environmental controls
  - Samples collected
  - Summary of visual results
  - Summary of water quality monitoring
  - Summary of shellfish monitoring
  - Problems encountered
  - Corrective actions

6.2.4 Weekly Construction Meetings

Weekly progress meetings will be coordinated with Ecology 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.

6.2.5 Import Material Characterization

Prior to any on-site placement of import materials, 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.

6.2.6 Post-Construction Documentation

Within 120 days of completion of each construction season, the Owner will submit a summary of information that will be presented in the Draft CAR. Within 120 days of Ecology confirmation that all of the cleanup action requirements have been fulfilled (excluding long-term post-construction monitoring requirements), the Owner will submit the Draft CAR. The Draft CAR will contain the following information:

- Introduction
  - Site location

  - Environmental setting
  - Relevant operational history
  - Summary of previous investigations and actions

- Cleanup action background
  - Basis for the cleanup action (i.e., the CD and CAP)
  - Cleanup standards
  - Summary of design basis
  - Summary of deviations from the design, if any

- Construction activities
  - Description of structure and pile demolition
  - Description of dredging and RMC placement activities
  - Description of excavation activities
  - Description of cap placement
  - Description of EMNR material 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 cleanup 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's oversight activities

  - (Note: quality assurance for water quality monitoring analytical data will be included in the Final Water Quality Monitoring Report)

- 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 cleanup 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 cleanup 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 cleanup action and corrective actions
  - Identification of successes in implementing the cleanup action
  - Analysis of lessons learned that may be applied to future activities
- Cleanup action contact information
  - Identification of individuals (contact names, addresses, and phone numbers) for design and remediation contractors, Ecology oversight contractors, and key personnel at the Owner, Ecology, and other agencies

The CAR will also include copies of as-built drawings, summaries of waste disposal and analytical results, the Final Water Quality Monitoring Report, and the certification statement required by the CD.

If applicable, the Owner will submit a Final CAR within 90 days of receipt of Ecology comments on the Draft CAR.

7 REFERENCES

Anchor QEA (Anchor QEA, LLC), 2013a. *Joint Aquatic Resources Permit Application: Port Gamble Bay Cleanup Project*. Prepared for Pope Resources LP/OPG Properties LLC. December.

Anchor QEA, LLC, 2013b. *Biological Assessment: Port Gamble Bay Cleanup Project*. Prepared for Pope Resources LP/OPG Properties LLC. December.

Anchor QEA, 2014. *Draft Port Gamble Bay Cleanup Project Supplemental Information (NWS-2013-1270) Memorandum*. Prepared for USACE, WDNR, Ecology, and WDFW. November 6.

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.

ATTACHMENT E-1
SAMPLING AND ANALYSIS PLAN

TABLE OF CONTENTS

List of Tables

List of Attachments

LIST OF ACRONYMS AND ABBREVIATIONS

° C	degrees Celsius
ASTM	American Society for Testing and Materials
COC	chain-of-custody
CQAO	Construction Quality Assurance Officer
CQAP	*Construction Quality Assurance Plan*
CU	certification unit
DGPS	differential global positioning system
Ecology	Washington State Department of Ecology
EDR	*Engineering Design Report*
FC	Field Coordinator
HDPE	high-density polyethylene
MLLW	mean lower low water
NAD83	North American Datum 1983
PSEP	Puget Sound Estuary Program
QA	quality assurance
QC	quality control
SAP	*Sampling and Analysis Plan*
Site	Port Gamble Bay Cleanup Project Site
SMA	Sediment Management Area
TVS	total volatile solids
USEPA	U.S. Environmental Protection Agency

1 INTRODUCTION

This *Sampling and Analysis Plan* (SAP) describes sediment sampling and analysis activities in parts of Port Gamble Bay, Washington ("Site") that will be performed during remedial construction to confirm that dredging actions achieve performance standards as described in the accompanying *Construction Quality Assurance Plan* (CQAP) and *Engineering Design Report* (EDR).

This document summarizes the conceptual sampling plan, field sampling methods, and analytical and biological laboratory procedures. This SAP was prepared following the Washington State Department of Ecology (Ecology) *Sediment Sampling and Analysis Plan Appendix* guidance document (Ecology 2008). Analytical quality assurance/quality control (QA/QC) procedures were also developed based on the analytical protocols and QA guidance of the Puget Sound Estuary Program (PSEP 1986, 1995, 1997a, 1997b, 1997c) and U.S. Environmental Protection Agency's (USEPA's) *Contract Laboratory Program National Functional Guidelines for Data Review* (USEPA 1999, 2004).

