FINAL CLEANUP ACTION PLAN
PORT GAMBLE BAY

PORT GAMBLE, WASHINGTON

Washington State Department of Ecology
Olympia, Washington 98504

December 2013

TABLE OF CONTENTS

EXECUTIVE SUMMARY ES-1
Site Background ES-1
Study Background ES-3
Cleanup Action Plan Overview ES-4
1 INTRODUCTION 1
1.1 Site Background 1
1.2 Purpose 4
2 SUMMARY OF SITE CONDITIONS 5
2.1 Site Environmental Conditions 5
2.2 Summary of RI Sampling 5
2.3 Conceptual Site Model 6
2.4 Chemicals of Concern 6
3 CLEANUP REQUIREMENTS 8
3.1 Cleanup Standards 8
3.1.1 Sediment Cleanup Levels 8
3.1.2 Points of Compliance 9
3.2 Sediment Management Areas 9
3.3 Cleanup Action Objectives 10
3.4 Compliance With Applicable Laws 11
3.4.1 State Environmental Policy Act 12
3.4.2 Puget Sound Dredged Material Management Program 12
3.4.3 Shoreline Management Act 13
3.4.4 Washington Hydraulics Code 13
3.4.5 Federal Clean Water Act 14
3.4.6 Washington Water Pollution Control Act 15
3.4.7 Archaeological and Historic Preservation Act 15
3.4.8 Health and Safety 16
3.4.9 Nationwide Permit 38 16
3.5 Exemptions from Procedural Requirements – Permits/Approvals and Substantive Requirements 17

3.5.1 Kitsap County Shoreline Master Plan 17
3.52 Hydraulic Project Approval Permit (HPAP) 17

4 SELECTED CLEANUP ACTIONS....18

4.1 Source Control....18
4.2 Intertidal Sediment Excavation and Capping....19
4.3 Subtidal Sediment Dredging and Backfilling....20
4.4 Subtidal Sediment Capping....22
4.5 Subtidal Sediment Enhanced Monitored Natural Recovery (EMNR)....23
4.6 Subtidal Sediment Monitored Natural Recovery 23
4.7 Compliance Monitoring....24

5 ALTERNATIVES CONSIDERED AND BASIS FOR REMEDY SELECTION....25

5.1 Cleanup Technologies....25
5.2 Feasibility Study Alternatives....25
5.3 Summary of Detailed Analysis of Alternatives....26
5.3.1 North Mill (SMA-1) Detailed Evaluation 27
5.3.1.1 Threshold Evaluation 27
5.3.1.2 Short-term Effectiveness.... 27
5.3.1.3 Long-term Effectiveness.... 29
5.3.1.4 Implementability 30
5.3.1.5 Cost.... 30
5.3.1.6 Community Concerns 31
5.3.1.7 Recycling and Waste Minimization 31
5.3.1.8 Environmental Impacts.... 31
5.3.1.9 Selected Remedy.... 31
5.3.2 South Mill (SMA-2) Detailed Evaluation....32
5.3.2.1 Threshold Evaluation 32
5.3.2.2 Short-term Effectiveness.... 32
5.3.2.3 Long-term Effectiveness.... 33
5.3.2.4 Implementability 35
5.3.2.5 Cost.... 36
5.3.2.6 Community Concerns 36
5.3.2.7 Recycling and Waste Minimization 37

5.3.2.8 Environmental Impacts 37
5.3.2.9 Selected Remedy 38
5.3.3 Central Bay (SMA-3) Detailed Evaluation 39
5.3.3.1 Threshold Evaluation 39
5.3.3.2 Short-term Effectiveness 39
5.3.3.3 Long-term Effectiveness 40
5.3.3.4 Implementability 41
5.3.3.5 Cost 42
5.3.3.6 Community Concerns 42
5.3.3.7 Recycling and Waste Minimization 43
5.3.3.8 Environmental Impacts 43
5.3.3.9 Selected Remedy 44
5.3.4 Former Lease Area (SMA-4) Detailed Evaluation 44
5.3.4.1 Threshold Evaluation 44
5.3.4.2 Short-term Effectiveness 45
5.3.4.3 Long-term Effectiveness 46
5.3.4.4 Implementability 47
5.3.4.5 Cost 48
5.3.4.6 Community Concerns 48
5.3.4.7 Recycling and Waste Minimization 48
5.3.4.8 Environmental Impacts 49
5.3.4.9 Selected Remedy 49
5.3.5 cPAH Background Area (SMA-5) Detailed Evaluation 49
5.3.5.1 Threshold Evaluation 49
5.3.5.2 Technical Practicability Evaluation for Background Area (SMA-5) 49
5.3.5.3 Dredging Resuspension and Residuals Impacts 50
5.3.5.4 Capping and EMNR Turbidity Impacts 51
5.3.5.5 Community Impacts 51
5.3.5.6 Technical Practicability Conclusions 52

6 IMPLEMENTATION OF THE CLEANUP ACTION 53

7 COMPLIANCE MONITORING 56

7.1 Monitoring Objectives and Rationale 56

8 FIVE-YEAR REVIEW 59

9 REFERENCES 60

List of Tables

Table 3-1 Sediment Cleanup Levels 9

Table 5-1 Remedial Alternatives Evaluation Matrix 28

List of Figures

Figure 1-1 Property (Bay) Vicinity Map

Figure 3-1 Sediment Management Areas (SMAs)

Figure 4-1 North Mill (SMA-1) Selected Cleanup Remedy

Figure 4-2 South Mill (SMA-2) Selected Cleanup Remedy

Figure 4-3 Central Bay (SMA-3) Selected Cleanup Remedy

Figure 4-4 Former Lease Area (SMA-4) Selected Cleanup Remedy

Appendices

Appendix A Schedule and Milestones

Appendix B Cultural Resources Assessment Plan

Appendix C SEPA Mitigated Determination of Nonsignificance

LIST OF ACRONYMS AND ABBREVIATIONS

Abbreviation	Definition
µg/kg	micrograms per kilogram
BTV	background threshold value
CAP	Cleanup Action Plan
CFR	Code of Federal Regulations
cm	centimeters
cm/yr	centimeter per year
COC	contaminant of concern
Corps	U.S. Army Corps of Engineers
cPAH	carcinogenic polynuclear aromatic hydrocarbon
CQAP	Construction Quality Assurance Project Plan
CSM	conceptual site model
CWA	Clean Water Act
cy	cubic yards
DAHP	Washington Department of Archaeology and Historic Preservation
DMMO	Dredged Material Management Office
DMMP	Dredged Material Management Program
DNR	Washington State Department of Natural Resources
Ecology	Washington State Department of Ecology
EMNR	enhanced, monitored natural recovery
EPA	U.S. Environmental Protection Agency
FLA	Former Lease Area
FS	feasibility study
HPA	Hydraulic Project Approval
JARPA	Joint Aquatic Resources Permit Application
ng/kg	nanograms per kilogram
mg/kg	milligrams per kilogram
MLLW	mean lower low water
MNR	monitored natural recovery
MTCA	Model Toxics Control Act
NHPA	National Historic Preservation Act

NWP	Nationwide Permit
OPG	OPG Properties LLC
P&T	Pope & Talbot, Inc.
PQL	practical quantitation limit
PR	Pope Resources LP
PSEP	Puget Sound Estuary Program
RCW	Revised Code of Washington
RI	remedial investigation
SEPA	State Environmental Policy Act
SMA	sediment management area
SMS	Sediment Management Standards
SPI	sediment profile imaging
SQS	Sediment Quality Standard
TEQ	toxicity equivalent quotient
TVS	total volatile solids
WAC	Washington Administrative Code

EXECUTIVE SUMMARY

This Cleanup Action Plan (CAP) describes the selected cleanup action for a portion of the Port Gamble Bay and Mill Site (Site), located in Port Gamble, Washington. Specifically, this CAP selects a cleanup action for Port Gamble Bay (referred to as the Property, Port Gamble Bay, or the Bay).

This CAP has been developed in accordance with the Model Toxics Control Act (MTCA), RCW 70.105D, and its implementing regulations, WAC 173-340, as well as the Sediment Management Standards (SMS) regulations, WAC 173-204. Ecology will make cleanup action decisions for the former sawmill area and uplands areas to the west and south of the former sawmill area, all of which are generally located near the eastern terminus of NE View Drive in Port Gamble, Washington ("Uplands RI/FS Area"), through a future amendment to this CAP or a separate cleanup action plan.

The selected cleanup action is based on site-specific data provided in the Partial Remedial Investigation/Feasibility Study Report (PRI/FS) and documents referenced therein. The PRI/FS is on file at the Washington State Department of Ecology's (Ecology) Headquarters located at 300 Desmond Drive, Lacey, Washington.

Site Background

Port Gamble Bay is located in Kitsap County and encompasses more than 2 square miles of subtidal and shallow intertidal habitat just south of the Strait of Juan de Fuca. Under Ecology's Toxics Cleanup Program Puget Sound Initiative, Port Gamble Bay is one of seven bays in Puget Sound identified for focused sediment cleanup. The Bay and surrounding areas support diverse aquatic and upland habitats, as well as resources for fishing, shellfish harvesting, and many other aquatic uses. The area surrounding the Bay remains largely rural in nature, though more than 100 acres of the basin are currently in commercial land use, largely in the Gamble Creek watershed. The Port Gamble S'Klallam Tribal Reservation is located east of the Bay. The Tribe uses the Bay for shellfish harvesting, fishing, and other resources.

Pope and Talbot, Inc. (P&T) continuously operated a sawmill facility on the upland portion of the Site for a period of approximately 142 years (1853 to 1995). Over that period, the upland area where the sawmill was located (Mill) underwent a variety of changes, including expansion by filling, as well as changes in the location and function of buildings and structures. Logs were generally stored, rafted and sorted in-water throughout the Bay. A 72 acre log rafting area along the western shore of the Bay (Former Lease Area) was leased by Department of Natural Resources (DNR) to P&T in several consecutive leases from 1974 to 2001 and terminated in 1996 at P&T's request. The majority of log rafting activities ceased in 1995 when the sawmill closed.

Contamination at the Site is related to use of sawmill buildings to saw logs for lumber, operation of two chip barge loading facilities and a log-transfer facility, sawmill emissions of particulates from burning of wood and wood waste, and the in-water log rafting and storage areas. Creosote treated pilings were placed throughout the Bay to support pier and wharf structures and to facilitate storage and transport of logs and wood products. Large accumulations of wood waste covered portions of the Bay.

Activities at the Site resulted in releases of hazardous substances at the Property. Hazardous substances released included cadmium, carcinogenic polynuclear aromatic hydrocarbons, dioxins/furans, and toxicity associated with wood waste and its breakdown products including, phenols, resin acids, and total and dissolved sulfides. Ecology has determined that these releases of hazardous substances at the Property present a threat to human health and the environment and require remedial action.

In 1985, P&T transferred ownership of the sawmill, uplands and adjacent tidelands to Pope Resources LP (PR). P&T continued wood products manufacturing at the Site until 1995 under a lease with PR. OPG Properties LLC (OPG), formerly known as Olympic Property Group LLC, was formed in 1998 to manage PR's real estate in Kitsap County and presently operates the Property including making leasing arrangements and property improvements.

A number of interim actions were conducted between 2002 and 2009 at the Site.

Study Background

Between 2002 and 2005, PR/OPG excavated approximately 26,310 tons of contaminated soils from the Mill. In 2003, approximately 13,500 cubic yards (cy) of sediment containing accumulations of wood waste and hazardous substances were dredged from a 1.8-acre area of the Property and disposed of at an approved upland facility. In 2007, Ecology and DNR dredged an additional 17,500 cy of wood waste from an adjacent one-acre area, and placed a six-inch layer of clean sand over a portion of the newly dredged area. Solid waste materials were segregated and disposed of at an approved off-site landfill facility. Salt in the dredged wood waste was removed using a freshwater washing system to allow for upland beneficial reuse of these materials in 2008 and 2009. While these earlier sediment cleanup actions reduced wood waste and hazardous substance risks at the Property, accumulations of wood waste remain on the bed of the Property, particularly at locations near the Mill. Observed biological toxicity requires further sediment cleanup under the SMS to address wood waste and its degradation byproducts.

Effective May 8, 2008, Ecology and Defendants entered into Agreed Order No. DE 5631, pursuant to which two focused Remedial Investigation and Feasibility Study Reports for portions of the Site including the Mill and the Bay were completed, submitted and released for public comment in February and March 2011. In December 2012, based upon public comment, the reports were revised and combined into a PRI/FS for Port Gamble that summarizes existing remedial investigation results for the Mill and the Bay and develops and evaluates remedial alternatives for the Property. The conclusions of the draft report form the bases for the cleanup action to be implemented in the Bay.

The PRI/FS identified risks to sensitive benthic invertebrates in aquatic areas of the Property adjacent to portions of the Mill, Former Lease Area, and also in the Central Bay. Potential human health risks from cadmium, dioxins/furans, and carcinogenic polynuclear aromatic hydrocarbon (cPAH) were also identified for those who may consume relatively large quantities of shellfish obtained from the Property and from natural background areas of Puget Sound. Overall concentrations of cadmium and dioxins/furans in Property sediments are currently 2 to 3 times higher than Puget Sound natural background levels. In addition, cPAH sediment concentrations are roughly 10 times higher at the Property compared to Puget Sound natural background levels.

Ecology developed and evaluated a range of cleanup action alternatives for addressing remaining contamination identified in Port Gamble Bay. More detailed information on the PRI/FS, including the cleanup options that were evaluated, can be found on Ecology's Toxics Cleanup Website (http://www.ecy.wa.gov/programs/tcp/sites/).

Cleanup Action Plan Overview

Based on the findings of the PRI/FS, Ecology prepared this CAP for the Property. This CAP provides the following:

- Identifies cleanup levels that OPG/PR needs to meet
- Requires cleanup actions to achieve these cleanup levels from the options identified in the PRI/FS, and describes these actions
- Establishes a schedule to carry out the cleanup
- Requires monitoring activities to demonstrate whether the cleanup is effective

The following actions have been selected to address existing sediment contamination at the Property:

- Approximately 2,000 creosoted pilings will be removed from the Bay as a source control measure for protection of human health and to facilitate access for subsequent dredging and capping. This action will be sequenced with removal of approximately 73,000 square feet of existing overwater structure (subject to more accurate delineation as needed for the engineering design report) adjacent to the Mill and removal of the Log Transfer Dock and pilings from staging and rafting areas throughout the Bay. All piling removal will be sequenced with follow-on dredging or capping actions to maximize control of piling removal residuals. The pilings will be removed and disposed of using best efforts, and equipment preferences and best management practices (BMPs) identified in both the (1) statewide Hydraulic Project Approval (HPA) - *Creosote Piling and Structural Removal* (WDFW 2011) and (2) the accompanying DNR Puget Sound Initiative – *Derelict Creosote Piling Removal, BMPs for Pile Removal and Disposal* (DNR 2011). Areas of moderate to extensive piling removal that are not capped or dredged will be covered with 6 inches of sand to control residuals.

- Approximately 10,000 to 15,000 cy of intertidal sediments from the Mill that exceed Puget Sound natural background levels will be excavated (likely using upland-based equipment operating during relatively low tidal conditions) to approximately two feet below the existing sediment surface, and backfilled and/or capped. Excavated material will be screened to remove debris, and the screened sediments reused or disposed of in upland areas within or near the Mill, as allowed. If no other allowed reuse or disposal alternatives are identified, the excavated material will be disposed of at an approved upland disposal facility.
- Approximately 30,000 to 45,000 cy of nearshore sediments (located inshore of approximately -20 feet mean lower low water [MLLW]) with biological toxicity and containing significant wood chip accumulations with total volatile solids (TVS) concentrations exceeding 15 percent will be dredged from the North Mill and South Mill areas. The final dredge plan design will be determined during the remedial design phase based on engineering and cultural resources considerations. Subsequently, the dredged areas will be backfilled and/or capped, including placement of 6 inches of sand to control dredging residuals. Subject to Dredged Material Management Program (DMMP) approval, dredged material will be screened to remove debris, and the screened sediments disposed at a DMMP open-water disposal facility, or otherwise reused or disposed of in upland areas within or near the Mill as allowed. If no other allowed reuse or disposal alternatives are identified, the dredged material will be disposed at an approved upland disposal facility.
- Approximately 7 acres of sediments in the South Mill area offshore of approximately -20 feet MLLW with biological toxicity and containing significant wood chip accumulations (TVS exceeding 15 percent) will be capped with an approximate 4-foot-thick cap. The final cap design will be determined during the remedial design phase. Beneficial reuse of clean navigational dredge material will be the source of the cap material, using materials that will support healthy benthic, shellfish, and forage fish communities, including geoduck.
- Approximately 3 acres of shallow subtidal sediments in the North Mill area with biological toxicity but with moderate wood waste accumulations (TVS less than 15 percent) will be capped with an approximate 1-foot-thick cap. Beneficial reuse of clean navigational dredge material will be the source of the cap material, using materials that will support healthy benthic, shellfish, and forage fish communities.

- Following completion of dredging and placement of caps in the North and South Mill areas, six inches of enhanced monitored natural recovery (EMNR) materials will be placed over roughly 100 acres of subtidal sediments in the remaining parts of the Mill, Former Lease Area, and Central Bay with biological toxicity but with moderate wood waste accumulations (TVS less than 15 percent). To the extent practicable, the source of the sand will be clean navigational dredge material, which will enhance the rate of natural recovery, reduce concentrations of conventional and wood waste breakdown contaminants, and achieve a healthy benthic community. Ecology may consider minor changes to the schedule for EMNR placement subject to the availability of clean dredged material from suitable beneficial reuse projects. Otherwise alternate sources of material will be used. The EMNR area will be further refined during remedial design and as part of adaptive management during initial construction phases to reflect ongoing natural recovery processes. EMNR actions may not be needed in those areas that pass SMS biological criteria during remedial design delineation sampling.
- During remedial design, a monitoring plan will be developed to provide methods and scheduled frequency of monitoring to assess the effectiveness of the remedy. Piling removal along with the dredging, capping, and EMNR outlined above will eliminate the major sources of contaminants, accelerating natural recovery over time.

1 INTRODUCTION

This CAP describes the selected cleanup action for a portion of the Site, located in Port Gamble, Washington. Specifically, the CAP selects proposed cleanup actions for Port Gamble Bay. The CAP provides a description of the proposed cleanup actions and sets forth functional requirements that the cleanup must meet to comply with MTCA and the SMS. The remainder of the Site will be covered through a future amendment to the Consent Decree and CAP if Ecology determines that no further remedial actions at the remainder of the Site are required. To the extent further remedial actions are required (remedial investigation, feasibility study, cleanup) at the remainder of the Site, Ecology expects such actions will be performed under an order and/or amendment to the Consent Decree and CAP.

1.1 Site Background

Under Ecology's Toxics Cleanup Program Puget Sound Initiative, Port Gamble Bay (Figure 1-1) is one of seven bays in Puget Sound identified for focused sediment cleanup. Port Gamble Bay is located in Kitsap County and encompasses more than 2 square miles of subtidal and shallow intertidal habitat just south of the Strait of Juan de Fuca. The Bay and surrounding areas support diverse aquatic and upland habitats, as well as resources for fishing, shellfish harvesting, and many other aquatic uses. The area surrounding the Bay remains largely rural in nature, though more than 100 acres of the basin are currently in commercial land use, largely in the Gamble Creek watershed. The Port Gamble S'Klallam Tribal Reservation is located east of the Bay, and the Tribe extensively uses the Bay for shellfish harvesting, fishing, and other resources. An upland tribal casino operates in the watershed.

In 1853, the corporate predecessor to P&T established one of the first sawmills on Puget Sound in Port Gamble, and continuously operated a forest products manufacturing facility at the Mill including in the Bay up until 1995. Between 1853 and 1995, operations in Port Gamble included a succession of sawmill buildings, two chip loading facilities, a log transfer facility, and log rafting and storage areas. During the mill's operating period, logs were rafted and stored offshore of the Mill. In the late 1920s, a chip barge loading facility was installed on the north end of the Mill. During the mid-1970s, an additional chip barge

loading facility (referred to as the alder mill) was constructed in the southeast portion of the Mill.

In 1985, P&T transferred ownership of the uplands and adjacent tidelands portion of the Mill to PR. P&T continued wood products manufacturing until 1995 under a lease with PR. Mill operations ceased in 1995, and the sawmill facility was dismantled and mostly removed in 1997. Since 1997, the uplands portion of the Mill have been leased to a variety of parties for use as a log sort and wood chipping yard, material handling activities, a marine laboratory, and parking.

P&T leased the 72-acre portion of the Former Lease Area (FLA) from DNR between 1974 and 2001 for log storage and transfer. The majority of log rafting ceased in 1995 when the sawmill closed. P&T removed pilings from the Former Lease Area in 1996. Similarly, log rafting and associated log sort yard activities that began in 1970 at the former log transfer facility ceased after P&T removed the pilings in 1996. Figure 1-1 also shows several historical landfills along the western shoreline, some of which received mill and municipal waste materials, but which were subsequently closed and remediated to MTCA standards.

In January 1997, Ecology conducted an initial investigation of the Mill, which consisted of sampling sediment in four catch basins. The results of that investigation indicated that concentrations of petroleum hydrocarbons and metals were present at levels above MTCA and SMS chemical criteria for these compounds. In April 1997, Clean Services Company, Inc., removed accumulated materials from 12 catch basins, four valve vaults, and four sumps.

In July 1998, Ecology notified P&T of the potential listing of the Mill on Ecology's Confirmed and Suspected Contaminated Site List. Subsequently, detailed environmental investigations were conducted by P&T and PR/OPG to characterize soil, groundwater, surface water, and sediment quality conditions at portions of the Site. The site characterization data confirmed the presence of hazardous substances in soil and groundwater in several uplands areas. The investigations also confirmed the presence of wood waste in nearshore sediments. Based on these data, Ecology added the Mill Site to the hazardous sites list in 2001.

Between 2002 and 2005, PR/OPG excavated approximately 26,310 tons of contaminated soils from the Mill, and in 2003, P&T dredged approximately 13,500 cubic yards (cy) of sediment containing wood waste from a 1.8-acre area of the Property. Excavated upland soils and the 2003 wood waste dredge material were disposed of at approved upland facilities. In 2004, follow-on surface sediment sampling and sediment profile imaging (SPI) was conducted by P&T to characterize post-dredge sediment quality conditions and to provide a baseline dataset for evaluation of anticipated future natural recovery. In 2006, P&T and Ecology performed additional sediment characterization, including benthic infaunal abundance, sediment bioassays, and SPI across a gradient of wood waste levels.

In early 2007, DNR and Ecology dredged an additional 17,500 in situ cy of wood waste from a 1-acre area adjacent to the 2003 dredging action and placed a 6-inch layer of clean sand over a portion of the newly dredged area. In cooperation with this agency-led project, P&T took over the day-to-day management of the dredged material once it was transferred to shore, and subsequently removed salt from the material utilizing an on-site upland holding cell and freshwater washing system to facilitate upland beneficial reuse of these materials. Unsuitable solid waste materials were segregated and disposed of at an approved off-site landfill facility. All soil segregation, disposal, treatment, and relocation tasks were completed in spring 2009, in accordance with Kitsap County Grading Permit 08-52323.

In November 2007, P&T filed for bankruptcy (Delaware Case No. 07-11738).

Two focused Remedial Investigation and Feasibility Study Reports for portions of the Site including the Mill and the Bay were completed, submitted and released for public comment in February and March 2011. In response to public comments, in 2011, Ecology performed supplemental sediment and tissue sampling at the Property. This sampling included collection of additional sediment chemistry and sediment bioassay samples. During this time, the Port Gamble S'Klallam Tribe also collected sediment and tissue samples.

In June 2012, based upon public comment, the reports were revised and combined into a PRI/FS that summarizes existing remedial investigation results for the Mill and the Bay and develops and evaluates remedial alternatives for the Property. The conclusions of the PRI/FS form the bases for the cleanup action to be implemented in the Bay.

1.2 Purpose

The purpose of this CAP is to:

- Describe the Property, including a summary of relevant history and the nature and extent of sediment contamination
- Identify site-specific cleanup levels and points of compliance for the selected cleanup actions
- Identify applicable state and federal laws for the selected cleanup action
- Identify and describe the selected cleanup action for the Bay
- Summarize the other cleanup action alternatives evaluated in the FS
- Discuss compliance monitoring requirements
- Present the schedule for implementing the CAP

2 SUMMARY OF SITE CONDITIONS

This section summarizes the findings of the PRI/FS report, including the nature and extent of sediment chemicals of concern (COCs).

2.1 Site Environmental Conditions

Port Gamble Bay is located in north-central Puget Sound in Kitsap County (Figure 1-1). The Bay has water depths ranging from 0 to -65 feet mean lower low water (MLLW) datum, although more typical bottom elevations in the center of the Bay range from -30 to -40 feet MLLW. The Bay is oriented with its long axis directed generally north to south, approximately 2.9 miles long and 0.9 miles wide at its maximum dimensions.

2.2 Summary of RI Sampling

As discussed above, between 2002 and 2005, PR/OPG excavated approximately 26,310 tons of contaminated soils that exceeded cleanup levels from the Mill and disposed of these materials at an approved and appropriate off-site landfill facility. Soil lead concentrations marginally exceeding conservative ecological screening criteria (but less than residential standards based on human health) remain in isolated areas of the Mill, but are unlikely to pose significant adverse effects to terrestrial ecological receptors. The previous interim actions at the Mill Site also reduced concentrations of all but one groundwater contaminant (arsenic) to levels that are now protective of human health and the environment. Current groundwater arsenic concentrations in a portion of the Mill are greater than the 8 μg/L natural background concentration due to local geochemical conditions, but are less than the marine surface water chronic criterion to protect aquatic life.

Ten sampling investigations were completed in the Bay between 2000 and 2011. The results of these studies are described and incorporated in the PRI/FS. Both sediment and tissue samples have been collected Bay-wide, with additional focused sampling in the North Mill and South Mill areas. The work has included surface sampling, sediment core collection, and sediment profile imaging (SPI). In addition to sediment conventional data and chemistry, bioassay, and tissue sampling, work has also included radioisotope dating of sediment cores to characterize overall net sedimentation rates in the Bay. Key conclusions from the sampling with respect to contaminants of concern (COC) are summarized in the sections below.

2.3 Conceptual Site Model

The conceptual site model (CSM) described in the PRI/FS report identified the following current and former sources of contamination to the Bay: wood waste, creosoted pilings, wood burning and hog fuel boiler burning, upland mill activities, and shoreline debris. Transport pathways identified in the CSM include currents and tidal fluctuations, concentration of clay particles, aerial deposition, and stormwater runoff.

Potential ecological and human health risks were also identified in the CSM. Benthic effects have been studied primarily through a series of bioassay tests conducted during several studies over the last 10 years. The primary conclusion in the PRI/FS is that risks to sensitive benthic invertebrates have been identified adjacent to the Mill, Former Lease Area, and Central Bay. Potential human health risks were also identified for those who may consume large amounts of shellfish obtained from both the Bay and from natural background areas of Puget Sound. Overall concentrations of cadmium and dioxins/furans in the Bay sediments were 2 to 3 times higher than Puget Sound natural background levels, and carcinogenic polynuclear aromatic hydrocarbon (cPAH) sediment concentrations were roughly 10 times higher in the Bay compared to Puget Sound natural background levels.

Consistent with deposition rates measured throughout Puget Sound (Carpenter et al. 1985; Lavelle et al. 1985), net sedimentation rates throughout the Bay average approximately 0.4 ± 0.1 centimeters per year (cm/yr), based on radioisotope dating (as described in the PRI/FS), corrected for wood waste accumulations in the Mill (four cores total).

2.4 Chemicals of Concern

The PRI/FS report evaluated a series of human health COCs: metals (arsenic, cadmium, copper, and mercury), cPAHs, polychlorinated biphenyls, and dioxins/furans. Of this list, cadmium, cPAHs, and dioxins/furans were identified as Site-related human health COCs. Cadmium has been identified as a low-level COC for human health, while cPAHs have been identified as a primary COC for human health. Dioxins/furans are a site-related COC for human health in limited areas of the Bay.

In addition, addressing biological toxicity in the Bay will require cleaning up wood waste and its degradation byproducts. The PRI/FS identified bioassay toxicity in several areas where wood waste and associated breakdown products occurred. Wood waste provides an inappropriate substrate for many benthic and epibenthic organisms to live on or in, and also impacts aquatic plants. In addition, ammonia, sulfides, and other toxic compounds can be generated during breakdown of wood waste in anoxic environments. At Port Gamble Bay, areas with abundant wood waste have elevated sulfide concentrations. Also, wood contains many other natural substances that can be present and toxic under certain circumstances, depending on the type of wood, the degree of processing, and environmental conditions. These chemicals include phenols, resin acids, and tannins. Some elevated levels of phenols and resin acids have been observed in areas of Port Gamble Bay with wood waste accumulations. Bioassay toxicity was used to identify sediments requiring cleanup but the presence of wood waste (as measured by total volatile solids), phenols, resin acids and total and dissolved sulfides were also used to help delineate areas of concern.

3 CLEANUP REQUIREMENTS

The MTCA regulations and SMS provide that a cleanup action must comply with cleanup levels for COCs at the points of compliance. The site-specific cleanup standards are summarized in the following sections, along with delineation of sediment management areas (SMAs) in Port Gamble Bay. Application of the standards and delineation of SMAs will be further refined in the remedial design and must be approved by Ecology. Cleanup action objectives and applicable or relevant and appropriate requirements (ARARs) based on federal and state laws (WAC 173-340-710) that the selected cleanup remedy must meet are also briefly summarized at the end of this section.

3.1 Cleanup Standards

Cleanup standards consist of: (1) cleanup levels that are protective of human health and the environment; and (2) the point of compliance at which the cleanup levels must be met. Site-specific cleanup standards were developed in the PRI/FS, which provides detailed discussions of the derivation of sediment cleanup standards, including both ecological risk-based and human health risk-based standards.

Ecological risk-based cleanup standards for sediments were based on SMS biological criteria, using the bioassay results presented in the PRI/FS report. The site-specific bioassay cleanup standard identified by Ecology is the Sediment Quality Standard (SQS) criterion, which was used to delineate SMAs as described below.

Human health risk-based standards were developed based on the highest risk-based concentrations, natural background levels, and practical quantitation limits (PQLs). Standards were developed for cadmium, cPAHs, and dioxins/furans.

3.1.1 Sediment Cleanup Levels

Based on the evaluations described in the PRI/FS report, Table 3-1 summarizes the site-specific sediment cleanup levels.

Table 3-1
Sediment Cleanup Levels

Chemical of Concern	Preliminary Cleanup Level
Toxicity due to wood waste breakdown products	SQS numeric biological standards described in WAC 172-204-320(3)
cPAH TEQ	16 µg/kg dry wt.
Dioxin/furan TEQ	5 ng/kg dry wt.
Cadmium	3 mg/kg dry wt.

3.1.2 Points of Compliance

Under MTCA, the point of compliance is the point or location on a site where the cleanup levels must be attained. For marine sediments, the point of compliance for protection of the environment is surface sediments within the biologically active zone. The biologically active zone is the depth in surface sediments within which benthic organisms are found. For most members of the benthic community, a 10-centimeter (cm) biologically active zone is considered appropriate (e.g., for benthic infauna such as polychaete worms). However, for geoducks, which are an important natural resource in Port Gamble Bay, the biologically active zone extends approximately 3 feet below the mudline (Straus et al. 2009).

The biologically active zone can include deeper sediments that could become exposed given conditions or activities in the Bay that may be expected to occur following cleanup (e.g., storm events or propeller wash that contribute to erosional forces).

3.2 Sediment Management Areas

This section summarizes the PRI/RS report conclusions regarding SMAs in Port Gamble Bay that exceed site-specific cleanup standards. Figure 3-1 presents the location of these SMAs. Briefly, the SMAs are as follows:

- **North Mill (SMA-1)**. An approximate 6-acre area located in the embayment north of the former Mill. The North Mill SMA has localized deep deposits of subtidal wood debris near the former chip loading area, and was delineated based on bioassay results that exceed SQS biological criteria, elevated cPAH levels that exceed background, and elevated dioxins/furans that exceed background and the PQL.

- **South Mill (SMA-2)**. An approximately 20-acre area located immediately south and east, and adjacent to the former Mill. This SMA has areas of relatively deep deposits of subtidal wood debris, particularly adjacent to the former alder mill chip loading area, and was delineated based on bioassay results that exceed SQS biological criteria, elevated cPAH levels that exceed background, and elevated dioxins/furans that exceed background and the PQL.
- **Central Bay (SMA-3)**. An approximate 80-acre area located in the south-central portion of the Bay. This area was delineated based on bioassay results that exceed SQS biological criteria and the presence of wood waste breakdown products in sediments.
- **Former Lease Area (SMA-4)**. An approximate 20-acre area located along the western shoreline of the south-central portion of the Bay within the FLA. This area was delineated based on bioassay results that exceed SQS biological criteria and the presence of wood waste breakdown products in sediments.
- **cPAH Background Area (SMA-5)**. An approximate 600-acre area that encompasses all of the other SMAs. The boundary of SMA-5 was developed based on surface sediment cPAH concentrations exceeding natural background levels. It also includes an area of elevated dioxins/furans near the FLA and one station at which cadmium exceeds natural background levels.

3.3 Cleanup Action Objectives

Cleanup action objectives consist of chemical- and medium-specific goals for protecting the environment. The cleanup action objectives specify the media and contaminants of interest, potential exposure routes and receptors, and proposed cleanup goals for Bay-wide sediments.

The cleanup action objectives for this CAP are focused on sediments and the COCs listed in Table 3-1, including:

- Toxicity due to wood waste breakdown products
- Carcinogenic petroleum hydrocarbons toxicity equivalent quotient (TEQ)
- Dioxin/furan TEQ
- Cadmium

Exposure routes to be addressed by the Bay cleanup action include transport pathways to benthic receptors and humans, and include: (1) currents and tidal fluctuations; (2) concentrations of clay particles; (3) aerial deposition; and (4) stormwater runoff. Exposure of benthos and humans results from both direct contact with and ingestion of sediments. In the case of human exposure, ingestion primarily occurs indirectly through shellfish consumption and secondarily through incidental ingestion of sediments during shellfish harvesting and other beach uses.

The sediment cleanup action objectives for this CAP are summarized as follows:

1. Eliminate, reduce, or otherwise control to the extent practicable risks to benthic organisms through exposure to sediments or porewater containing deleterious wood waste and/or other COCs that exceed the cleanup levels summarized in Table 3-1.
2. Eliminate, reduce, or otherwise control to the extent practicable risks to humans from ingestion of seafood containing chemicals that exceed risk-based concentrations and/or natural background concentrations.

3.4 Compliance With Applicable Laws

The cleanup action in the Bay will be performed pursuant to MTCA and the SMS under the terms of a Consent Decree between Ecology and PR and OPG.

In addition to the cleanup standards developed through the SMS process, other regulatory requirements must be considered in the selection and implementation of a cleanup action. MTCA requires cleanup standards to be at least as stringent as all applicable state and federal laws (WAC 173-340-700(6)(a)). In addition, all cleanup actions must comply with applicable state and federal laws (WAC 173-340-710(1)). The applicable state and federal laws may impose certain technical and procedural requirements (including obtaining permits or approvals) for performing cleanup actions. Applicable state and federal laws are identified in this Section. At this time, Ecology has not identified any relevant and appropriate requirements which apply to these cleanup actions.

Pursuant to RCW 70.105D.090(1), Defendants are exempt from the procedural requirements of Chapters 70.94, 70.95, 70.105, 77.55, 90.48, and 90.58 RCW and of any laws requiring or

authorizing local government permits or approvals. However, Defendants shall comply with the substantive requirements of such permits or approvals. The exempt permits or approvals and the applicable substantive requirements of those permits or approvals, as they are known at the time of this plan are identified in Section 3.5. Where they are not identified, they will be determined at the remedial design stage of the cleanup. The substantive requirements of any permits or approvals will be added to this CAP by amendment. The amendment will be issued for public notice and comment. The amendment's requirements will become enforceable under the Consent Decree without an amendment to the Decree.

3.4.1 State Environmental Policy Act

The State Environmental Policy Act (SEPA) (RCW 43.21C; WAC 197-11) and the SEPA procedures (WAC 173-802) are intended to ensure that state and local government officials consider environmental values when making decisions. Under WAC 197-11-250 MTCA and SEPA procedural requirements are integrated to reduce duplication and improve public participation, including common public review and comment. SEPA requires the identification, avoidance, minimization and/or mitigation of environmental impacts associated with agency permitting or actions such as the MTCA cleanup of Port Gamble Bay. The impacts from this cleanup have been identified along with requirements to select construction methods and timing and implementation of Best Management Practices that will mitigate those impacts that cannot be avoided during demolition and construction. Avoidance, minimization and mitigation measures identified during preparation of the SEPA checklist are described in the Mitigated Determination of Non-Significance (MDNS) attached as Appendix C. Additional avoidance and minimization measures and/or mitigation requirements identified prior to and during construction must also be met.