2 GENERAL FIELD OPERATIONS

This section describes the sediment sample collection activities as they pertain to the CQAP. Methods for water quality monitoring are described in the accompanying *Water Quality Monitoring Plan* (Attachment E-2 to the CQAP).

Subsurface sediment sampling will be conducted to: 1) confirm that remedial actions achieve performance standards described in the CQAP and EDR; and 2) to inform the design of additional removal action if necessary. The following sections describe sample collection and processing procedures.

2.1 Horizontal Positioning and Vertical Control

Horizontal positioning will be determined by onboard differential global positioning system (DGPS) based on target coordinates that will be developed based on Contractor-developed certification units (CUs) within the Sediment Management Areas (SMAs). The horizontal datum will be North American Datum 1983 (NAD83), Washington State Plane, North Zone. Measured station positions will be converted to latitudinal and longitudinal coordinates to the nearest 0.01 second. The accuracy of measured and recorded horizontal coordinates is typically less than 1 meter and will be within 2 meters, following Dredge Material Management Program guidance.

The vertical elevation of the mudline at each sediment sampling location will be measured using a fathometer mounted on the sampling vessel. Alternatively, a lead line tape will be used to confirm mudline depths near the actual sample location. The mudline measurement, time, and the predicted tidal elevation at the time of sample collection will be recorded. The measured mudline elevation will be converted to mean lower low water (MLLW) by adding the predicted tidal elevation at the time the sample was collected. Real-time tidal elevations will be determined after sample collection using National Oceanic and Atmospheric Administration's tide gage located at Bangor tide station 1034.

2.2 Equipment List

The following general equipment will be required during sample collection procedures:

- Personal protective equipment, as required by the Health and Safety Plan
- Navigation and Site maps
- Camera
- Field notebook
- Aluminum decked boat equipped with outboard motor
- Calibrated rod or ruler for sediment depth measurement
- Sampling device (vibracore sampler or similar device for dredge sampling, hang auger or similar device)
- Weighted tape measure calibrated in 0.1-foot increments
- Decontamination supplies

2.3 Equipment Decontamination Procedures

Sample containers, instruments, working surfaces, technician protective gear, and other items that may come into contact with sediment sample material must meet high standards of cleanliness. All equipment and instruments used that are in direct contact with the sediment collected for analysis must be made of glass, stainless steel, or high-density polyethylene (HDPE) and will be cleaned prior to each day's use and between sampling or compositing events. Decontamination of all items will follow PSEP protocols. The decontamination procedure is as follows:

1. Scrub until free of visible sediment and rinse with site water.
2. Pre-wash rinse with tap water.
3. Wash with solution of tap water and Alconox® soap (brush).
4. Rinse with tap water.
5. Rinse three times with distilled water.
6. Cover (no contact) all decontaminated items with aluminum foil.
7. Store in clean, closed container for next use if not used immediately.
8. Collect decontamination liquids and solids for proper disposal.

2.4 Station and Sample Identification

Target stations will be determined based on Contractor-developed CUs. Sediment core sample nomenclature identification will be determined using the following system:

- Each subtidal core sample location will be identified as PG to depict the project location, PC to depict the post-dredge confirmatory purposes, and an alphanumeric of SC-01 through SC-73, identifying the coring locations, followed by sample interval depth in feet with the date collected in the format YYMMDD (e.g., PG-PC-SC-01-0-1-150814 for a core collected on August 14, 2015, from 0 to 1 feet).
- Each intertidal excavation core sample location will be identified as PG to depict the project location, EC to depict the post-excavation confirmatory purposes, and an alphanumeric of EC-01 through EC-27 identifying the coring locations, followed by sample interval depth in feet with the date collected in the format YYMMDD (e.g., PG-EC-01-0-1-150814 for a core collected on August 14, 2015, from 0 to 1 feet).
- A field duplicate sample will be identified by adding 50 to the sample number (e.g., PG-PC-SC-51-0-1-150814 is the duplicate of the composite sample collected at PG-PC-SC-01-0-1-150814).
- A rinse blank sample will be identified by PG-PC-RB and appended with the date collected, in the format YYMMDD.

3 SAMPLING METHOD REQUIREMENTS

This section addresses the sample collection and processing procedures for in-water sediments that will be used to ensure data quality from sample collection to sample processing. Specifically, this section describes sample scheduling, positioning, identification, collection, subsampling, compositing, field QA, and waste management.