3.4.2 Puget Sound Dredged Material Management Program

In Puget Sound, the open-water disposal of sediments is managed under the Dredged Material Management Program (DMMP). This program is administered jointly by the United States Army Corps of Engineers (Corps), the U.S. Environmental Protection Agency (EPA), DNR, and Ecology. The DMMP developed the Puget Sound Dredge Disposal Analysis protocols, which include testing requirements to characterize whether dredged sediments are appropriate for open-water disposal. The results of this characterization are formalized

in a written suitability determination from the Dredged Material Management Office (DMMO).

Sediments dredged from SMA-1 and SMA-2 may be disposed of in open water. The DMMP has designated disposal sites throughout Puget Sound. Initial DMMP characterization of sediments has been performed on representative subsurface samples collected from SMA-1 and SMA-2 (including dioxin/furan testing), and these data indicate that some of the wood waste material to be dredged from these SMAs is likely suitable for unconfined open-water disposal at a non-dispersive location (e.g., at the nearby Port Gardner disposal site). Similar wood waste materials have also been determined to be suitable for open-water disposal at DMMP facilities (e.g., DMMP 2009). However, additional dredged material characterization would be required during remedial design to complete the suitability determination. If it is determined to be suitable, PR/OPG must comply with DMMP requirements including material approval and disposal requirements.

3.4.3 Shoreline Management Act

The Shoreline Management Act (RCW 90.58) and its implementing regulations establish requirements for developments on the shorelines of the state. A substantial development shall not be undertaken on shorelines of the state without first obtaining a permit from the government entity having administrative jurisdiction. Any development must be consistent with the policy of RCW 90.58.140, and the applicable guidelines, rules or master program. The Kitsap County Master Program was revised January 2013 and has been reviewed by Ecology and is currently undergoing public comment.

3.4.4 Washington Hydraulics Code

The Washington Hydraulics Code (WAC 220-110) establishes requirements for the construction of any hydraulic project or the performance of any work that will use, divert, obstruct, or change the natural flow or bed of any of the salt or fresh water of the state. The code also creates a program requiring Hydraulic Project Approval (HPA) permits for any activities that could adversely affect fisheries and water resources. Timing restrictions and technical requirements under the hydraulics code are applicable to dredging, capping, and placement of post-dredge residual covers.

3.4.5 Federal Clean Water Act

The Clean Water Act (CWA) is the primary federal law for protecting water quality from pollution. The CWA regulations provide requirements for the discharge of dredged or fill material to waters of the United States and are applicable to any in-water work. The CWA regulations also prescribe permitting requirements for point source and non-point source discharges. Acute criteria are relevant and appropriate requirements for discharges to marine surface water during sediment dredging, as well as for return flows (if necessary) to surface waters from dewatering operations.

Section 402 of the Clean Water Act requires a permit for discharge of pollutants pursuant to 33 U.S.C. § 1342 that is likely to apply to construction stormwater from the cleanup. Construction activities that disturb 1 acre or more of land need to comply with the provisions of construction stormwater regulations. Ecology has determined that a construction stormwater general permit does not meet the requirements for the permit exemptions in RCW 70.105D.090, and thus a project-specific construction stormwater permit will be required if land disturbance greater than 1 acre is necessary. A construction stormwater general permit must be obtained during the design phase and a Construction Quality Assurance Project Plan (CQAP) must be prepared as part of the remedial design process, supplemented as appropriate by the remedial contractor.

Section 404 of the CWA requires permits from the Corps for discharges of dredged or fill material into waters of the United States, including wetlands. 33 U.S.C. § 1344. Section 404 permit requirements depend on suitability determinations (described previously in 3.4.2) according to DMMP guidelines. Section 404(b)(1) requires an alternatives analysis as part of the permitting process. Requirements for all known, available, and reasonable technologies for treating waste water prior to discharge to state waters are applicable to any dewatering of marine sediment prior to upland disposal.

Section 401 of the CWA requires the state to certify that federal permits are consistent with water quality standards. 33 U.S.C. § 1341. The requirements of a certification determination are applicable.

3.4.6 Washington Water Pollution Control Act

Ecology has promulgated statewide water quality standards under the Washington Water Pollution Control Act (RCW 90.48). Under these standards, all surface waters of the state are divided into classes (Extraordinary, Excellent, Good, and Fair) based on the aquatic life uses of the water bodies. 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 return flows (if necessary) to surface waters from dewatering operations.

3.4.7 Archaeological and Historic Preservation Act

The Archaeological and Historic Preservation Act (16 U.S.C.A. § 496a-1) is applicable if any covered materials are discovered during excavation or dredging activities performed as a part of the selected sediment cleanup action. Concurrent with the PRI/FS, a Bay-wide cultural resources overview was developed for the Site to identify and map areas of known or possible historical, archaeological, and cultural resources (NWAA 2010). The overview was developed by a professional archaeologist for the area in and adjacent to the Site and provided specific steps to complete identification, evaluation, and protection of cultural resources that may be affected by sediment cleanup. Information from the overview was considered by Ecology in developing the selected sediment cleanup remedy for Port Gamble Bay. Significantly, the cleanup actions included in the selected remedy will occur in locations and at elevations (i.e., recent fill) that are not expected to coincide with the presence of cultural resources.

Early in the remedial design and permitting of the cleanup action, PR/OPG, in consultation with the Washington Department of Archaeology and Historic Preservation (DAHP) and the Port Gamble S'Klallam Tribe and other tribes, will further evaluate areas where cleanup-related disturbance of cultural resources may occur, including capping, dredging, staging and mooring areas, and transport routes as appropriate. More detailed cultural resource evaluations, as necessary, will be integrated with studies for engineering design as practicable. Early in the remedial design phase, PR/OPG will review existing cultural resource records, geotechnical data, historical documents, and ethnographic information to

determine areas of potential effects on cultural resources and to identify data gaps. Building on the cultural resources overview of Port Gamble Bay, which identified and mapped areas of known or possible historical, archaeological, and cultural resources within the cleanup area (NWAA 2010), PR/OPG will develop a Cultural Resources Study Plan, including archaeological fieldwork and subsurface testing as necessary in marine waters and upland areas where ground and sediment disturbance is planned (for efficiency, opportunities will be identified to conduct subsurface testing in conjunction with collection of data as part of other elements of remedial design).

The cleanup actions selected by Ecology also include appropriate compliance monitoring provisions during implementation of the cleanup action, consistent with Section 106 of the National Historic Preservation Act (NHPA) and Washington State laws. Detailed compliance monitoring plans will be developed during the remedial design and permitting phase, consistent with regulatory requirements. Appropriate cultural resource work plans, including a cultural resources treatment plan and an inadvertent discovery plan, will be included in the remedial design.

3.4.8 Health and Safety

Sediment cleanup construction activities will be performed in accordance with the requirements of the Washington Industrial Safety and Health Act (RCW 49.17) and implementing regulations and the federal Occupational Safety and Health Act and implementing regulations (29 C.F.R. §§ 1910, 1926). These applicable regulations include requirements that workers are to be protected from exposure to contaminants and that excavations are to be properly shored.

3.4.9 Nationwide Permit 38

The cleanup action may qualify for a U.S. Army Corps of Engineers (Corps) Nationwide Permit 38 (NWP 38). Otherwise it may qualify for the full permitting process under 33 U.S.C. § 1344.

3.5 Exemptions from Procedural Requirements – Permits/Approvals and Substantive Requirements

3.5.1 Kitsap County Shoreline Master Plan

The cleanup action will take place within Kitsap County. Ecology will consult with Kitsap County regarding the substantive requirements during the remedial design phase.

3.52 Hydraulic Project Approval Permit (HPAP)

Ecology will consult with the area habitat biologist for the Washington State Department of Fish and Wildlife regarding the substantive requirements for the HPAP during the remedial design phase and will amend this CAP to include those requirements at that time. The amendments will become enforceable requirements under the Consent Decree without the need to amend the Decree. Ecology will also consult with tribal biologists on how to determine the specific fish closure periods.

4 SELECTED CLEANUP ACTIONS

The cleanup actions selected by Ecology for the Site incorporate Bay-wide source control and a combination of removal, capping and EMNR sediment cleanup actions appropriately targeted to different areas within Port Gamble Bay. The selected actions are interdependent and will be sequenced to maximize overall protectiveness, beginning with source control and followed closely in time by intertidal excavation, subtidal dredging, and backfilling. Capping and EMNR will be sequenced to occur after removal actions are completed to maximize control of dredging residuals and to accelerate natural recovery processes, with the goal of reducing the overall restoration time frame to the extent practicable. Figures 4-1 through 4-4 summarize the selected cleanup actions for SMA-1 through SMA-4, respectively. The following sections describe the selected source control and cleanup actions.

4.1 Source Control

Approximately 2,000 creosoted pilings will be removed from throughout the Bay as a source control measure for protection of human health and to facilitate access for subsequent dredging and capping. While most of the creosoted pilings to be removed are located within or adjacent to North and South Mill (see Figures 4-1 and 4-2), concurrent creosoted piling removal will also occur in other areas of Port Gamble Bay such as the Log Transfer Dock and log staging and rafting areas. PR/OPG will concurrently remove approximately 73,000 square feet of existing overwater structure (subject to more accurate delineation as needed during the engineering design study) within Mill North and Mill South and remove the Log Transfer Dock and pilings from staging and rafting areas throughout the Bay. All piling removal will also be sequenced to occur shortly before dredging or capping actions to maximize control of piling removal residuals.

Pilings will be removed using best efforts, equipment preferences and best management practices (BMPs) identified in the (1) statewide *Hydraulic Project Approval (HPA) - Creosote Piling and Structural Removal* (WDFW 2011) and (2) the DNR *Puget Sound Initiative – Derelict Creosote Piling Removal, BMPs for Pile Removal and Disposal* (DNR 2011). Areas of moderate to extensive piling removal not otherwise anticipated to be later capped or dredged will be covered with 6 inches of sand to control piling removal residuals.

4.2 Intertidal Sediment Excavation and Capping

Approximately 10,000 to 15,000 cy of intertidal sediments in portions of the North Mill (SMA-1) and South Mill (SMA-2) that exceed Puget Sound natural background levels will be excavated (likely using upland-based equipment operating during relatively low tidal conditions) to approximately 2 feet below the existing sediment surface, and backfilled with a suitable cap or appropriate substrate if capping is determined not necessary during the Engineering Design Study. Approximate intertidal sediment removal areas in SMA-1 and SMA-2 are depicted in Figures 4-1 and 4-2, respectively. Ecology will determine the final horizontal and vertical extents of intertidal sediments to be removed in these SMAs after final delineation is completed during remedial design. In addition, subsurface wood waste deposits that may potentially be present in these intertidal areas will also be evaluated during remedial design. Significant deposits of subsurface wood waste or contaminants that are encountered during design or construction will be fully addressed by the remedy design to meet the cleanup action objectives summarized in Section 3.3 and as described below. Remediation levels defining a significant subsurface deposit will be defined during remedial design.

Excavated material will be screened to remove debris, and the screened sediments sorted as appropriate to facilitate reuse or disposal in upland areas within or near the Mill, as allowed. Screening-level sampling and testing conducted by OPG/PR of intertidal sediments from SMA-1 and SMA-2 suggests that dioxins/furans and/or cPAH concentrations in some of the excavated intertidal sediments may exceed MTCA soil cleanup levels, and will be further screened for appropriate reuse or disposal options during remedial design. Detailed upland beneficial reuse and institutional control plans will be developed during remedial design. If no other allowed reuse or disposal alternatives are identified, the excavated material will be disposed at an approved upland disposal facility.

The final intertidal excavation and backfill/capping plans will be developed during the remedial design phase subject to Ecology approval. The intertidal excavation and backfill/capping designs will be developed to control contaminant exposure to humans and the environment and to provide suitable habitat for benthic organisms and forage fish. Excavated areas will be backfilled/capped to restore the existing grade. The thickness and composition of the caps will be designed to minimize exposure to humans during shoreline

activities (e.g., shellfishing, recreation), and are anticipated to be approximately 2 feet thick or as Ecology determines is necessary to address exposure. All backfill/capping materials will come from a source approved by Ecology and will have suitable geotechnical characteristics. The cap will be designed to isolate contaminants and provide habitat using materials that will support a healthy benthic, shellfish, and forage fish community.

4.3 Subtidal Sediment Dredging and Backfilling

Approximately 30,000 to 45,000 cy of nearshore sediments with surface sediment toxicity exceeding SQS biological criteria (Table 3-1) that are underlain by wood waste deposits with TVS concentrations exceeding 15 percent will be dredged from portions of the North Mill (SMA-1) and South Mill (SMA-2). Subsequently, the dredged areas will be backfilled and/or capped, including placement of a nominal 6 inches of sand to control dredging residuals.

Approximate subtidal sediment removal areas in SMA-1 and SMA-2 are depicted in Figures 4-1 and 4-2, respectively. The final horizontal and vertical extents of sediments to be dredged from SMA-1 and SMA-2 will be determined by Ecology after being delineated during remedial design, supplementing existing data as necessary. The final dredge prisms for SMA-1 and SMA-2 will be developed also considering engineering and implementability constraints such as slope stability and cultural resource protection requirements.

Prior geophysical survey and sediment coring work performed in SMA-1 identified a concentrated shallow subtidal deposit of wood chips within the footprint of the former chip loading facility. This deposit is located directly below surface sediments containing elevated porewater sulfide concentrations. Removal of wood chip deposits exceeding a TVS concentration of 15 percent is the goal of the SMA-1 dredging action. Anticipated post-dredge surface sediments with dredging residuals exceeding a TVS concentration of 15 percent will be managed by placing a post-dredge sand cover over the dredge area.

Similarly, dredging actions in SMA-2 will target removal of sediments exceeding a TVS concentration of 15 percent at elevations shoreward of the approximate -20 feet MLLW contour, to focus dredging within the more productive photic zone and also to target the zone of elevated sulfide concentrations, subject to final design based on engineering and

cultural resources considerations. Anticipated post-dredge surface sediments with dredging residuals exceeding a TVS concentration of 15 percent will be managed by either placing a post-dredge sand cover over the dredge area or by placement of a sand cap, considering engineering and implementability constraints such as slope stability and cultural resource protection requirements. Subject to final design evaluations, wood waste deposits waterward of the approximate -20 feet MLLW contour will be capped (see Section 4.5).

A portion of the dredge sediments generated from the North Mill (SMA-1) and South Mill (SMA-2) are prospectively considered suitable for open-water disposal at a non-dispersive, unconfined DMMP open-water disposal site. Provided that large wood debris is appropriately screened, it is expected that the DMMP agencies will permit some or all of the SMA-1 and/or SMA-2 wood debris to be disposed of in a suitable open-water disposal location.

The use of open-water disposal for dredge material is evaluated on a case-by-case basis, and future suitability determinations can be subject to evolving policy issues related to sediment chemistry. SMA-1 sediments underwent a preliminary screening that suggests these sediments would pass the open-water disposal suitability determination, including for dioxins/furans. Similarly, SMA-2 sediments were screened against DMMP criteria as part of preliminary sampling performed by OPG/PR. In developing alternatives and associated costs, it was assumed that roughly 80 percent of SMA-1 and approximately 50 percent of SMA-2 dredged sediments would be suitable for open-water disposal under the selected remedy.

Additional characterization of these sediments will be required to confirm the use of open-water disposal. Sampling and characterization in accordance with DMMP protocols will be performed for specific areas identified in SMA-1 and SMA-2. Formal DMMP suitability determinations will be performed during remedial design. Sediment that is determined by the DMMO to be suitable for open-water disposal will be transported by barge and disposed of at a suitable open-water disposal site such as the Port Gardner non-dispersive DMMP disposal site after larger wood and debris greater than 2 feet in any dimension is removed.

Dredged material that is unsuitable for open-water disposal will be beneficially reused on uplands on or near the Mill as practicable. Screening-level sampling and testing conducted by OPG/PR of subtidal sediments in the SMA-1 and SMA-2 dredge areas suggests that dioxins/furans and/or cPAH concentrations in some of the excavated intertidal sediments may exceed MTCA soil cleanup levels, and will be further screened for appropriate reuse or disposal options during remedial design. Detailed upland beneficial reuse plans will be developed during remedial design. If no other allowed reuse or disposal alternatives are identified, the excavated material will be disposed of at an approved upland disposal facility. Potential disposal options for these materials will be finalized during remedial design.

4.4 Subtidal Sediment Capping

Approximately 7 acres of sediments in the Mill Site South (SMA-2) offshore of approximately -20 feet MLLW with surface sediment toxicity exceeding SQS biological criteria (Table 3-1) and also with underlying sediment TVS concentrations exceeding 15 percent will be contained with an approximate 4-foot-thick cap. The thickness and composition of the cap will be designed to provide 3 feet of clean sediment and an additional 1 foot of buffer between surface sediment geoduck habitat and underlying wood waste deposits in this area. The final cap specification will be determined during remedial design. Beneficial reuse of clean navigational dredge material is the preferred source of the cap material, using materials that will support healthy benthic, shellfish, and forage fish communities, including geoduck. The preliminary extent of the SMA-2 cap is depicted on Figure 4-2. Ecology will determine the final extent of the SMA-2 cap after final delineation is completed during remedial design.

Approximately 3 acres of shallow subtidal sediments in the North Mill (SMA-1) with surface sediment toxicity exceeding SQS biological criteria (Table 3-1) but without significant underlying wood waste accumulations (TVS less than 15 percent) will be capped with an approximate 1-foot-thick cap. The extent of the SMA-1 sediment cap is depicted on Figure 4-1. Material selected will ensure support for healthy benthic, shellfish, and forage fish communities.

Grain size and other engineering specifications for the cap material will be determined during remedial design, following relevant design guidance (e.g., Palermo et al. 1998) and in consultation with natural resource agencies for habitat considerations.

4.5 Subtidal Sediment Enhanced Monitored Natural Recovery (EMNR)

Six inches of EMNR materials will be placed over roughly 100 acres of subtidal sediments in parts of the South Mill (SMA-2), Central Bay (SMA-3), and FLA (SMA-4) with surface sediment toxicity exceeding SQS biological criteria (Table 3-1) but without significant wood waste accumulations (underlying sediment TVS less than 15 percent). The 2007 interim dredging action performed in SMA-2 will also receive a 6-inch-thick EMNR layer (Figure 4-2).

Material selected will ensure that the rate of natural recovery is enhanced, reduce concentrations of conventional and wood waste breakdown contaminants, and achieve a healthy benthic community.

EMNR placement will be sequenced such that placement in SMA-2 will precede work at SMA-4 and subsequently in SMA-3.