3.1 Field Documentation

Field documentation will consist of a daily field log and sample collection forms (Attachment E-1-1). The daily field log is intended to provide sufficient data and observations to enable readers to reconstruct events that occurred during the sampling period. All data entries will be made using an indelible ink pen. Corrections will be made by drawing a single line through the error, writing in the correct information, then dating and initialing the change. Examples of information to be recorded include field personnel, weather conditions, complications encountered, field communications, and other general details associated with the sampling effort. At a minimum, the following information will be included in this log:

- Names of the Field Coordinator (FC) and person(s) collecting and logging the sample
- Sample station number
- Date and collection time of each sediment sample
- Observations made during sample collection, including weather conditions, complications, communications, and other details associated with the sampling effort
- Qualitative notation of apparent resistance of sediment column to sampling, including notes on debris
- Any deviations from the approved SAP

In addition to maintaining a daily field log, sample collection forms will be completed for each sample. The sample collection forms will include standard entries for station identifiers, station coordinates, date and time of sample location, type of samples collected, type of analyses for each sample, and specific information pertaining to the matrix being collected. For sediment core samples, the collection form will include information regarding penetration of the sampler and physical characteristics of the sediment, such as texture, color, odor, stratification, and sheen.

3.2 Station Locations

Figures E-3 and E-4 in the CQAP show the locations of SMA-1 and SMA-2 and preliminary CUs within these SMAs. Final CUs will be determined by the Contractor.

3.3 Sample Containers for Analysis

The contract laboratory will provide certified, pre-cleaned, USEPA-approved containers for all archived samples.

3.4 Field Quality Assurance Samples

Field QA samples will be used to evaluate the efficiency of field decontamination and processing procedures. Although validation guidelines have not been established for field QA samples, their analysis is useful in identifying possible problems resulting during sample collection or sample processing in the field. All field QA samples will be documented in the daily field log and verified by the Construction Quality Assurance Officer (CQAO) or designee.

3.4.1 Rinsate Blanks for Sediments

For sediment samples, one equipment rinsate blank will be collected for each sample collection method. Rinsate blanks consist of rinsing the decontaminated equipment used for field processing of samples with distilled water and collecting the rinsate water in sample containers for analysis. Rinsate blanks will be analyzed for metals and organic parameters.

3.4.2 Field Homogenization Duplicate (Split Sample)

At least one field homogenization sample will be collected and analyzed for every 20 sediment samples processed in the field. The field homogenization sample consists of collecting additional sediment from one location, processing that sample consistent with procedures outlined in this SAP, then submitting a blind split of that sample to the laboratory.

3.4.3 Additional Sediment Volume for Laboratory Quality Assurance and Quality Control

Field QA samples will include the collection of additional sediment volume to ensure that the laboratory has sufficient sample volume to run the program-required analytical QA/QC samples for analysis. Additional sample volume to meet this requirement will be collected at a frequency of one per sampling event or one in 20 samples processed, whichever is more frequent.

3.5 Subsurface Sediment Core Collection

This section describes collection, processing, and handling procedures for the collection of subsurface sediment core samples. Sediment cores will be collected using either piston coring or vibracoring equipment. The project team will coordinate sample collection, sediment compositing (if necessary), and sample transport to the analytical laboratory. Sampling will occur after dredging activities are complete within each SMA. Completion of dredging activities within an SMA will be confirmed by the Contractor based on bathymetry surveys of the area. The Anchor QEA project manager will notify the U.S. Coast Guard of sampling dates and locations. It is anticipated that mobilization, field sampling, sample processing, and demobilization will require approximately 1 working day within SMA-1 and 2 working days within SMA-2. Cores will be collected at the locations to be determined as part of the Contractor's work plan. Sediment core locations may be adjusted in the field as necessary.

3.5.1 Piston Core Collection Procedures

Sediment cores may be collected using a piston core, or equivalent sampling technology. The piston core is typically deployed using either a diver or deployed from a sampling vessel. The piston core will be lowered to the bottom, where the unit will be energized and advanced to the appropriate depth to collect a sample from the 0- to 2-foot interval. Material in the 0- to 2-foot interval will be visually inspected and the thickness of surficial generated residuals in each core (characterized by relatively low density sediments) documented. Sediments in successive 6-inch intervals underlying the generated residuals will be sectioned for total volatile solids (TVS) analysis.

If refusal is encountered at any core location, the core sample will be offset from 10 to 100 feet, and the station will be re-attempted at a comparable water depth. After three rejections or refusals at a given station, the core will be processed using the available recovered intervals. If field evidence suggests refusal is caused by wood waste, this will be noted and additional assessments regarding additional removal within the area will be made.

Recovered core tubes will be cut into sections, capped, stored upright (vertical) onboard the vessel, and sent to the logging and processing site at the end of the day or periodically throughout the day.

3.5.2 Vibracore Collection Procedures

Sediment cores may be collected using a vibracore, or equivalent sampling technology, onboard a vessel equipped with an A-frame and sufficient deck space for staging of gear and sample processing. A new core tube (or liner) will be used for sampling at each station to eliminate the possibility of cross contamination among stations. The vibracore will be deployed from the vessel using the A-frame and hydraulic winch. The vibracore will be energized as it nears the bottom and supported upright with the winch line during penetration into the sediment. The vibracore will penetrate into the sediment to the target core depth of 3 feet MLLW or refusal, whichever comes first. Upon completing penetration at a station, the vibracore will be shut down, the position recorded, and the sampler recovered. After the core is on deck, the liner containing sediment will be extracted onto a core tray.

Refusal will be defined as less than 5 cm of penetration per minute. If refusal is encountered, the vessel will be slightly moved and a second core attempted, then, if needed, a third attempt. If refusal is encountered after the third attempt, additional cores will not be attempted unless operational problems are suspected. The longest of the three cores will be retained for analysis.

3.5.3 Sample Acceptance Criteria

Sample acceptance criteria are listed below. If acceptance criteria are not achieved, the core will be rejected and another collection attempt will be made.

Following are the sediment core acceptance criteria:

- The core penetrated to (and retained material to) the project depth or refusal.
- Recovery was at least 75% of the length of core penetration.
- Sediment does not extend out of the top of the core tube or contact any part of the sampling apparatus at the top of the core tube.
- There are no obstructions in the cored material that might have blocked the subsequent entry of sediment into the core tube and resulted in incomplete core collection.
- There are no significant air gaps in the core tube or evidence of significant loss of material out of the cutter head during retrieval.

3.5.4 Core Processing Procedures

The core processing station will be located at an upland location adjacent to the Site or at the analytical laboratory. Transported cores will be handled consistent with American Society for Testing and Materials (ASTM) procedures (ASTM D 4220) and stored upright in the analytical laboratory refrigerators or on site until processed. Filled sample containers will be stored in coolers containing ice to maintain the samples at 4 degrees Celsius (°C) ±2°C until delivery or shipping to the analytical laboratory.

All working surfaces and instruments will be thoroughly cleaned, decontaminated, and covered with aluminum foil to minimize outside contamination between sampling events. Disposable gloves will be discarded after processing each station and replaced prior to handling decontaminated instruments or work surfaces.

The steps for processing the samples are as follows:

1. Cut core longitudinally using a circular saw or power shears, taking care not to penetrate the sediment while cutting.
2. Use decontaminated utensils to split the core to expose the center of the two halves for sampling.
3. Photograph the entire length of the core.
4. Record the description of the core sample on the core log form for the parameters as appropriate and present, including:

   a. Sample recovery (depth in feet of penetration and sample compaction)
   b. Physical soil description in accordance with the Unified Soil Classification System (includes soil type, density/consistency of soil, and color)
   c. Odor (e.g., hydrogen sulfide or petroleum)
   d. Vegetation
   e. Debris
   f. Biological activity (e.g., detritus, shells, tubes, bioturbation, and live or dead organisms)
   g. Visual stratification, structure, and texture
   h. Presence of oil sheen
   i. Any other distinguishing characteristics or features
5. Material in the 0- to 2-foot interval will be visually inspected and the thickness of surficial generated residuals in each core (characterized by relatively low density sediments) will be documented.
6. Sediments in successive 6-inch intervals underlying the generated residuals will be sectioned and immediately submitted for TVS analysis.
7. Using a clean spoon, place sample material from the core into a cleaned, stainless steel bowl or HDPE bucket and homogenize by hand or by using a stainless steel paddle and variable speed drill.
8. Using a clean, stainless steel spoon, completely fill pre-labeled sample containers for the remaining analyses.
9. Immediately after filling the sample container with sediment, place the screw cap on the sample container and tighten.
10. Thoroughly check all sample containers for proper identification, analysis type, and lid tightness.
11. Pack each container carefully to prevent breakage and place inside of a cooler with ice for storage at the proper temperature (4°C ± 2°C for all samples).

Following processing, sediment samples volumes will be submitted for analysis or archiving.

3.6 Waste Management

All sediment remaining after core acquisition will be washed overboard at the collection site prior to moving to the next sampling station. All disposable sampling materials and personnel protective equipment used in sample collection and processing, such as disposable coveralls, gloves, and paper towels, will be placed in heavy-duty garbage bags or other appropriate containers. Sediment remaining after core processing and sampling will be collected in 55-gallon drums and consolidated. The 55-gallon drum area will be located in a secure area and labeled appropriately. After core processing is completed, a composite sample will be collected and analyzed to obtain representative data for sediment disposal profiling.