The preliminary extents of EMNR areas in SMA-2, SMA-3, and SMA-4 are depicted on Figures 4-2 through 4-4, respectively. The EMNR areas will be further refined during remedial design and as part of adaptive management during initial construction phases to reflect ongoing natural recovery processes. EMNR may not be required in those areas that pass SMS biological criteria (Table 3-1) during remedial design delineation sampling.

4.6 Subtidal Sediment Monitored Natural Recovery

Monitored natural recovery is selected as the remedy for SMA-5 where active remediation will not be conducted (i.e., all of SMA-5 outside the boundaries of SMA's 1 to 4). The sampling scope and schedule to assess the rate of natural recovery will be determined, subject to Ecology approval, during the remedial design phase and will include contingency plans and triggers for implementation of active remedial measures if required. Where monitored natural recovery does not achieve cleanup standards in ten years, PR/OPG will comply with

sediment recovery zone requirements. These requirements will be added to this CAP by amendment. The amendment will be issued for public notice and comment. The amendment's requirements will become enforceable under the Consent Decree without an amendment to the Decree.

4.7 Compliance Monitoring

Compliance monitoring will be performed to verify that construction actions achieve remedial design objectives and to verify the short- and long-term effectiveness of the selected remedy. For example, creosoted piling removal along with the dredging, capping, and EMNR cleanup actions described above will eliminate the major sources of contaminants to this area, which is anticipated to accelerate natural recovery over time.

Prior dredging experience at the Mill has demonstrated that it may be difficult to achieve design cut elevations in areas of closely-spaced, broken or buried pile stubs. Once required excavation or dredging elevations have been verified as outlined above, performance monitoring will involve collecting sediment samples from the base of the excavations or dredge areas to confirm that cleanup levels have been achieved and/or to document concentrations of residual contaminants. Performance monitoring activities will include the following:

- Collection of composite samples from the final limits of the sediment excavations and dredge prisms, with the sampling density appropriately tailored to the location and size of the removal area (detailed post-construction verification sampling plans will be developed during remedial design)
- The confirmatory sediment samples will be submitted for analysis of PAHs, dioxins/furans, cadmium, and/or TVS as appropriate for each remedial action area, to verify that the removal actions are complete or to document dredging residual concentrations that will be addressed by post-dredge sand placement
- Samples will be analyzed on a short turnaround basis to allow the results to be compared with sediment cleanup levels shown in Table 3-1 to evaluate whether the final limits of the remedial excavations have been achieved

Compliance monitoring requirements are described in more detail in Section 7 of this CAP.

5 ALTERNATIVES CONSIDERED AND BASIS FOR REMEDY SELECTION

A range of potential cleanup action alternatives for each SMA was evaluated in the PRI/FS. This section summarizes the cleanup technologies and alternatives considered and the basis for the selected remedy.

5.1 Cleanup Technologies

The PRI/FS report presents a detailed screening evaluation of potentially applicable general response actions and remediation technologies. Cleanup action alternatives were developed by assembling the technologies that were carried forward from this screening evaluation, including dredging, capping, EMNR, monitored natural recovery (MNR), and combinations of these remedial technologies consistent with EPA (2005).

5.2 Feasibility Study Alternatives

The PRI/FS report presents a detailed evaluation of a range of potential cleanup action alternatives for SMA-1 through SMA-5, as follows:

- SMA-1
  - Dredge
  - Dredge and Cap (**selected remedy**)
  - Cap
  - Cap and EMNR
- SMA-2
  - Dredge
  - Dredge and Cap
  - Dredge and Cap II
  - Dredge, Cap and EMNR (**selected remedy**)
  - Cap
  - Cap and EMNR
- SMA-3
  - Dredge
  - Cap

  - EMNR (**selected remedy**)
  - MNR
- SMA-4
  - Dredge
  - Cap
  - EMNR (**selected remedy**)
  - MNR
- SMA-5
  - Dredge
  - Cap
  - EMNR
  - MNR (**selected remedy**)

The evaluations of each alternative are summarized in Section 5.3 below.

5.3 Summary of Detailed Analysis of Alternatives

This section provides a narrative description of the evaluation and comparison of these alternatives for each SMA. Each alternative was evaluated relative to the following SMS and MTCA criteria:

- Threshold criteria of protection of human health and the environment, and attainment of cleanup standards
- Short-term effectiveness
- Long-term effectiveness
- Implementability
- Cost
- Community concerns
- Recycling and Waste Minimization
- Environmental Impacts

For each alternative, an absolute numeric ranking ranging from 1 to 5 was assigned, where 1 is the lowest (least favorable) ranking and 5 is the highest (most favorable) ranking. These

absolute rankings were weighted to calculate a total score for each alternative. Table 5-1 summarizes the evaluation and tabulates the overall score for each alternative.

5.3.1 North Mill (SMA-1) Detailed Evaluation

5.3.1.1 Threshold Evaluation

All of the alternatives evaluated for SMA-1 meet the SMS threshold criteria of protection of human health and the environment, and attainment of cleanup standards. Each alternative was configured to meet the required cleanup standards, and all alternatives would meet the cleanup standard within a 10-year time frame. Cleanup will be achieved in compliance with applicable laws.

5.3.1.2 Short-term Effectiveness

For the Dredge alternative, short-term effectiveness was given a score of 3 for human health and 4 for environment, for an average score of 3.5. This scoring reflects the relatively large volume of material that needs to be handled in this alternative and the potential risks to human health associated with this work, as well as generated dredge residuals.

For the Dredge and Cap alternative, less material is removed, with less attendant human health risk during implementation. At the same time, dredge residuals will still result in environmental impact. Thus, this alternative was given a score of 4 for human health, and 4 for environment, for an average score of 4.0.

The Cap alternative does not require upland management of dredge material and debris, and thus represents the lowest potential risk to human health. However, there are water quality impacts associated with placing a large volume of capping material, which represents a short-term environmental risk. Thus, this alternative ranks 5 for human health, and 4 for environment, for an overall average of 4.5.

Table 5-1
Remedial Alternatives Evaluation Matrix

SMA	Alternative	Protection of Human Health and the Environment[a]			Attainment of Cleanup Standards and Compliance with Laws[b]		Short-term Effectiveness[c]			Long-term Effectiveness[d]					Ability to be Implemented[e]				Cost[f]	Community Concerns[g]	Recycling, Reuse, Waste Min.[h]	Environmental Impacts[i]	Total Score
		Human Health	Environment	Time to Achieve Standards	Cleanup Standards	Applicable laws	Human Health	Environment	Score	Environment	Human Health	Certainty and Reliability	Residual Risks	Score	Technical Feasibility	Availability of Materials, Land, etc.	Permitting and Regulatory	Score	Estimated Average Cost Score	Score	Score	Score	
Mill Site North	1 - Dredge	Y	Y	Y	Y	Y	3	4	**3.5**	5	5	4	4	**4.5**	4	5	5	**4.7**	**1**	5	**2**	**4**	**69**
	e and Cap	Y	Y	Y	Y	Y	4	4	**4.0**	5	5	4	3	**4.3**	4	5	5	**4.7**	**2**	3	**3**	**4**	**72**
	3 - Cap	Y	Y	Y	Y	Y	5	4	**4.5**	4	5	3	3	**3.8**	5	5	5	**5.0**	**3**	1	**3**	**4**	**75**
	4 - Cap and EMNR	Y	Y	Y	Y	Y	5	5	**5.0**	3	5	2	2	**3.0**	5	5	5	**5.0**	**3**	1	**3**	**4**	**71**
Mill Site South	1 - Dredge	Y	Y	Y	Y	N	1	1	**1.0**	5	5	4	4	**4.5**	3	2	4	**3.0**	**1**	5	**2**	**1**	**54**
	e and Cap	Y	Y	Y	Y	Y	2	1	**1.5**	5	5	4	3	**4.3**	3	3	5	**3.7**	**1**	4	**3**	**3**	**58**
	e and Cap II	Y	Y	Y	Y	Y	3	2	**2.5**	4	5	4	3	**4.0**	4	4	5	**4.3**	**2**	3	**4**	**3**	**66**
	4 - Dredge, Cap, and EMNR	Y	Y	Y	Y	Y	4	4	**4.0**	4	5	4	3	**4.0**	4	4	5	**4.3**	**3**	2	**4**	**4**	**74**
	5 - Cap	Y	Y	Y	Y	Y	5	5	**5.0**	4	5	3	3	**3.8**	5	4	5	**4.7**	**4**	1	**5**	**3**	**80**
	6 - Cap and EMNR	Y	Y	Y	Y	Y	5	5	**5.0**	3	5	2	1	**2.8**	5	4	5	**4.7**	**4**	1	**5**	**4**	**75**
Central Bay	1 - Dredge	Y	Y	Y	Y	N	1	1	**1.0**	5	5	2	4	**4.0**	2	1	2	**1.7**	**2**	2	**2**	**1**	**48**
	2 - Cap	Y	Y	Y	Y	Y	5	3	**4.0**	4	5	4	3	**4.0**	4	3	5	**4.0**	**5**	3	**5**	**2**	**83**
	3 - EMNR	Y	Y	Y	Y	Y	5	5	**5.0**	3	5	4	2	**3.5**	5	4	5	**4.7**	**5**	4	**5**	**3**	**87**
	4 - MNR	N	N	N	N	N	1	1	**1.0**	2	1	1	1	**1.3**	5	5	5	**5.0**	**5**	1	**1**	**5**	**62**
FLA	1 - Dredge	Y	Y	Y	Y	Y	1	1	**1.0**	5	5	5	4	**4.8**	3	3	5	**3.7**	**2**	4	**2**	**3**	**64**
	2 - Cap	Y	Y	Y	Y	Y	5	4	**4.5**	4	5	5	3	**4.3**	4	5	5	**4.7**	**5**	4	**5**	**4**	**91**
	3 - EMNR	Y	Y	Y	Y	Y	5	5	**5.0**	4	5	4	3	**4.0**	5	5	5	**5.0**	**5**	3	**5**	**4**	**91**
	4 - MNR	N	N	N	N	N	1	1	**1.0**	2	1	1	1	**1.3**	5	5	5	**5.0**	**5**	1	**1**	**5**	**62**
Background	1 - Dredge and MNR	N	Y	N	N	N	1	1	**1.0**	3	2	2	4	**2.8**	2	1	2	**1.7**	**2**	1	**2**	**1**	**39**
	2 - Cap and MNR	N	Y	N	N	N	2	2	**2.0**	3	2	3	3	**2.8**	3	2	4	**3.0**	**5**	2	**5**	**2**	**67**
	3 - EMNR and MNR	N	Y	N	N	N	2	3	**2.5**	4	2	2	2	**2.5**	4	3	5	**4.0**	**5**	2	**5**	**3**	**71**
	4 - MNR	N	Y	N	N	N	1	5	**3.0**	5	1	1	1	**2.0**	5	5	5	**5.0**	**5**	1	**1**	**5**	**70**

Notes:

Does not meet threshold criteria
Highest scoring alternatives (within a few points)
Draft preferred alternative

1 = Low
2 = Low-medium
3 = Medium
4 = Medium-high
5 = High

EMNR = enhanced, monitored natural recovery
FLA = former lease area
MNR = monitored natural recovery
SMA = Sediment Management Area

a = Overall protection of human health and the environment, time required to attain the cleanup standard(s), and on-site and off-site environmental impacts and risks to human health resuling from implementing the cleanup alternatives.
b = Attainment of the cleanup standard(s) and compliance with applicable federal, state, and local laws.
c = Short-term effectiveness, including protection of human health and the environment during construction and implementation of the alternative.
d = Long-term effectiveness, including degree of certainty that the alternative will be successful, long-term reliability, magnitude of residual biological and human health risk, and effectiveness of controls for ongoing discharges and/or controls required to manage treatment residues or remaining waste cleanup and/or disposal site risks.
e = Ability to be implemented, including the potential for landowner cooperation, consideration of technical feasibility, availability of needed off-site facilities, services and materials, administrative and regulatory requirements, scheduling, monitoring requirements, access for construction, operations and monitoring, and integration with existing facility operations and other current or potential cleanup actions.
f = Cost, including consideration of present and future direct and indirect capital, operation, and maintenance costs and other foreseeable costs.
g = The degree to which community concerns are addressed.
h = The degree to which recycling, reuse, and waste minimization are employed.
i = Environmental impact. Sufficient information shall be provided to fulfill the requirements of the State Environmental Policy Act. Discussions of significant short-term and long-term environmental impacts, significant irrevocable commitments of natural resources, significant alternatives including mitigation measures, and significant environmental impacts which cannot be mitigated shall be included.

The Cap and EMNR alternative entails handling the lowest volume of material, and thus has the lowest attendant risks to both human health and the environment. This alternative scored 5 for both human health and the environment, for an overall average score of 5.0.

5.3.1.3 Long-term Effectiveness

The long-term effectiveness of the Dredge alternative ranks high for protection of human health and the environment because source material is removed to the maximum extent practicable. Because of generated dredge residuals, this alternative ranks marginally lower for certainty and reliability, and residual risks. This alternative was scored 5 for human health, 5 for environment, 4 for certainty/reliability, and 4 for residual risks, for an average score of 4.5.

The Dredge and Cap alternative has a similar ranking to the Dredge alternative; however, the residual risk category ranks lower because of the reliance on caps to prevent exposure to material that remains in the environment. Thus, the scoring is 5, 5, 4, 3 for human health, environment, certainty/reliability, and residual risk, respectively, for an overall average of 4.3.

The Cap alternative is protective of human health because the exposure pathway to sediments is removed; a score of 5 was assigned. Because the benthic community will reside within the cap matrix and there remains a lower risk of toxicity due to sulfides from decomposing wood waste (though the caps would be designed to address this risk), environment ranks slightly lower compared to human health, and was scored 4. Because institutional controls are required, capping has lower certainty/reliability compared to removal, and was scored 3. Similar to the Dredge and Cap alternative, residual risk was also scored 3, for an overall average score of 3.8 for long-term effectiveness.

The Cap and EMNR alternative is similar to the Cap alternative and ranks 5 for protection of human health. However, the reliance on EMNR in parts of the SMA results in a lower score of 3 for environment because of the potential for benthic exposure before natural recovery processes have reduced concentrations below criteria. EMNR presumes ongoing natural recovery following placement of clean sand, and thus is less certain (until a demonstration is made through long-term monitoring) than capping, so certainty has been scored 2.

Similarly, residual risk ranks 2 because of the reliance on EMNR in portions of the SMA. The overall average score for long-term protectiveness is 3.0 for the Cap and EMNR alternative.

5.3.1.4 Implementability

The technical feasibility of the Dredge alternative was given a score of 4 in consideration of the amount of material handled, and the need to process debris and unsuitable dredge material in an available upland location. Materials and equipment for dredging are commonly available, and this criterion was scored 5. Finally, dredging projects are routinely permitted in Puget Sound and have the support of regulatory agencies when performed in conjunction with cleanup, and thus this criterion scored 5. The overall average implementability score for the Dredge alternative is 4.8.

The Dredge and Cap alternative is the same as the Dredge alternative from an implementability standpoint, and the same considerations and scoring are applied. The implementability average score for this alternative is also 4.8.

Capping ranks higher for technical feasibility compared to dredging because there would be less need for upland sorting or processing of excavated material. Thus, the Cap alternative was scored 5 for technical feasibility. Capping materials and equipment are commonly available, and thus this criterion was also scored 5. Finally, as with dredging, there is regulatory and permitting support for capping performed during environmental cleanup, and this criterion scored 5 as well, for an overall average score of 5.0 for implementability.

The Cap and EMNR alternative has the same considerations as the Cap alternative and was thus scored the same, with an overall average score of 5.0.

5.3.1.5 Cost

The Dredge alternative in SMA-1 has the highest estimated cost ($1.1 million/acre) and the lowest rank, scoring 1. The Dredge and Cap alternative is estimated to cost $900,000/acre and has a score of 2. The Cap and Cap and EMNR alternatives are estimated to cost $700,000/acre, and have been given a score of 3 for cost.

5.3.1.6 Community Concerns

As this is one of the smaller SMAs with relatively few existing shellfish beds that would be impacted by the cleanup, a stronger preference has been expressed for removal (dredging) of as much material as possible. Removal of contaminated sediments also provides the greatest flexibility for future land uses in this area. This preference is reflected in a score of 5 for the Dredge alternative, a score of 3 for the Dredge and Cap alternative, and scores of 1 for the Cap and EMNR alternatives.

5.3.1.7 Recycling and Waste Minimization

The ability for a sediment cleanup project to use recycling and waste minimization is limited to a few key opportunities discussed in Section 5. The Dredge alternative has limited opportunity for recycling or reuse, while at the same time generating waste during excavation, and was thus scored 2. The Dredge and Cap, Cap, and Cap and EMNR alternatives have the potential to beneficially reuse navigationally dredged sand for cap material, and thus all of these alternatives were scored 3 for this evaluation criterion.

5.3.1.8 Environmental Impacts

The potential environmental impacts associated with all alternatives rank equally considering that the scale and scope of each project is similar. The environmental impacts associated with dredge residuals are relatively low due to the relatively low volume of material excavated. The environmental (water quality) impacts associated with cap material placement are also relatively low considering the relatively low volume of material used. Thus, all alternatives were scored 4 for consideration of environmental impacts.

5.3.1.9 Selected Remedy

Based on this evaluation, the Dredge and Cap, Cap, and Cap and EMNR total scores rank highest. The Dredge and Cap alternative was selected due to Ecology's preference for removal of dense wood waste deposits as part of the remedy, particularly in areas with identified sulfide toxicity. The restoration timeframe for the Dredge and Cap alternative is approximately 2 to 3 years for design, permitting, and implementation.

5.3.2 South Mill (SMA-2) Detailed Evaluation

5.3.2.1 Threshold Evaluation

The Dredge alternative meets the threshold criteria for protection of human health and the environment, and achieves cleanup standards within a 10-year time frame. However, a Dredge alternative over this large area is likely to have significant water quality impacts that would be difficult to control. There are also concerns about resuspension and distribution of wood debris and contaminated sediments to other areas of the Bay. For these reasons, this alternative may be more difficult to obtain permits for, and it may also be more difficult to remain in compliance with water quality limits during implementation.

The remaining alternatives evaluated for SMA-2 meet the SMS threshold criteria of protection of human health and the environment, and attainment of cleanup standards. Each of these alternatives has been configured to meet the required cleanup standards, and all of the remaining alternatives will meet the cleanup standard within the required 10-year time frame. Finally, cleanup will be achieved in compliance with applicable laws.