4 SAMPLE HANDLING AND CUSTODY

This section addresses sampling program requirements for maintaining custody of samples throughout the sample collection and shipping process and provides specific procedures for sample shipping.

4.1 Sample Custody Procedures

Samples are considered to be in one's custody if they are: 1) in the custodian's possession or view; 2) in a secured location (under lock) with restricted access; or 3) in a container that is secured with an official seal(s) such that the sample cannot be reached without breaking the seal(s).

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

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

4.2 Sample Shipping and Receipt Requirements

All samples will be shipped or hand-delivered to the analytical laboratory no later than the day after collection. If samples are collected on Friday, they may be held until the following Monday for shipment, provided that this does not adversely impact holding time requirements. Specific sample shipping procedures are as follows:

- Each cooler or container containing the samples for analysis will be shipped via overnight delivery to the appropriate analytical laboratory. In the event that Saturday delivery is required, the FC will contact the analytical laboratory before 3 p.m. on Friday to ensure that the laboratory is aware of the number of coolers shipped and the airbill tracking numbers for those coolers. Following each shipment, the FC will call the laboratory and verify that the shipment from the day before has been received and is in good condition.
- Coolant ice will be sealed in separate, doubled plastic bags and placed in the shipping containers.
- Individual sample containers will be placed in a sealable plastic bag, packed to prevent breakage, and transported in a sealed ice chest or other suitable container.
- Glass jars will be separated in the shipping container by shock-absorbent material (e.g., bubble wrap) to prevent breakage.
- The shipping containers will be clearly labeled with sufficient information (name of project, time and date container was sealed, person sealing the container, and consultant's office name and address) to enable positive identification.
- The shipping waybill number will be documented on all COC forms accompanying the samples.
- A sealed envelope containing COC forms will be enclosed in a plastic bag and taped to the inside lid of the cooler.
- A minimum of two signed and dated COC seals will be placed on adjacent sides of each cooler prior to shipping.
- Each cooler will be wrapped securely with strapping tape, labeled "Glass – Fragile" and "This End Up," and will be clearly labeled with the laboratory's shipping address and the consultant's return address.

Upon transfer of sample possession to the analytical laboratory, the persons transferring custody of the sample container will sign the COC form. Upon receipt of samples at the laboratory, the shipping container seal will be broken, and the receiver will record the condition of the samples on a sample receipt form. COC forms will be used internally in the laboratory to track sample handling and final disposition.

5 PHYSICAL AND CHEMICAL ANALYTICAL METHODS

This section summarizes the target physical and chemical analyses for the sampled sediment. All samples will be archived for future analyses if necessary. Prior to analysis, all samples will be maintained according to appropriate holding times and temperatures for each analysis. Table E-1-1 presents the guidelines for sample handling and storage.

Prior to the analysis of the samples, the laboratory will calculate method detection limits for each analyte of interest, where applicable. Method detection limits will be below the sediment evaluation criteria specified in the EDR (see Table 2-2 of the EDR), if technically feasible. To achieve the required detection limits, some modifications to the methods may be necessary. These modifications from the specified analytical methods will be provided by the laboratory at the time of establishing the laboratory contract and must be approved by Ecology prior to implementation.

If necessary, chemical and physical testing will be conducted at an Ecology-accredited laboratory that is also accredited under the National Environmental Laboratories Accreditation Program. All chemical and physical testing will adhere to the most recent PSEP QA/QC procedures and PSEP analysis protocols. If more current analytical methods are available, the laboratory will use them.

In completing chemical analyses for this project, the contract laboratory is expected to meet the following minimum requirements:

- Adhere to the methods outlined in this SAP, including methods for each analytical procedure
- Deliver facsimile, hard copy, and electronic data as specified
- Meet reporting requirements for deliverables
- Meet turnaround times for deliverables
- Implement QA/QC procedures, including laboratory QC requirements, data quality objectives, and performance evaluation testing requirements
- Notify the CQAO of any CQAP QA/QC problems when they are identified, to allow for quick resolution
- Allow laboratory and data audits to be performed, if deemed necessary

Table E-1-1
Guidelines for Sample Handling and Storage

Parameter	Sample Size	Container Size and Type	Holding Time	Preservative
Total solids/total volatile solids (TVS)	50 g	8-oz Glass	14 days	Cool/4° C
			6 months	Freeze -18° C

Notes:
All sample containers will have lids with Teflon inserts

6 REFERENCES

Ecology (Washington State Department of Ecology), 2008. *Sediment Sampling and Analysis Plan Appendix (SAPA)*.