5.3.2.2 Short-term Effectiveness

For the Dredge alternative, short-term effectiveness was given a score of 1 for human health and 1 for environment, for an average score of 1.0. This scoring reflects the significant volume of material that needs to be handled in this alternative, resulting in significant potential risks to human health associated with this work based on documented health and safety issues that show measurable increased worker safety risk for marine construction compared to upland construction. The large volume of dredge material would also result in significant generated dredge residuals and unknown residual distribution and impacts on the rest of the Bay.

For the Dredge and Cap alternative, less material is removed than the Dredge alternative, with less human health risk associated with this action during implementation. However, the overall volume of removal is still significant. Further, significant generated dredge residuals will result in environmental impact. Thus, this alternative was given a score of 2 for human health, and 1 for environment, for an average score of 1.5.

The Dredge and Cap II alternative removes less volume than the Dredge and Cap alternative. Considerations about human health and the environment are similar, but scoring is higher to reflect the lower removal volume, with a value of 3 selected for human health, and 2 for environment, for an overall average score of 2.5.

The Dredge, Cap, and EMNR alternative balances removal and capping such that the dredging is focused on the highest concentration of woody debris in the area most susceptible to generation of porewater sulfide. The result is a lower volume of removal compared to the Dredge and Cap II alternative, and a greater percentage of the dredged material would be suitable for open-water disposal. The dredge prism is also located in an area that is less subject to strong currents. Because of the lower risks associated with the lower volume of removal, human health and environment both score 4, with an overall average of 4.0 for this alternative.

The Cap alternative requires limited upland management of dredge material and debris (from the intertidal excavation area), and thus represents the lowest potential risk to human health. While there may be water quality impacts associated with placing a large volume of capping material, this represents a short-term environmental risk that is lower than the risk of water quality impacts and residuals generation associated with removal. Thus, this alternative ranks 5 for human health, and 5 for environment, for an overall average of 5.0.

The Cap and EMNR alternative entails handling the lowest volume of material, and thus has the lowest attendant risks to both human health and the environment. This alternative scored 5 for both human health and the environment, for an overall average score of 5.0.

5.3.2.3 Long-term Effectiveness

The long-term effectiveness of the Dredge alternative ranks high for protection of human health and the environment because source material is removed to the maximum extent practicable. Because of generated dredge residuals, this alternative ranks marginally lower for certainty and reliability, and residual risks. This alternative was scored 5 for human

health, 5 for environment, 4 for certainty/reliability, and 4 for residual risks, for an average score of 4.5.

The Dredge and Cap alternative has a similar ranking to the Dredge alternative; however, the residual risk category ranks lower because of the reliance on caps to maintain protectiveness. Thus, the scoring is 5, 5, 4, 3 for human health, environment, certainty/reliability, and residual risk, respectively, for an overall average of 4.3.

The Dredge and Cap II alternative has a similar ranking to the Dredge and Cap alternative; however, the environment category ranks slightly lower because less removal is accomplished. Thus, the scoring is 5, 4, 4, 3 for human health, environment, certainty/ reliability, and residual risk, respectively, for an overall average of 4.0.

The Dredge, Cap, and EMNR alternative shares the same considerations and scoring as the Dredge and Cap II alternative, and thus has an overall average score of 4.0 for long-term effectiveness.

The Cap alternative is protective of human health because the exposure pathway to sediments is removed; a score of 5 was assigned. Because the benthic community (and in particular, geoducks) will reside within the cap matrix, environment ranks slightly lower compared to human health, and was scored 4. Because institutional controls are required and there may be a lower risk of continuing sulfides impacts (though the caps would be designed to address this risk), capping has lower certainty/reliability compared to removal, and was scored 3. Similar to the Dredge, Cap, and EMNR alternative, residual risk was also scored 3, for an overall average score of 3.8 for long-term effectiveness.

The Cap and EMNR alternative is similar to the Cap alternative and ranks 5 for protection of human health. However, the reliance on EMNR in parts of the SMA results in a lower score of 3 for environment because of the potential for benthic exposure before natural recovery processes have reduced concentrations below criteria. EMNR presumes ongoing natural recovery following placement of clean sand, and thus is less certain (until a demonstration is made through long-term monitoring) than capping, and thus certainty/reliability has been scored 2. Finally, residual risk ranks 1 because of the reliance on EMNR in portions of the

SMA, and because of the risk posed by the relatively large volume of woody debris that remains under this alternative. The overall average score for long-term protectiveness is 2.8 for the Cap and EMNR alternative.

5.3.2.4 Implementability

The technical feasibility of the Dredge alternative was given a score of 3 in consideration of the relatively large amount of material handled, and the need to process debris and unsuitable dredge material in an available upland location. While materials and equipment for dredging are commonly available, the upland space required for processing up to 100,000 to 150,000 cy (representing the 75 percent of SMA-2 material assumed to be unsuitable for DMMP open-water disposal) of dredge material is significant and the ability to manage this volume upland is questionable; thus this criterion was scored 2. The permitting and regulatory criterion was scored 4 because the large volume of dredging could trigger regulatory concerns. The overall average implementability score for the Dredge alternative is 3.0.

The Dredge and Cap alternative is similar to the Dredge alternative from an implementability standpoint, and the same considerations and scoring (3) are applied for technical feasibility. Because the volume of dredge material is lower, the scores for availability of materials and space, as well as the score for regulatory and permitting is slightly higher than the dredge alternative, with scores of 3 and 5, respectively. The implementability average score for the Dredge and Cap alternative is 3.8.

The Dredge and Cap II alternative entails a lower volume of material handled on the upland compared to the Dredge and Cap alternative, and thus has been assigned a higher score of 4 for technical feasibility. Considerations for availability of materials/space, and permitting/regulatory are reduced, and thus a score of 4 was assigned. Finally, a score of 5 was assigned for regulatory/permitting (similar to other small- to medium-scale dredging alternatives) for an overall average score of 4.3.

The Dredge, Cap, and EMNR alternative is similar in scope and scale to the Dredge and Cap alternative, and the scoring for implementability reflects this, with an overall average of 4.3 for this alternative.

Capping ranks higher for technical feasibility compared to dredging because there would be less need for upland sorting/processing of excavated material. Thus, the Cap alternative was scored 5 for technical feasibility. Capping materials and equipment are commonly available; however, a relatively large volume of cap material would be required under this alternative (over 100,000 tons), and thus this criterion was scored 4. Finally, as with dredging, there is regulatory and permitting support for capping performed during environmental cleanup, and this criterion scored 5 as well, for an overall average score of 4.8 for implementability.

The Cap and EMNR alternative has the same considerations as the Cap alternative and similar cap material volume requirements and was thus scored the same, with an overall average score of 4.8.

5.3.2.5 Cost

The Dredge alternative in SMA-2 has the highest estimated cost ($1.6 million/acre) and the lowest rank, scoring 1. The Dredge and Cap alternative is estimated to cost $1.1 million/acre and has also been assigned a score of 1. The Dredge and Cap II alternative is estimated to cost $900,000/acre and has been assigned a score of 2. The Dredge, Cap, and EMNR alternative has an estimated cost of $510,000/acre and has been assigned a score of 3. The Cap and Cap and EMNR alternatives are estimated to cost $370,000/acre, and have been given a score of 4 for cost.

5.3.2.6 Community Concerns

This SMA represents the area most heavily impacted by mill operations over time, and where it has been reported by divers that geoducks have been heavily impacted by wood wastes in sediments. While dredging large volumes of wood waste and impacted sediments may present some challenges and short-term risks to human health and the environment, the long-term gains over multiple generations from cleaning up this area have been stated by community and tribal members as being worth the risks. Therefore, like at SMA-1,

alternatives that result in greater long-term removal (dredging) of contaminated sediments were scored higher. The Dredge alternative received a score of 5; the Dredge and Cap alternative a score of 4; Dredge and Cap II (which dredges lower quantities of sediments) a score of 3; Dredge, Cap, and EMNR a score of 2; and both the Cap and Cap and EMNR alternatives a score of 1.

5.3.2.7 Recycling and Waste Minimization

The ability for a sediment cleanup project to use recycling and waste minimization is limited to a few key opportunities discussed in Section 5. As with SMA-1, the Dredge alternative in SMA-2 has limited opportunity for recycling or reuse, while at the same time generating waste during excavation, and was thus scored 2.

The Dredge and Cap alternative has the potential to beneficially reuse sand for cap material, and thus this alternative was scored 3 for this evaluation criterion.

The Dredge and Cap II and Dredge, Cap, and EMNR alternatives are similar to the Dredge and Cap alternative, with the key difference that they would generate less waste from the removal process, and thus these alternatives were scored 4.

Finally, the Cap and Cap and EMNR alternatives produce the least waste and have the highest potential for recycling through the beneficial reuse of maintenance dredge material in the cap, and thus these alternatives both score 5 for this evaluation criterion.

5.3.2.8 Environmental Impacts

The potential environmental impacts associated the Dredge alternative are significant. The large volume of material removed (140,000 to 200,000 cy) and associated water quality and dredge residuals impacts would be substantial. Because open-water disposal would only be applicable to a small portion of the dredge material, upland rehandling would result in significant noise, traffic, and local air emissions at the offloading facility and during transloading to the landfill. Marine traffic associated with dredging would interfere with local fishing and shellfish harvest activities for at least 3 years, and noise and light associated with this long-term construction project would cause notable impacts on the local

communities that surround Port Gamble Bay. As a result, the Dredge alternative was given a score of 1 for the environmental impacts criterion.

The Dredge and Cap and Dredge and Cap II alternatives have lower overall dredge volumes and lower impacts associated with dredging. There are additional potential water quality impacts (specifically turbidity) associated with cap material placement that are not associated with dredging, because the volume of material placed is higher under these alternatives than under the Dredge alternative. Thus, these two alternatives were both assigned a score of 3 for environmental impacts.

The Dredge, Cap, and EMNR alternative provides a balanced approach that minimizes impacts associated with dredging, and reduces impacts associated with capping compared to the Cap alternative. Thus, this alternative was assigned a score of 4.

The Cap alternative does not result in dredge-related impacts; however, this alternative does require placement of significant volumes of material for cap construction, and thus has been assigned a score of 3 for environmental impacts.

The Cap and EMNR alternative requires less cap material placement than the Cap alternative and, therefore, scores comparatively higher at 4 for environmental impacts.

5.3.2.9 Selected Remedy

Based on this evaluation, the Dredge, Cap, and EMNR alternative and the Cap alternative total scores rank highest. The Dredge, Cap, and EMNR alternative was selected due to Ecology's preference for removal of large deposits of wood waste as part of the remedy, particularly in areas with identified sulfide toxicity. However, the overall cost of the Dredge, Cap, and EMNR alternative presumes the use of open-water disposal for 50 percent of the dredge material, consistent with OPG/PR's preliminary screening-level sampling. The restoration timeframe for the Dredge, Cap, and EMNR alternative is approximately 3 years for design, permitting, and implementation.

5.3.3 Central Bay (SMA-3) Detailed Evaluation

5.3.3.1 Threshold Evaluation

The Dredge alternative meets the threshold criteria for protection of human health and the environment, and achieves cleanup standards within a 10-year time frame. However, dredging over this large area is likely to have significant water quality impacts that would be difficult to control. There are also concerns about resuspension and distribution of wood debris and contaminated sediments to other areas of the Bay. For these reasons, it may be more difficult to obtain permits for this alternative, and it may also be more difficult to remain in compliance with water quality limits during implementation.

The Cap and EMNR alternatives for SMA-3 meet the SMS threshold criteria of protection of human health and the environment, and attainment of cleanup standards. Each of these alternatives has been configured to meet the required cleanup standards, and these alternatives will meet the cleanup standard within a 10-year time frame. Finally, cleanup will be achieved in compliance with applicable laws for the Cap and EMNR alternatives.

The MNR alternative does not meet the threshold criteria for protection of human health and the environment or attainment of cleanup standards/compliance with laws. Bioassay results currently exceed SQS, and cPAH levels are on the order of 2 to 4 times the cleanup level. Because ongoing natural recovery has not been documented in this SMA and sedimentation rates in the area are very low, this alternative is not expected to meet the cleanup standards within 10 years.

5.3.3.2 Short-term Effectiveness

For the Dredge alternative, short-term effectiveness was given a score of 1 for human health and 1 for environment, for an average score of 1.0. This scoring reflects the substantial volume of dredge material that needs to be managed in this alternative (with approximately twice the volume compared to the Mill Site South Dredge alternative – and similar effectiveness considerations on a larger scale), as well as generated dredge residuals, which will result in a significant environmental impact in the Central Bay.

The Cap alternative does not require upland management of dredge material and debris, and thus represents the lowest potential risk to human health. However, there are water quality impacts associated with placing a large volume of capping material, which represents a short-term environmental risk. Thus, this alternative ranks 5 for human health and 3 for environment, for an overall average of 4.0.

The EMNR alternative entails handling the lowest volume of material, and thus has the lowest attendant risks to both human health and the environment. This alternative scored 5 for both human health and the environment, for an overall average score of 5.0.

Because MNR does not take active measures to improve human health and the environment in the short term, it was scored 1 for both of these criteria, for an overall average of 1.0 for short-term effectiveness.

5.3.3.3 Long-term Effectiveness

The long-term effectiveness of the Dredge alternative ranks high for protection of human health and the environment because source material is removed to the maximum extent practicable. However, the scale of the removal would require more than eight construction seasons to complete, which significantly impacts the certainty that the dredging remedy can be completed. Finally, due to generated dredge residuals, this alternative ranks marginally lower for residual risks. This alternative was scored 5 for human health, 5 for environment, 2 for certainty/reliability, and 4 for residual risks, for an average score of 4.0.

The Cap alternative is protective of human health because the exposure pathway to sediments is removed; a score of 5 was assigned. Because the benthic community will reside within the cap matrix, environment ranks lower compared to human health, and was scored 4. Because institutional controls are required, capping has lower certainty/reliability compared to removal, and was scored 4. Similar to the Cap alternatives in the other SMAs, residual risk was also scored 3, for an overall average score of 4.0 for long-term effectiveness.

The EMNR alternative is similar to the Cap alternative and ranks 5 for protection of human health. However, the reliance on EMNR in parts of the SMA results in a lower score of 3 for

environment because of the potential for benthic exposure before natural recovery processes have reduced concentrations below criteria. EMNR presumes ongoing natural recovery following placement of clean sand, and thus is less certain than capping; however, bioassay exceedances are very close to the SQS and so it is reasonable to assume EMNR can be reliable in reducing toxicity to the benthic community. Thus certainty/reliability has been scored 4. Residual risk ranks 2 because of the reliance on natural recovery processes and the fact that material is not removed under this alternative. The overall average score for long-term protectiveness is 3.5 for the EMNR alternative.

Natural recovery is presumed to be occurring very slowly in SMA-3, and thus MNR has been assigned a score of 1 for protection of human health and 2 for protection of the environment because the predominant issue in the Central Bay is exceedance of cPAH levels. Further, MNR is scored 1 for certainty/reliability and 1 for residual risks because active measures are not taken under this alternative. The overall average score for long-term effectiveness of MNR in SMA-3 is 1.3.

5.3.3.4 Implementability

The technical feasibility of the Dredge alternative was given a score of 2 in consideration of the significant amount of material handled, and the need to process debris and unsuitable dredge material in an available upland location. Materials and equipment for dredging are commonly available; however, the space required to manage 200,000 to 250,000 cy of dredge material would likely be difficult, if not impossible to find, and thus this criterion was scored 1. Finally, while dredging projects in Puget Sound typically have the support of regulatory agencies when performed in conjunction with cleanup, it is expected that dredging on the scale necessary in SMA-3 for this alternative would create significant concerns, and thus this criterion scored 2. The overall average implementability score for the Dredge alternative is 1.8.

Capping ranks higher for technical feasibility compared to dredging because there would be less need for upland sorting/processing of excavated material. Thus, the Cap alternative was scored 4 for technical feasibility. While capping equipment is commonly available, procuring more than 180,000 tons of cap material for this alternative could be difficult, and

thus this criterion was scored 3. Finally, there is typically regulatory and permitting support for capping performed during environmental cleanup, and this criterion was scored 5, for an overall average score of 4.0 for implementability.

The EMNR alternative has similar considerations to the Cap alternative but ranks higher for technical feasibility and availability of materials because only one-half of the cap material is required under this alternative. Thus, scores were 5, 4, and 5 for technical feasibility, availability of materials and equipment, and permitting/regulatory considerations, respectively, for an overall average score of 4.8.

MNR does not entail active construction. Implementability is related to periodic sampling during each monitoring event. Because it does not trigger any of the technical feasibility, materials availability, or permitting/regulatory issues that occur with active construction, all factors were assigned a score of 5, for an overall average score of 5.0 for implementability.

5.3.3.5 Cost

The Dredge alternative in SMA-3 has the highest estimated cost ($800,000/acre) and the lowest rank, scoring 2. The Cap alternative is estimated to cost $60,000/acre and has been assigned a score of 5. The EMNR alternative is estimated to cost $40,000/acre and has been given a score of 5 for cost. MNR is estimated to cost $5,000/acre in the Central Bay and has been assigned a score of 5.

5.3.3.6 Community Concerns

The Central Bay is a much larger area than those at the mill site, and contains thriving geoduck beds that serve as a recruitment area for the commercial beds to the north. This SMA is also in the center of the Bay and both dredging and capping actions will interfere with fishing over the short term. Balancing these considerations is the need to clean up an area of the Bay in which breakdown products of wood waste have settled and formed flocculant sediments that are undesirable habitat for shellfish, fish, crab, and other biota. Therefore, alternatives received a higher score that would have the potential to improve sediment conditions for biota and remediate contamination while still allowing survival of the existing benthic community and interfering with fishing activities as little as possible.

Based on these considerations, the Dredge alternative received a score of 2. This alternative would require 7 years of dredging operations in the center of the Bay, and would likely resuspend a great deal of flocculent sediments that would settle elsewhere in the Bay. In addition, dredging would destroy the existing geoduck beds and benthic community throughout this area. The Cap alternative received a score of 3. This alternative would have fewer impacts than the Dredge alternative and would require only two capping seasons to carry out. However, the full 1-foot cap envisioned under this alternative would likely kill the existing benthic community, including the geoduck bed, which would require a substantial period of time to become re-established. The EMNR alternative is similar, but uses a 6-inch layer of sediments, which would likely be enough to improve the physical and chemical conditions in sediments without completely eliminating the shellfish and benthic communities. The MNR alternative received a score of 1, because it does not result in any immediate benefit to this area and public comments were received expressing clear dissatisfaction with this approach in the Bay.

5.3.3.7 Recycling and Waste Minimization

Similar to SMA-1 and SMA-2, the Dredge alternative in SMA-3 has limited opportunity for recycling or reuse, while at the same time generating waste during excavation, and was thus scored 2 for recycling/waste minimization.

The Cap alternative and the EMNR alternative produce the least waste and have the highest potential for recycling through the beneficial reuse of maintenance dredge material in the Cap, and thus these alternatives both score 5 for this evaluation criterion.

MNR does not entail active construction. There is no opportunity for recycling or waste minimization with this alternative. MNR has been assigned a score of 1 for this criterion.

5.3.3.8 Environmental Impacts

The potential environmental impacts associated the Dredge alternative are significant. Dredging over 4 to 8 years would have substantial community impact, with noise, air and light issues affecting the Port Gamble Bay community, disruption of access to fishing and

shellfish harvesting, and significant potential air emissions associated with the marine equipment and offloading/transloading activity for the estimated 200,000+ cy of material that would not be suitable for DMMP open-water disposal. The large volume of material removed, associated water quality and dredge residuals impacts, and community impacts described above result in a score of 1 for this criterion. In addition, dredging would eliminate the benthic community and any shellfish resources in the area remediated.

The Cap alternative does not result in dredge-related impacts; however, this alternative does require placement of significant volumes of material for cap construction, with associated potential for water quality impacts. This alternative also buries the benthic community. Although most elements of the benthic community recover within 2 to 3 years, larger organisms such as geoduck may require long timeframes for recovery. Thus, this alternative has been assigned a score of 2 for environmental impacts.

The EMNR alternative requires less and thinner cap material placement than the Cap alternative and, therefore, scores comparatively higher at 3 for environmental impacts.

Because MNR does not entail construction activities, there are no environmental impacts associated with this alternative. MNR has been assigned a score of 5 for environmental impacts.

5.3.3.9 Selected Remedy

Based on this evaluation, the Cap alternative and EMNR alternative total scores rank similarly, with EMNR ranking highest of the alternatives. Thus, EMNR is the selected alternative for SMA-3. The restoration timeframe for the EMNR alternative is approximately 2 to 3 years for design, permitting, and implementation.

5.3.4 Former Lease Area (SMA-4) Detailed Evaluation

5.3.4.1 Threshold Evaluation

The Dredge, Cap, and EMNR alternatives for SMA-4 meet the SMS threshold criteria of protection of human health and the environment, and attainment of cleanup standards. Each of these alternatives has been configured to meet the required cleanup standards, and

these alternatives will meet the cleanup standard within a 10-year time frame. Finally, cleanup will be achieved in compliance with applicable laws for the Dredge, Cap, and EMNR alternatives.

The MNR alternative does not meet the threshold criteria for protection of human health and the environment or attainment of cleanup standards/compliance with laws. Bioassay results currently exceed SQS, and cPAH levels are on the order of 2 times the cleanup level. Because ongoing natural recovery has not been documented in this SMA, and sedimentation rates in the area are very low, this alternative is not expected to meet the cleanup standards within 10 years.

5.3.4.2 Short-term Effectiveness

For the Dredge alternative, short-term effectiveness was given a score of 1 for human health and 1 for environment, for an average score of 1.0. This scoring reflects the large volume of dredge material that needs to be managed in this alternative and the potential risks to human health associated with this work, as well as generated dredge residuals in a more nearshore shellfish-rich environment, which may result in a significant environmental impact in the FLA.

The Cap alternative does not require upland management of dredge material and debris, and thus represents the lowest potential risk to human health. However, there are water quality impacts associated with placing the capping material, which represents a short-term environmental risk. Thus, this alternative ranks 5 for human health and 4 for environment, for an overall average of 4.5.

The EMNR alternative entails handling the lowest volume of material, and thus has the lowest attendant risks to both human health and the environment. This alternative scored 5 for both human health and the environment, for an overall average score of 5.0.

Because MNR does not take active measures to improve human health and the environment in the short term, it was scored 1 for both of these criteria, for an overall average of 1.0 for short-term effectiveness.

5.3.4.3 Long-term Effectiveness

The long-term effectiveness of the Dredge alternative ranks high for protection of human health and the environment because source material is removed to the maximum extent practicable. The ability to dredge a site of this size has been demonstrated on other projects, and the overall duration is reasonable, making dredging rank high for certainty/reliability. Finally, due to generated dredge residuals, this alternative ranks marginally lower for residual risks. This alternative was scored 5 for human health, 5 for environment, 5 for certainty/reliability, and 4 for residual risks, for an average score of 4.8.

The Cap alternative is protective of human health because the exposure pathway to sediments is removed; a score of 5 was assigned. Because the benthic community will reside within the cap matrix, environment ranks lower compared to human health, and was scored 4. Although institutional controls are required, capping can be completed in a reasonable time frame, and thus certainty/reliability was scored 5. Similar to the Cap alternatives in the other SMAs, residual risk was also scored 3, for an overall average score of 4.3 for long-term effectiveness.

The EMNR alternative is similar to the Cap alternative and ranks 5 for protection of human health. However, the reliance on EMNR in parts of the SMA results in a lower score of 4 for environment because of the potential for benthic exposure before natural recovery processes have reduced concentrations below criteria. EMNR presumes ongoing natural recovery following placement of clean sand, and thus is less certain than capping. Thus, certainty/reliability has been scored 4. Residual risk ranks 3 because of the reliance on natural recovery processes and the fact that material is not removed under this alternative. The overall average score for long-term protectiveness is 4.0 for the EMNR alternative.

Similar to the Central Bay SMA, the FS presumes that natural recovery is occurring very slowly in SMA-4, and thus MNR has been assigned a score of 1 for protection of human health and 2 for protection of the environment. Further, MNR is scored 1 for certainty/reliability and 1 for residual risks because active measures are not taken under this alternative. The overall average score for long-term effectiveness of MNR in SMA-4 is 1.3.

5.3.4.4 Implementability

The technical feasibility of the Dredge alternative was given a score of 3 in consideration of the large volume of material handled, and the need to process debris and unsuitable dredge material in an available upland location. Materials and equipment for dredging are commonly available; however, the space required to manage 50,000 to 60,000 cy of dredge material would be significant, and thus this criterion was scored 3. Finally, as with other alternatives, dredging cleanup projects of this scale in Puget Sound typically have the support of regulatory agencies, and thus this criterion scored 5. The overall average implementability score for the Dredge alternative is 3.8.

Capping ranks higher for technical feasibility compared to dredging because there would be less need for upland sorting/processing of excavated material. Thus, the Cap alternative was scored 4 for technical feasibility. Capping equipment is commonly available, and procuring the required volume of cap material for this alternative is feasible, and thus this criterion was scored 5. Finally, there is typically regulatory and permitting support for capping performed during environmental cleanup, and this criterion was scored 5, for an overall average score of 4.8 for implementability.

The EMNR alternative has similar considerations to the Cap alternative but ranks higher for technical feasibility and availability of materials because only one-half of the cap material is required under this alternative. Thus, scores were 5, 5, and 5 for technical feasibility, availability of materials and equipment, and permitting/regulatory considerations, respectively, for an overall average score of 5.0.

MNR does not entail active construction. Implementability is related to periodic sampling during each monitoring event. Because it does not trigger any of the technical feasibility, materials availability, or permitting/regulatory issues that occur with active construction, all factors were assigned a score of 5, for an overall average score of 5.0 for implementability.

5.3.4.5 Cost

The Dredge alternative in SMA-4 has the highest estimated cost ($800,000/acre) and the lowest rank, scoring 2. The Cap alternative is estimated to cost $100,000/acre and has been assigned a score of 5. The EMNR alternative is estimated to cost $70,000/acre and has been given a score of 5 for cost. MNR is estimated to cost $10,000/acre in the FLA and has been assigned a score of 5.

5.3.4.6 Community Concerns

This SMA is also relatively small, and is located along a sloped area where neither substantial intertidal shellfish beds nor major geoduck beds are likely to be impacted by cleanup operations. It is also out of the way of most fishing activities in the Bay. Therefore, based on preferences expressed by the community, alternatives that actively remove or remediate sediments in this SMA received higher scores. The Dredge and Cap alternatives both received a score of 4, the EMNR alternative received a score of 3, and the MNR alternative received a score of 1.

5.3.4.7 Recycling and Waste Minimization

Similar to the other SMAs, the Dredge alternative in SMA-4 has limited opportunity for recycling or reuse, while at the same time generating waste during excavation, and was thus scored 2 for recycling/waste minimization.

The Cap alternative and the EMNR alternative produce the least waste and have the highest potential for recycling through the beneficial reuse of maintenance dredge material in the cap, and thus these alternatives both score 5 for this evaluation criterion.

MNR does not entail active construction. There is no opportunity for recycling or waste minimization with this alternative. MNR has been assigned a score of 1 for this criterion.

5.3.4.8 Environmental Impacts

The potential environmental impacts associated the Dredge alternative are greater than for capping alternatives. The relatively large volume of material removed and associated water quality and dredge residuals impacts result in a score of 3 for this criterion.

The Cap and EMNR alternatives do not result in dredge-related impacts; however, these alternatives do require placement of relatively large volumes of material during construction, with associated potential for water quality impacts, and thus both of these alternatives have been assigned a score of 4 for environmental impacts.

Because MNR does not entail construction activities, there are no environmental impacts associated with this alternative. MNR has been assigned a score of 5 for environmental impacts.

5.3.4.9 Selected Remedy

Based on this evaluation, the Cap alternative and EMNR alternative total scores rank similarly, with EMNR ranking highest of the alternatives. Thus, EMNR is the selected alternative for SMA-4. The restoration timeframe for the EMNR alternative is approximately 2 years for design, permitting, and implementation.

5.3.5 cPAH Background Area (SMA-5) Detailed Evaluation

5.3.5.1 Threshold Evaluation

None of the alternatives for SMA-5 meet the SMS threshold criteria of protection of human health and, therefore, none meet the requirement for attainment of cleanup standards. Consistent with SMS, because no practicable alternative exists to achieve cleanup levels, a technical practicability evaluation was performed for SMA-5. This evaluation is described below.

5.3.5.2 Technical Practicability Evaluation for Background Area (SMA-5)

The Background Area (SMA-5) is characterized by sediments and tissue cPAH concentrations that exceed human health risk criteria. The natural background sediment

and tissue cPAH concentrations also exceed MTCA risk criteria for protection of human health under the exposure scenarios modeled. However, cPAH concentrations in SMA-5 sediments exceed natural background by an order of magnitude.

Ecology selected a cleanup level for cPAHs based on the sediment background threshold value (BTV). BTVs are higher than natural background because they represent a 90 percent confidence interval on the 90th percentile background value. The cleanup level for cPAH was thus selected to be 16 μg/kg dry weight TEQ.

SMS defines the term "practicable" as "able to be completed in consideration of environmental effects, technical feasibility and cost." (WAC 173-204-200(19)). The general response actions of dredging, capping, and EMNR are technically impracticable in SMA-5. Given the scope and size of the SMA, environmental impacts from in-water construction on this scale (dredge residuals, water quality impacts during removal and material placement, impacts to shellfish beds, vessel and vehicle traffic, interference with fisheries, construction noise and light, and air emissions) would be substantial as discussed below, and uses of the Bay would be restricted for long periods of time during remedy implementation. More importantly, however, is that the best outcome that could be anticipated from an active remedy is that only about 30 percent of SMA-5 could be cleaned up to a natural background surface sediment concentration, which itself is higher than risk-based concentrations. Further, upon completion of a dredge, cap, or EMNR action in SMA-5, it is not clear that changes in tissue concentrations would be observable, and they would likely be very small compared to the overall risk.

The following details describe the environmental and community impacts that render dredging, capping, and EMNR impracticable for SMA-5.

5.3.5.3 Dredging Resuspension and Residuals Impacts

As previously discussed, dredging resuspension and residuals releases have been well-documented and would be expected to result in significant impacts to Port Gamble Bay if a dredging remedy were to be implemented in SMA-5. Based on bottom conditions in the

Bay, residuals loss on the order of 2 to 5 percent of the contaminant mass dredged would be expected (Bridges et. al. 2008 and 2012).

5.3.5.4 Capping and EMNR Turbidity Impacts

As has been well-documented on other sediment remediation projects, placement of silt, sand, and gravel under water results in a turbidity plume, even for materials with very low fines content. The magnitude of the turbidity plume is a function of the percent fines, the volume of material placed, and the settling velocity of the cap material. The spread of the plume will vary depending on the settling velocity of the material, as well as prevailing currents and wind during cap/EMNR placement. Because of the number of variables involved, predicting the spread of a turbidity plume during cap/EMNR requires a complicated modeling process.

Widespread turbidity can cause a variety of environmental impacts, including a reduction in light penetration (and reduced photosynthesis), and impacts to adult fish, as well as affecting normal development of bivalve eggs and larva. Although not directly quantifiable, these impacts could potentially be significant, and span a long duration for a capping or EMNR remedial action in SMA-5, which would require placement on the order of 250,000 to 500,000 tons of cap/cover material over a period of 1 to 3 years.

5.3.5.5 Community Impacts

Under any construction scenario for SMA-5, community impacts from noise, light, air emissions, and truck traffic would be significant. Offsite transport and disposal of the 500,000 to 700,000 cy of dredge material would require 50,000 to 70,000 dump truck trips through the Port Gamble community, or wherever else an offloading site would be located. Import of 250,000 to 500,000 tons of cover or cap material from a beneficial reuse source would entail at a minimum 100 large barge trips into the Bay, but more likely on the order of 200 to 500 barge trips based on typical equipment available for a project of this nature, which would inhibit the use of the Bay for fishing and/or shellfish harvesting for anywhere from 1 to 3 years during the construction season. Where an upland quarry is required for cap/cover material, 20,000 to 40,000 truck trips would be needed to deliver the material.

Besides the direct community impacts during construction, related indirect impacts such as infrastructure wear and tear (e.g. pavement damage) would require additional mitigation upon completion of the SMA-5 remedial action.

5.3.5.6 Technical Practicability Conclusions

Based on the environmental and community impacts, logistical considerations, and overall feasibility of conducting a large scale remedy in the Port Gamble Bay community, dredging, capping, and EMNR remedies are technically impracticable in SMA-5. Environmental impacts from dredging resuspension/residuals and turbidity from capping and EMNR would be significant. Community impacts such as air emissions, noise, light, and general community disruption would also be substantial.

As with active remedial measures, natural recovery processes are expected to result in a reduction in Site-wide cPAH concentrations over time, particularly after cPAH sources such as creosoted piles are removed during the remedial action. Recovery of SMA-5 will be monitored over time under the MNR alternative.

6 IMPLEMENTATION OF THE CLEANUP ACTION

Remedial design will begin with development of a Remedial Design and Adaptive Management Work Plan, a Cultural Resources Assessment Plan (Appendix B), and concept-level engineering designs (generally 30 percent design) sufficient to complete a Joint Aquatic Resources Permit Application (JARPA). Permitting and engineering design schedules accommodate initiation of remedial actions in summer 2015.

Appropriate sequencing of remedial actions and adaptive management are important elements of the selected remedy for Port Gamble Bay. As discussed in Section 4, the selected actions are interdependent and will be sequenced to maximize overall protectiveness, as well as short term effectiveness. Sequencing considerations include beginning with source control, followed closely in time by intertidal excavation, subtidal dredging, and backfilling. Capping and EMNR will be sequenced to occur after removal actions are completed to maximize control of dredging residuals and to accelerate natural recovery processes, with the goal of reducing the overall restoration time frame to the extent practicable and maximizing short term effectiveness.

The selected remedy assumes that, where practicable, cap, cover, and residuals management materials may largely be obtained from a beneficial reuse maintenance event when clean sediment with the appropriate grain size is available. Based on history, large volumes of this type of material are only periodically dredged in Puget Sound. Alternatively, smaller volumes from local maintenance dredge projects (marinas, etc.) may be available in any given year. PR/OPG will be required to seek alternate sources if obtaining dredged materials will prevent the cleanup from concluding in a reasonable timeframe, which will be defined during remedial design.

There are considerable advantages associated with sequencing the implementation of the sediment cleanup remedy, allowing for an adaptive management strategy to be used during the cleanup process. Because implementation is expected to occur within an approximate 3-year period, the opportunity exists to collect interim data to gauge the rate and success of natural recovery processes. At the same time, it is desirable to use suitable clean material as

it becomes available (whether small or large volumes) to avoid missing opportunities. Appropriate sequencing can be accomplished in several ways:

1. Discrete capping, EMNR, and/or residual management areas can be selected for completion in any given year, and all of the available beneficial reuse material generated during that year would be dedicated to one or more SMAs. The advantage of this approach is that an SMA could be considered effectively "finished" and long-term monitoring of that SMA could be initiated. The disadvantage of this approach is that other SMAs that cannot be completed in a given year would remain unaddressed until a future construction season.
2. Wide areas could be addressed, with a thinner placement of material in a series of lifts that are completed as material comes available. This approach would allow interim monitoring to occur to gauge the effectiveness of the remedy as it is implemented. It could be determined that the initial thinner lifts (similar to EMNR) within a capping area have sufficiently addressed benthic and human health risk, and the adaptive management approach could ultimately result in a different final remedy for that area. This approach would also cover a wider area with the available material, at least partially addressing exposure over a greater footprint. Finally, this approach would cause less benthic disturbance and short-term environmental impact, as the benthic community is less likely to be damaged with thinner lifts of material, which would allow the community time to adapt before the next placement of material. The disadvantage of this approach is that larger areas of Port Gamble Bay would remain "unfinished" until adaptive management endpoints are met and/or full placement of the design thickness of material is achieved.

The Remedial Design and Adaptive Management Work Plan will describe in detail the phasing of implementation of the sediment cleanup remedy, including the adaptive management strategy to be used during implementation of the sediment cleanup remedy.

Appendix A contains an outline of the required schedule for completing remedial design and implementation activities.

Appendix B is the existing Cultural Resources Assessment Plan which provides an overview of cultural resources assessment and consultation activities that will inform the design and

permitting of the cleanup and restoration actions, along with development of study plans and inadvertent discovery provisions during implementation of the actions, consistent with state and federal requirements.

Consistent with Chapter 70.105D RCW, as implemented by Chapter 173-340 WAC (MTCA Cleanup Regulation), Ecology has determined that the selected sediment cleanup action described in Section 4 of this CAP is protective of human health and the environment, will attain federal and state requirements that are applicable or relevant and appropriate, complies with cleanup standards, and provides for compliance monitoring. The selected cleanup action satisfies the preference expressed in WAC 173-340-360 for the use of permanent solutions to the maximum extent practicable, and provides for a reasonable restoration timeframe.