PSEP (Puget Sound Estuary Program), 1986 as updated in 1989, 1991, 1995, and 1997. *Recommended protocols for measuring conventional sediment variables in Puget Sound*. Prepared for the Puget Sound Estuary Program, U.S. Environmental Protection Agency, Region 10, Office of Puget Sound, Seattle, Washington.

PSEP, 1995. *Recommended guidelines for conducting laboratory bioassays on Puget Sound sediments*. Prepared for the Puget Sound Estuary Program, U.S. Environmental Protection Agency, Region 10, Office of Puget Sound, Seattle, Washington. July 1995.

PSEP, 1997a. *Recommended guidelines for sampling marine sediment, water column, and tissue in Puget Sound*. U.S. Environmental Protection Agency, Region 10, Seattle, Washington, and Puget Sound Water Quality Authority, Olympia, Washington.

PSEP, 1997b. *Recommended Guidelines for Measuring Organic Compounds in Puget Sound Water, Sediment and Tissue Samples*. U.S. Environmental Protection Agency, Region 10, Seattle, Washington, and Puget Sound Water Quality Authority, Olympia, Washington.

PSEP, 1997c. *Recommended Protocols for Measuring Metals in Puget Sound Water, Sediment and Tissue Samples*. U.S. Environmental Protection Agency, Region 10, Seattle, Washington, and Puget Sound Water Quality Authority, Olympia, Washington.

USEPA (U.S. Environmental Protection Agency), 1999. *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review.* U.S. Environmental Protection Agency, Office of Emergency Response. EPA 540/R-99/008. October.

USEPA, 2004. *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. Office of Solid Waste and Emergency Response. EPA 540-R-04-004, OSWER Directive 9240.1-45.

ATTACHMENT E-1-1
DAILY FIELD LOG AND SAMPLE COLLECTION FORMS

ANCHOR QEA

Sediment Core Collection Log

Page __ of __

Job: | **Station ID:**

Job No: | **Attempt No.**

Field Staff: | **Date:**

Contractor: | **Logged By:**

Vertical Datum: | **Horizontal Datum:**

Field Collection Coordinates:

Lat/Northing: | Long/Easting:

A. Water Depth

DTM Depth Sounder:

DTM Lead Line:

B. Water Level Measurements

Time:

Height:

Source:

C. Mudline Elevation

Recovery Measurements (prior to cuts)

Core Collection Recovery Details:

Core Accepted: Yes / No

Core Tube Length:

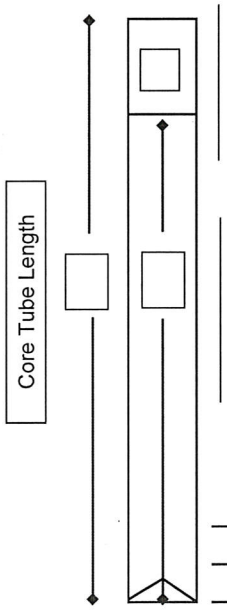
Drive Penetration:

Headspace Measurement:

Recovery Measurement:

Recovery Percentage:

Total Length of Core To Process:



Sections To Process:

A:

B:

C:

D:

Drive Notes:

Core Field Observations and Description:

Sediment type, moisture, color, minor modifier, MAJOR modifier, other constituents, odor, sheen, layering, anoxic layer, debris, plant matter, shells, biota

Notes:

Sediment Core Processing Log

ANCHOR QEA

Job:	Station ID:
Job No.	Date/Time:
No. of Sections:	Core Logged By:
Drive Length:	Attempt #:
Recovery:	Type of Core ☐ Mudmole ☐ Vibracore ☐ Other
% Recovery:	Diameter of Core (inches)
Notes:	Core Quality ☐ Good ☐ Fair ☐ Poor ☐ Disturbed

Recovered Length (ft)	Size % G	Size % S	Size % F	PID	**Classification and Remarks** (Density, Moisture, Color, Minor Constituent, MAJOR Constituent, with Additional Constituents, Sheen, Odor)	Sample	Subsample	Summary Sketch

ANCHOR QEA

Surface Sediment Field Log

Job: Station:

Job No: Date:

Field Staff: Sample Method:

Contractor: Target Coordinates: Lat.

Horizontal Datum: Long.

Water Height

DTM Depth Sounder:

DTM Lead Line:

Tide Measurements

Time:

Height:

Sample Acceptability Criteria:

1) Overlying water is present
2) Water has low turbidity
3) Sampler is not overfilled
4) Surface is flat
5) Desired penetration depth

Notes: Mudline Elevation (lower low water-large tides): calculated after sampling

Grab #	Time	Actual Coordinates		Sample Accept (Y/N)	Recovery Depth (cm)	Comments: jaws close, good seal, winnowing, overlying water, surface intact, etc
		Longitude/Easting	Lattidue/ Northing			

Sample Description: surface cover, (density), moisture, color, minor modifier, MAJOR modifier, other constituents, odor, sheen, layering, anoxic layer, debris, plant matter, shells, biota

Sample Containers:

Analyses:

ATTACHMENT E-2
WATER QUALITY MONITORING PLAN

TABLE OF CONTENTS

List of Tables

List of Figures

1 INTRODUCTION

This document presents the *Water Quality Monitoring Plan* (WQMP) for the sediment cleanup actions in Port Gamble Bay ("Site"), as set forth in the *Final Cleanup Action Plan* (Ecology 2013), and in accordance with the requirements of Consent Decree 13-2-02720-0 between the Washington State Department of Ecology (Ecology) and Pope Resources, LP/ OPG Properties, LLC (PR/OPG), entered in December 2013.

This WQMP has been prepared to support Project compliance with the requirements of Washington State's Water Quality Standards for Surface Water (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., in 2007), 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

PR/OPG 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 daylights 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* (2009), water column effects caused by dredging are intermittent, discontinuous, and relatively short-lived. 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 dredging, and include turbidity and pH, and may include chemicals of concern (CoCs) depending on site-specific conditions.

RSET (2009), including 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 dredging; this tool has been used to determine water quality monitoring requirements at other regional sediment cleanup projects (e.g., Lower Duwamish Waterway and East Waterway, Seattle). For example, RSET determined that sediment cadmium concentrations less than 2,000 milligrams per kilogram (mg/kg) do not have the potential to exceed water quality criteria at the point of dredging. Since the maximum cadmium concentration detected in sediments at the Site (3.1 mg/kg) is more than 600 times lower than this screening criterion, there is no potential for water quality criteria exceedances when these sediments are resuspended at the point of dredging. Maximum concentrations of other Site CoCs are similarly well below the RSET screening criteria. Therefore, there is no need for water quality monitoring of CoCs in this situation.

Water quality monitoring data will be collected during in-water construction periods to confirm compliance with turbidity and pH standards. Table E-2-1 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 E-2-1
Water Quality Monitoring Criteria

Monitoring Parameters	Water Quality Criterion
Turbidity	Turbidity must not exceed: • Five 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 E-2-1 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 Enhanced Monitored Natural Recovery (EMNR) and cap material, consistent with other regional sediment cleanup projects. Project experience has shown that even when using EMNR and cap materials with very little 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, EMNR and capping activities 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 objectives. The outcome of the sediment cleanup action will result in a net positive effect on human health and the environment because environmental conditions in the bay would be improved over current conditions.