7 COMPLIANCE MONITORING

Compliance monitoring and contingency responses (as needed) will be implemented in accordance with WAC 173-340-410, Compliance Monitoring Requirements. OPG/PR will comply with detailed requirements in the Construction Quality Assurance Plan (CQAP) and Operations, Maintenance, and Monitoring Plan (OMMP) to be prepared as a part of the remedial design. The objective of these plans is to confirm that cleanup standards have been achieved, and also to confirm the long-term effectiveness of cleanup actions in Port Gamble Bay. The plans will contain discussions on duration and frequency of monitoring, the trigger for contingency response actions, and the rationale for terminating monitoring. The three types of compliance monitoring to be conducted include:

- **Protection Monitoring** to confirm that human health and the environment are adequately protected during the construction period of the cleanup action
- **Performance Monitoring** to confirm that the cleanup action has attained cleanup standards and other performance standards
- **Confirmation Monitoring** to confirm the long-term effectiveness of the cleanup action once performance standards have been attained

Cleanup levels and associated points of compliance for the cleanup action are described above in Section 3.

7.1 Monitoring Objectives and Rationale

Monitoring to determine whether cleanup standards have been achieved during and after the cleanup action is required. OPG/PR will undertake three broad categories of compliance monitoring at the Site as follows:

- **Water Quality (Protection and Confirmation Monitoring)** – During the cleanup action, construction controls and protection monitoring will be implemented as practicable to ensure surface water quality protection within Port Gamble Bay. Detailed monitoring and contingency response requirements will be described in the CQAP and OMMP to be prepared as a part of remedial design as approved by Ecology.

- **Physical Limits and Integrity (Performance and Confirmation Monitoring)** – As discussed in Section 4.7, bathymetric performance monitoring will be conducted during the cleanup action to guide the limits of construction activities. Following completion of construction, physical confirmation monitoring of sediment cap surfaces will be performed to verify that caps are not substantially eroded over time by natural and/or anthropogenic forces. During these confirmation monitoring events, sediment cap thickness will be assessed and compared with the minimum required thickness determined during remedial design to ensure integrity of the caps to protect human health and the environment (Palermo et al. 1998). Again, detailed monitoring and contingency response requirements will be described in the CQAP and OMMP to be prepared as a part of remedial design.
- **Sediment Quality (Performance and Confirmation Monitoring)** – As discussed in Section 4.7, once required excavation or dredging elevations have been verified, performance monitoring will involve collecting representative composite sediment samples from the base of excavations to certify that cleanup and remediation levels have been achieved and to document concentrations of contaminants remaining on site. The certification sample composites will be comprised of a minimum of 5 multi-increment subsamples to address small-scale heterogeneity in sediment chemical concentrations resulting from environmental sampling and analysis (e.g., see EPA 2011). The size of the compositing areas at the base of the excavations will be defined in the CQAP (prepared during remedial design), and are anticipated to represent approximately 2 to 3 days of removal construction work (e.g., corresponding to roughly 50 to 100 lineal feet of shoreline in the intertidal excavation areas). If certification samples exceed remediation levels at the base of excavation areas, analysis of the data will be performed to assess the extent and degree of exceedance. Following Ecology approval, response actions will be implemented as appropriate, including but not limited to:
  - No further action (i.e., cleanup determined to be successful within a given certification area)
  - Additional wood waste and/or chemical sampling to further characterize residual contamination within and/or adjacent to the excavation and dredge areas
  - Placement of a clean sand cover as necessary to address identified sediment residuals

  - Placement of a confining cap layer or backfill to achieve isolation of underlying contaminants
  - Supplemental excavation or dredging to remove contaminated sediments or wood waste or miscellaneous debris, followed by additional post-construction performance sampling, as appropriate

- Following completion of construction, confirmation monitoring of surface sediments within the cap areas will be conducted. Chemical monitoring will be performed to verify that these areas achieve and maintain site-specific cleanup levels (Table 3-1). Again, detailed monitoring and contingency response requirements will be described in the CQAP and OMMP to be prepared as a part of remedial design.

8 FIVE-YEAR REVIEW

Because the cleanup action described in Section 4 will result in hazardous substances remaining in Port Gamble Bay at concentrations exceeding cleanup levels (e.g., beneath caps and in other areas), Ecology will review the selected cleanup action described in this CAP at least every 5 years to ensure protection of human health and the environment. Consistent with the requirements of WAC 173-340-420, the 5-year review shall include but is not limited to the following:

- A review of available monitoring data to verify the effectiveness of completed cleanup actions, including engineered caps, in limiting exposure to hazardous substances remaining in Port Gamble Bay
- A review of monitoring data for enhanced monitored natural recovery areas and monitored natural recovery areas, to confirm effective recovery of these areas
- A review of new scientific information for individual hazardous substances or mixtures present in Port Gamble Bay
- A review of new applicable state and federal laws for hazardous substances present in Port Gamble Bay
- A review of current and projected future land and resource uses in Port Gamble Bay
- A review of the availability and practicability of more permanent remedies
- A review of the availability of improved analytical techniques to evaluate compliance with cleanup levels

Ecology will publish a notice of all periodic reviews in the site register and will provide an opportunity for review and comment by the potentially liable persons and the public. If Ecology determines that substantial changes in the cleanup action are necessary to protect human health and the environment at the site, a revised CAP will be prepared and provided for public review and comment in accordance with WAC 173-340-380 and 173-340-600.

9 REFERENCES

Anchor and EPI (Environmental Partners, Inc.), 2008. Final Remedial Investigation/Feasibility Study Work Plan and Sampling and Analysis Plan. Former Pope & Talbot Inc. Sawmill Site, Port Gamble, Washington. Prepared for Pope Resources LP, Olympic Property Group L.L.C., and the Washington State Department of Ecology. October 2008.

Bridges, T., S. Ells, D. Hayes, D. Mount, S. Nadeau, M. Palermo, C. Patmont, and P. Schroeder, 2008. U.S. Army Engineer Research and Development Center. 2008. The four Rs of environmental dredging: Resuspension, release, residual, and risk. U.S. Army Engineer Research and Development Center, Vicksburg, MS. ERDC/EL TR-08-4. January 2008.

Bridges, et al., 2010. Dredging Processes and Remedy Effectiveness: Relationship to the 4 Rs of Environmental Dredging. Todd S Bridges, Karl E Gustavson, Paul Schroeder, Stephen J Ells, Donald Hayes, Steven C Nadeau, Michael R Palermo, and Clay Patmont. February 10, 2010.

Carpenter, R., M.L. Peterson and J.T. Bennett, 1985. ^{210}Pb derived sediment accumulation and mixing rates for the greater Puget Sound region. *Marine Geology* 64:291-312.

DMMP (Dredged Material Management Program), 2009. Determination on the Suitability of Proposed Dredged Material Tested for the Former Scott Mill Site, Anacortes, Washington. Project NWS-2009-203 Evaluated Under Section 404 of the Clean Water Act for Open-Water Disposal at the Port Gardner Non-Dispersive Site. June 2009.

DNR (Washington Department of Natural Resources), 2011. Puget Sound Initiative – Derelict Creosote Piling Removal, Best Management Practices for Pile Removal and Disposal. Appendix to WDFW (2011) HPA 125073-1 (see below). Updated August 26, 2011.

Ecology, 2012. Final Partial Remedial Investigation and Feasibility Study for Port Gamble Bay Property (a portion of the Port Gamble Bay and Mill Site). Port Gamble, Washington. December 2012.

EPA (U.S. Environmental Protection Agency), 2005. Contaminated Sediment Remediation Guidance for Hazardous Waste Sites. EPA-540-R-05-012. December 2005.

Lavelle, J.W., G.J. Massoth, and E.A. Crecelius, 1985. Sedimentation rates in Puget Sound from ^{210}Pb measurements. NOAA Technical Memorandum ERL PMEL-61. Pacific Marine Environmental Laboratory, Sequim, WA.

NWAA (Northwest Archaeological Associates Inc.), 2010. Cultural Resources Overview for the Port Gamble Bay Cleanup and Restoration Project, Kitsap County, Washington. March 1, 2010.

Palermo, M.R., R.E. Randall, R. Fredette, J. Clausner, T. Myers, M. Rollings, and G. Williams, 1998. Technical Guidance for Subaqueous Dredged Material Capping. United States Army Corps of Engineers. Waterways Experiment Station, Vicksburg, MS.

Straus, K.M., L.M. Crosson, and B. Vadopalas, 2009. Effects of Geoduck Aquaculture on the Environment: A Synthesis of Current Knowledge. Washington Sea Grant Technical Report WSG-TR 08-01. School of Aquatic and Fishery Sciences, University of Washington. October 2009.

WDFW (Washington Department of Fish and Wildlife), 2011. Hydraulic Project Approval (HPA) 125073-1: Creosote Piling and Structural Removal. December 15, 2011. http://www.google.com/url?sa=t&rct=j&q=derelict%20piling%20removal%20hpa&source=web&cd=1&cad=rja&ved=0CDAQFjAA&url=http%3A%2F%2Fwww.rco.wa.gov%2Fprism%2FProjectSnapshotAttachmentData.aspx%3Fid%3D140875&ei=YOnHUJHWH8TAigKvqoCQDw&usg=AFQjCNExd2H8s4NgcEE-mBodrCkKWi1P6Q&bvm=bv.1355272958,d.cGE.

FIGURES

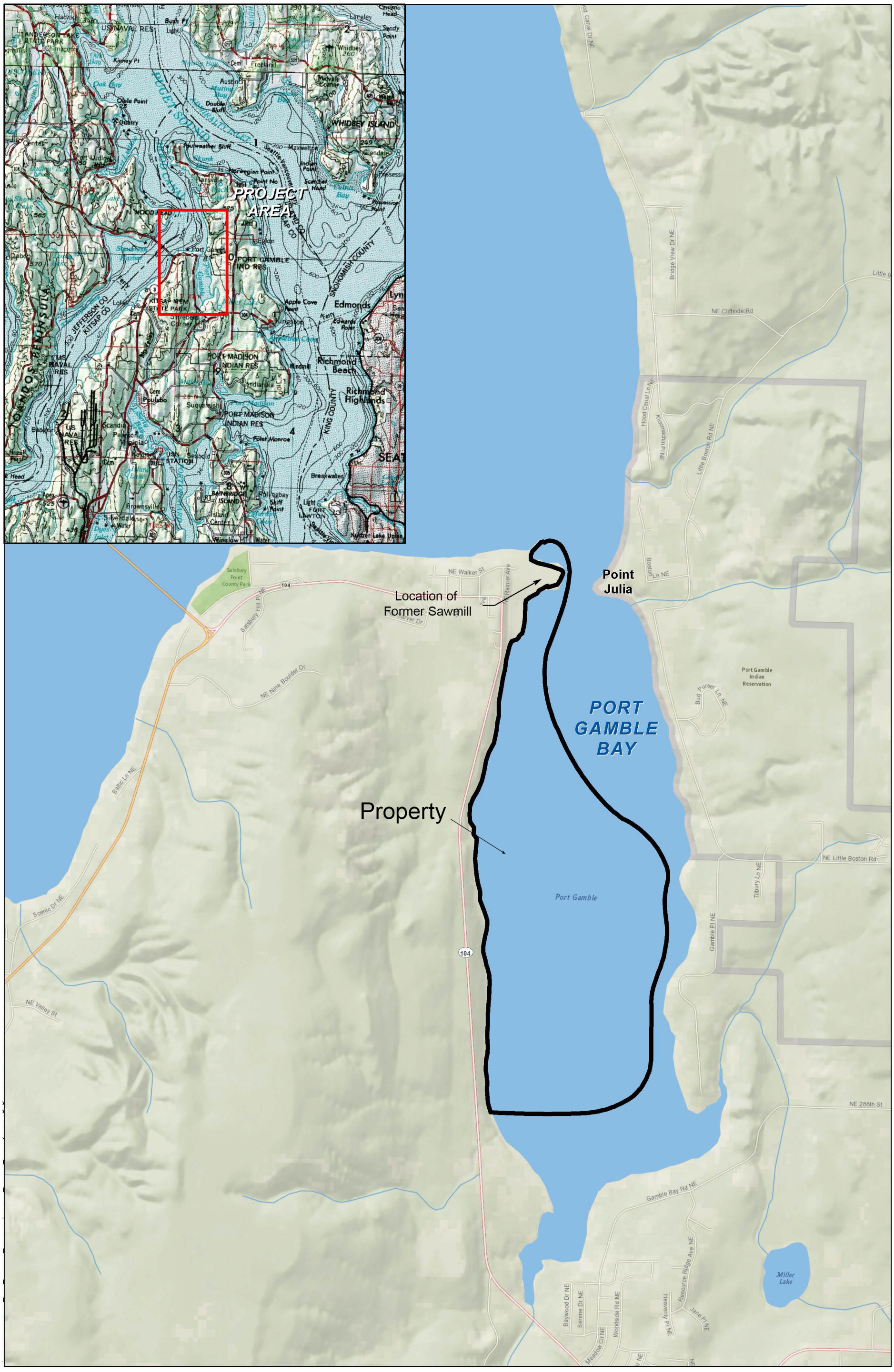


Figure 1-1
Site Vicinity Map
Port Gamble Bay and Mill Site

Mill North (SMA 1)

Location of Former Sawmill

Point Julia

Mill South (SMA 2)

PORT GAMBLE BAY

Background (SMA 5)

Central Bay (SMA 3)

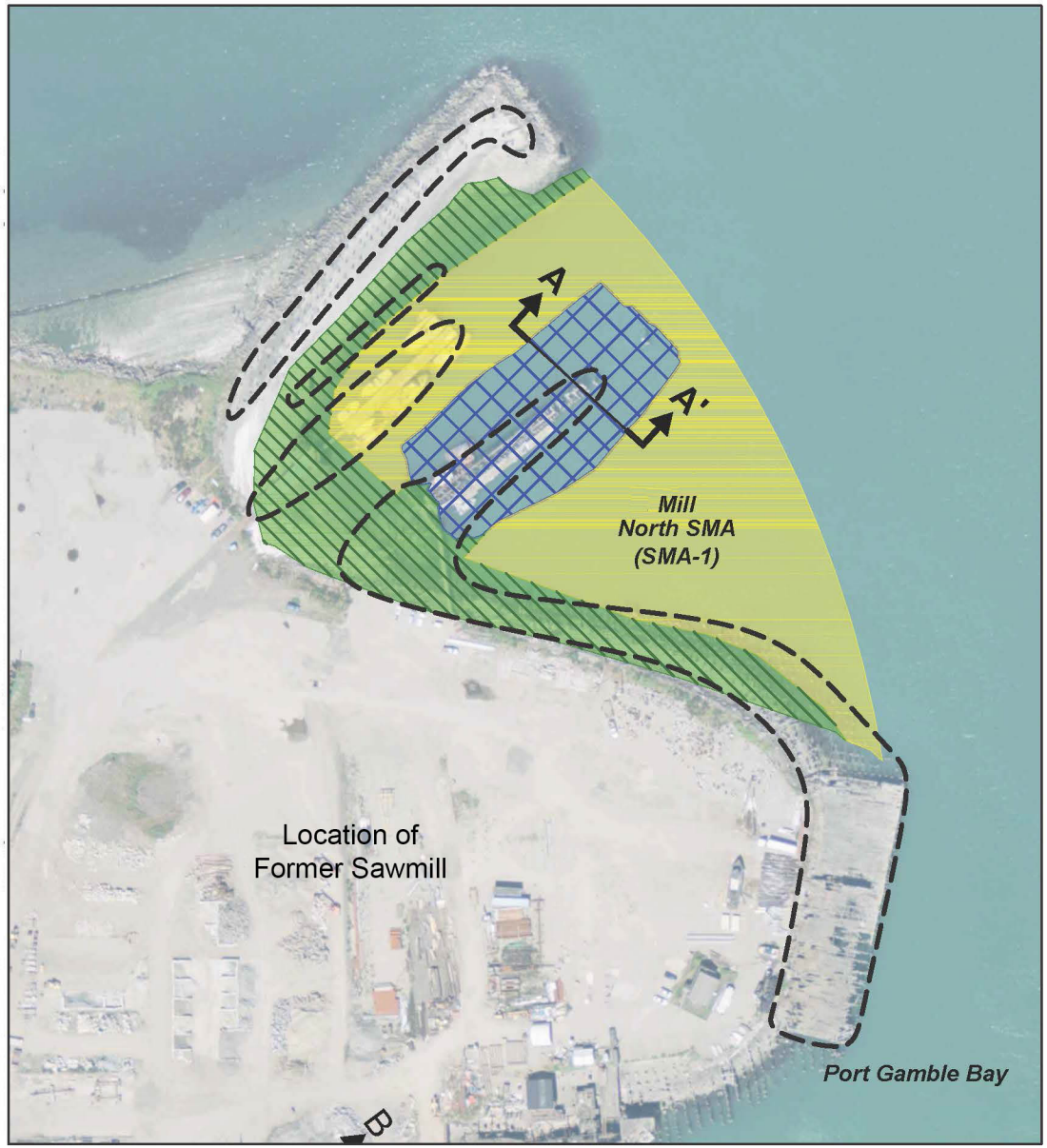
Former Lease Area (SMA 4)

Boundaries are approximate and subject to remedial design study. Uplands component of site will be determined in seperate study.