2.2 Monitoring Locations and Depths

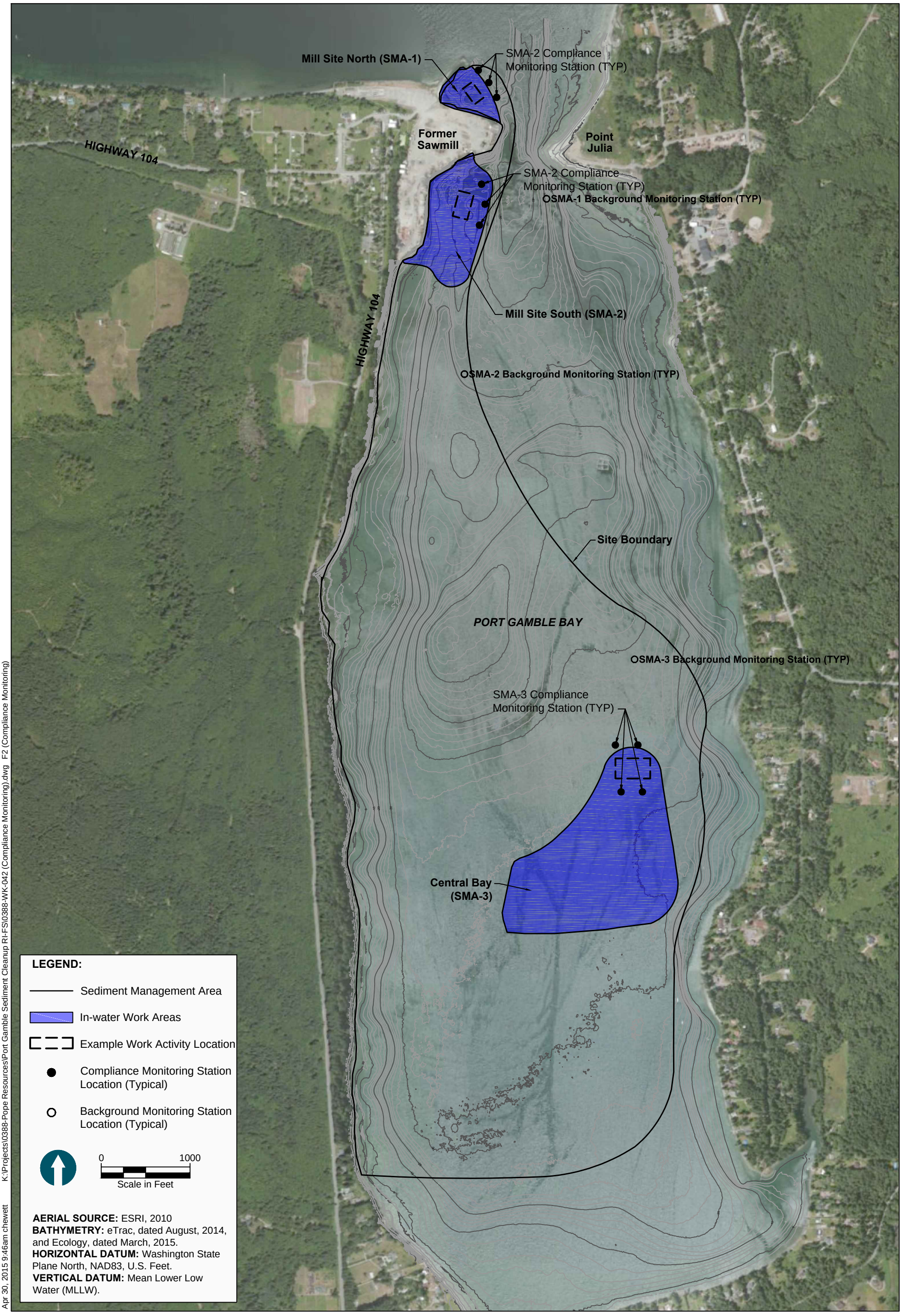
The monitoring distance for water quality measurements is a 150-foot radius from active construction or turbidity curtain, when deployed. Each monitoring event will consist of measuring turbidity and pH at three or four locations on the 150-foot radius, depending on the site, and one background location (Figure E-2-1).[1] Steps to modify the operation if exceedances are detected at the 150-foot radius are described in Section 3.5.1.

The representative background monitoring station will be located approximately 1,000 feet beyond active in-water work areas. Figure E-2-1 shows the proposed background sample locations for the different Sediment Management Areas (SMAs).

Figure E-2-1 also shows a radial compliance boundary and several representative water quality monitoring locations for compliance measurements (150 feet from active in-water work or turbidity curtain). 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, also taking 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, which will be recorded onto 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.

[1] The outer extent of the compliance boundaries and background locations are shown on the figure; however, the actual location within these boundaries is dependent on the dredge location.



Apr 30, 2015 9:46am chewett K:\Projects\0388-Pope Resources\Port Gamble Sediment Cleanup RI-FS\0388-WK-042 (Compliance Monitoring).dwg F2 (Compliance Monitoring)

Figure E-2-1
Approximate Water Quality Monitoring Stations
Attachment E-2: Water Quality Monitoring Plan
Port Gamble Bay Cleanup Site

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., 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 (e.g., 150 feet from the current of construction activity or turbidity curtain, when deployed). 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.

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 collected.

At the conclusion of each monitoring event, field data sheets and results of the monitoring event will be retained in the project file.

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 below:

- *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., from pile removal to dredging or moving construction from one SMA to another SMA) 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. These steps are discussed below. 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 150-foot compliance station. If turbidity or pH measured at the 150-foot compliance boundary 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 150-foot boundary, 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.
2. If water quality passes the turbidity and pH standards, the monitoring crew will move to the next station.
3. If the station water turbidity or pH standard exceedance is confirmed (two measurements in 5 to 10 minutes), the Contractor will be notified and options to modify the Contractor's operations will be assessed. In addition, Ecology will be notified.
4. The Contractor will modify operations as necessary in order to meet turbidity and pH standards.
5. Wait 30 minutes to 1 hour and retake measurements at the 150-foot station.
6. If additional exceedances are confirmed at any 150-foot 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., pile removal to dredging or moving construction from one SMA to another SMA) will trigger a transition back to Intensive monitoring as described in Section 2.4.

4 REPORTING

In the event that 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.

   Russ McMillan
   Washington State Department of Ecology
   rmcm461@ecy.wa.gov
   360-407-7536

2. Modify the Contractor's operations and re-check 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

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.

RSET (Regional Sediment Evaluation Team), 2009. *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. May 2009.