Topographic and Bathymetric Contour - 5-ft Intervals (MLLW Datum)

Feet
0 500 1,000 1,500 2,000

Figure 3-1
Property and Sediment Management Area

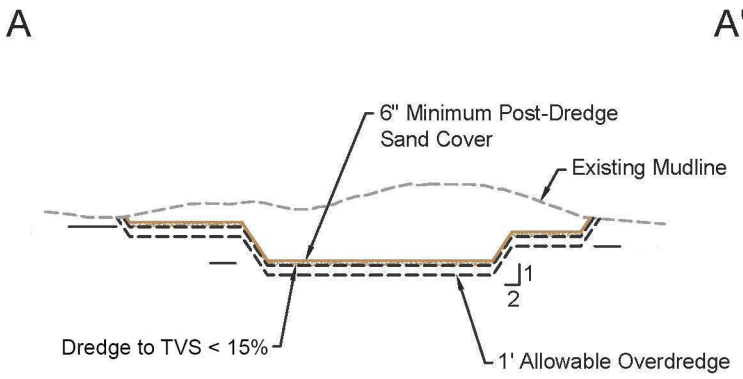


LEGEND:

- Dredge Wood Chip Deposit with Residuals Cover
- Intertidal Cap
- Intertidal Cap Excavation
- 1-ft Thick Benthic Cap
- Creosote Piling Removal Area

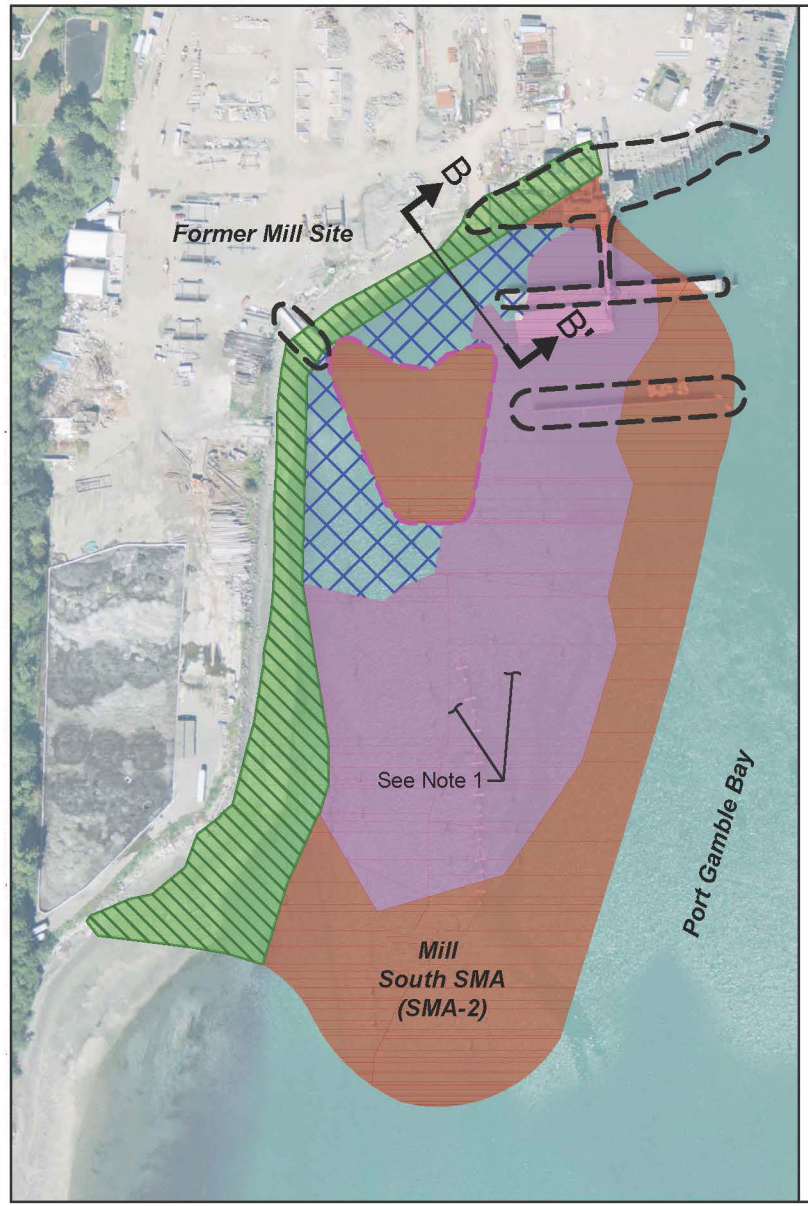
0 200
Scale in Feet

SOURCE: Aerial by USGS, High Resolution State Orthoimagery for Kitsap County, Washington, 2008
HORIZONTAL DATUM: Washington State Plane North, NAD83.



Section A-A' Schematic
Not to Scale

Figure 4-1
Mill North (SMA-1)
Port Gambe Bay and Mill Site



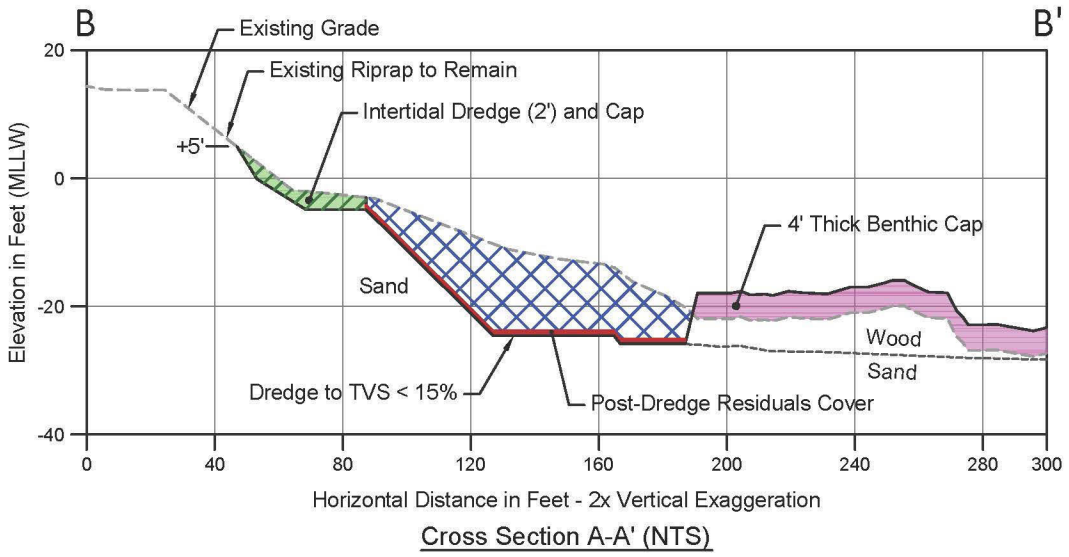
0 300
Scale in Feet

SOURCE: Aerial by USGS, High Resolution State Orthoimagery for Kitsap County, Washington, 2008
HORIZONTAL DATUM: Washington State Plane North, NAD83.

NOTE:
1. Demolition will also include pile removal elsewhere in the SMA but not specifically identified by the Demolition Area boundary.

LEGEND:

- Dredge Wood Waste > 15% TVS with Residuals Cover
- Intertidal Cap
- Intertidal Cap Excavation
- 4-ft Thick Benthic Cap
- EMNR/ Residuals Cover
- Creosote Piling Removal Area
- 2007 Dredge and Cap Area



Cross Section A-A' (NTS)

Figure 4-2
Mill South (SMA-2)
Port Gamble Bay and Mill Site

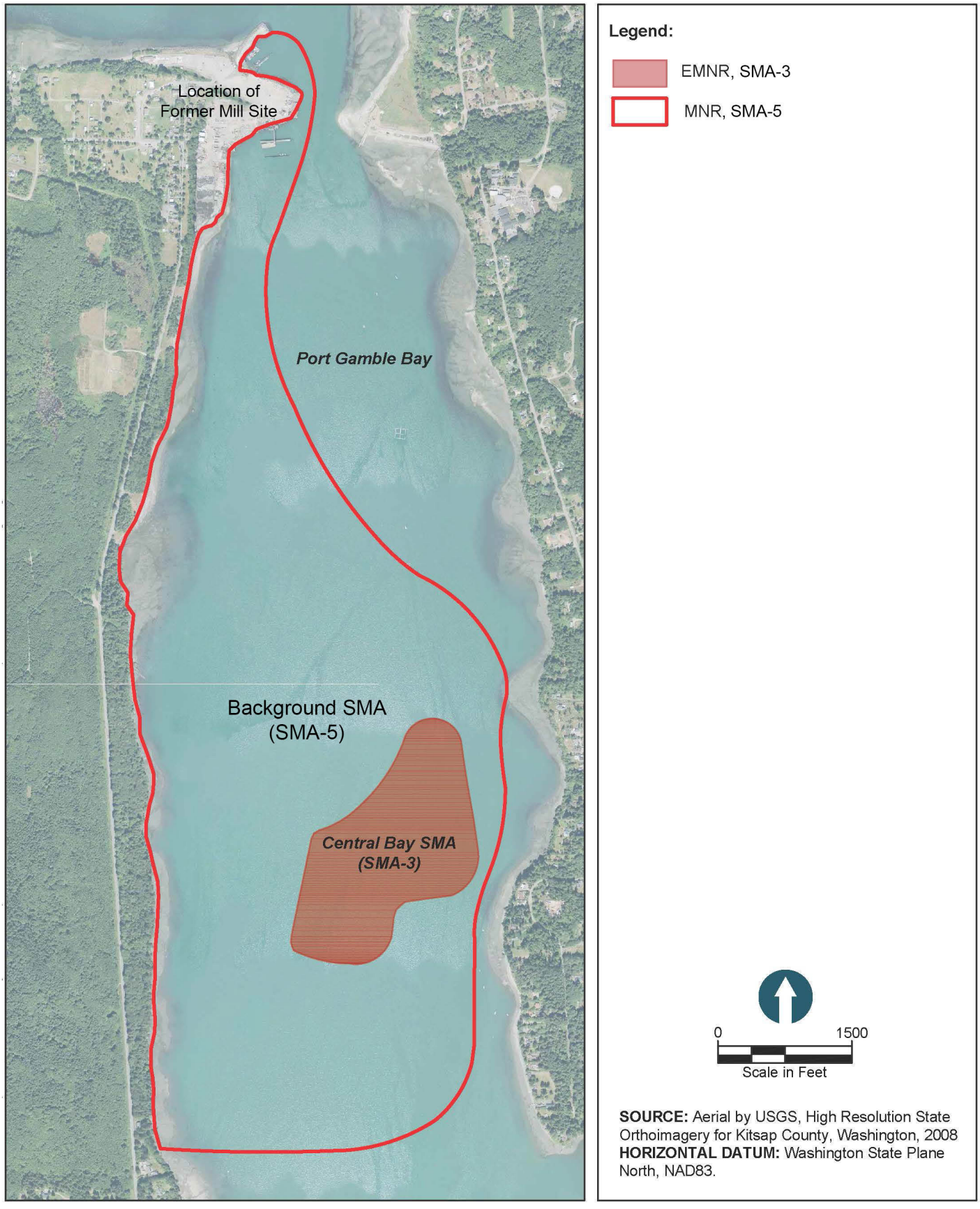


Figure 4-3
Central Bay (SMA-3)
Background (SMA-5)
Port Gamble Bay and Mill Site

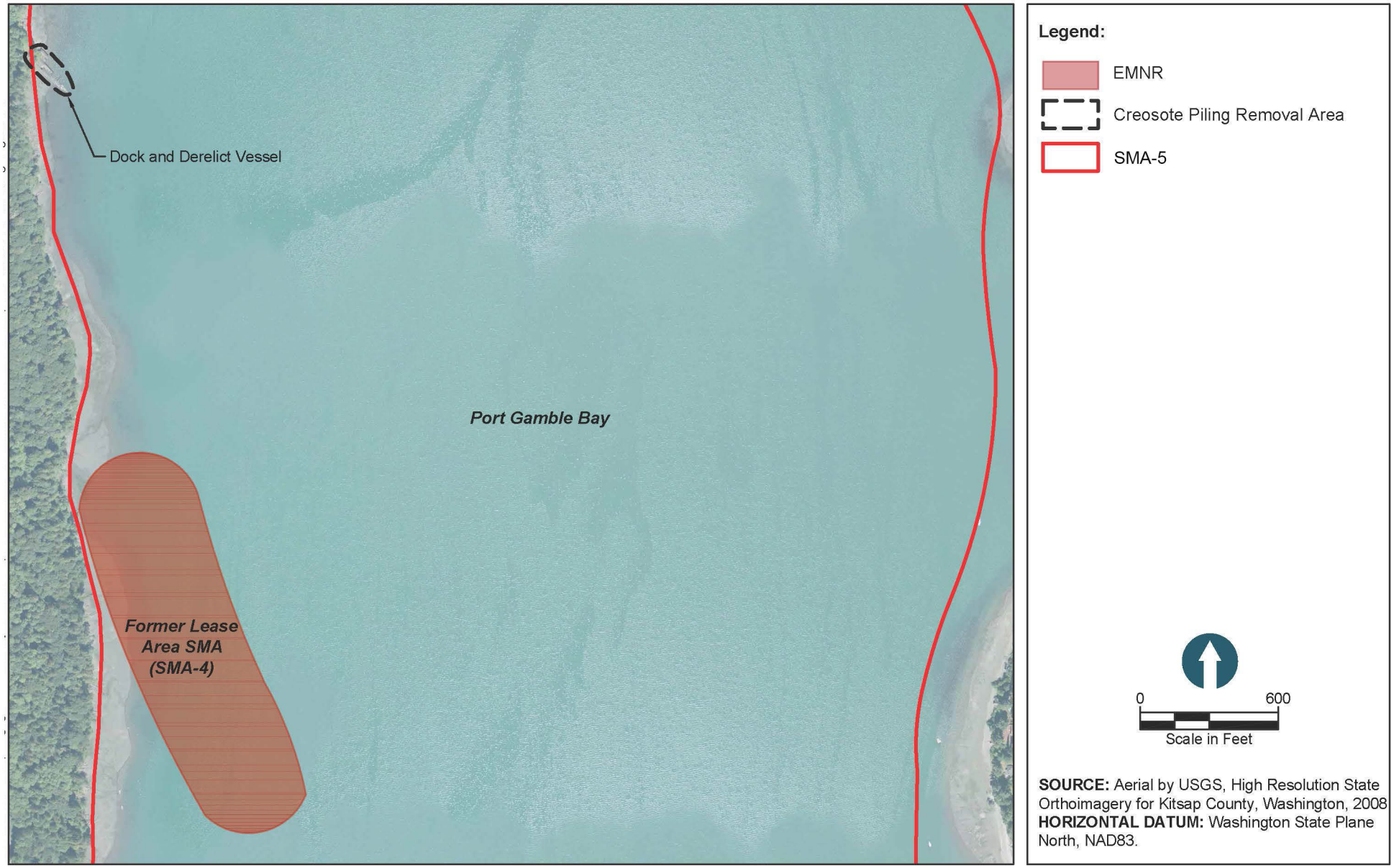


Figure 4-4
Former Lease Area (SMA-4)
Port Gamble Bay and Mill Site

APPENDIX A
SCHEDULE AND MILESTONES

Appendix A

Schedule and Milestones

Project Milestones

- **Draft & Final Remedial Design Work Plan and Adaptive Management Plan** – PR/OPG will submit draft and final Remedial Design Work Plan and Adaptive Management Plan. The draft Remedial Design Work Plan and Adaptive Management Plan will identify project milestones, work products, sampling and analyses, plans and specifications, and schedules that meet the requirements of the MTCA Cleanup Regulation, Chapter 173-340 WAC and the Sediment Management Standards, Chapter 173-204 WAC.
- **Draft and Final Plans and Specifications and Engineering Design Report** – PR/OPG will submit draft, draft final, and final Plans and Specifications and a draft and final Engineering Design Report. These will comply with the requirements of WAC 173-340-400(4)(a) and WAC 173-204. The report will provide engineering concepts and design criteria for major components of the selected cleanup action. The Plans and Specifications and Engineering Design Report will include but not be limited to the following components: dredge/excavation prisms; cap effectiveness modeling; extent/design of caps; seismic and slope stability analysis; stormwater controls; substrate specifications for habitat enhancement; modeling of natural recovery rates; and institutional controls.
- **Compliance Monitoring** – Compliance monitoring requirements will be developed during the engineering design phase and will comply with requirements of WAC 173-340-10 and WAC 173-204. PR/OPG will submit a construction quality assurance plan (CQAP) and operations, maintenance and monitoring plan (OMMP) which will satisfy the following objectives:
    - Protection Monitoring – confirm protection of human health and the environment during construction
    - Performance Monitoring – confirm cleanup attains required standards
    - Confirmation Monitoring – confirm long-term effectiveness of cleanup

  The CQAP and OMMP will include but not be limited to specific monitoring objectives, scope and frequency, duration, contingency responses and triggers for implementing them.

- **Cleanup Action Report** – PR/OPG will submit a Cleanup Action Report in accordance with WAC 173-340-400 (6)(b), and WAC 173-204 after completion of the construction of the cleanup. The Cleanup Action Report will be submitted with graphical representations of the work performed. The report will also provide documented evidence that institutional controls have been implemented.
- **Data Acquisition and Submittal** – All data collection and analyses shall be in accordance with requirements of WAC 173-340 and WAC 173-204 and Ecology's Data Submittal Policy 840 (http://www.ecy.wa.gov/programs/tcp/policies/pol840.pdf) which include Ecology's prior review and approval of a Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP). Laboratory data shall be included in reports and must have met the quality assurance

and quality control procedures outlined in the associated SAP and QAPP. QA'd data shall be submitted and successfully entered into Ecology's EIM data base within 90 days of receipt of the final data package from the analytical laboratory to facilitate Ecology's review of the data.

Project Permitting

- PR/OPG must obtain permits and identify substantive requirements of laws for which MTCA creates a permit exemption. Permits will be required for work performed as part of the Engineering Design Study and for construction of the cleanup. Required public review and comment on the permits and substantive conditions will be provided.

Deliverables	Date Due
Effective date of Consent Decree	Start
PR/OPG submits: • Draft Remedial Design Work Plan and Adaptive Management Plan	15 days after start
PR/OPG submits: • Final Remedial Design Work Plan and Adaptive Management Plan	60 days after PR/OPG receives Ecology's comments on Draft RDWP&AMP
PR/OPG submits: • Draft Plans and Specifications • Draft Engineering Design Report.	As set forth in the Ecology-approved Final Remedial Design Work Plan
PR/OPG submits: • Draft Final Plans and Specifications	60 days after PR/OPG receives Ecology's comments on Draft Plans and Specifications
PR/OPG submits: • Final Plans and Specifications	30 days after PR/OPG receives Ecology's comments on Draft Final Plans and Specifications
PR/OPG submits: • Final Engineering Design Report	30 days after PR/OPG receives Ecology's comments on Draft Engineering Design Report

PR/OPG submits: • Draft Operations Monitoring and Maintenance Plan • Draft Construction Quality Assurance Plan	30 days after PR/OPG submits Draft Engineering Design Report
Begin constructing cleanup action	July 1, 2015
Construction is complete	As set forth in the Ecology-approved Final Engineering Design Report
PR/OPG implements institutional controls	90 days after construction is complete
PR/OPG submits: • Draft Cleanup Action Report	120 days after construction is complete
PR/OPG submits • Progress Reports	In accordance with Consent Decree

APPENDIX B
CULTURAL RESOURCES ASSESSMENT PLAN

TABLE OF CONTENTS

1 INTRODUCTION 1
1.1 Background and Regulatory Context 1
2 ASSESSMENT AND CONSULTATION APPROACH 4
2.1 Previous Research and Consultations 4
2.2 Documents and Data Needs 5
2.3 Tribal and DAHP Engagement and Consultation 7
3 TENTATIVE SCHEDULE 8
4 REFERENCES 9

LIST OF ACRONYMS AND ABBREVIATIONS

APE	Area of Potential Effects
CFR	Code of Federal Regulations
DAHP	Washington Department of Archaeology and Historic Preservation
DNR	Washington State Department of Natural Resources
Ecology	Washington State Department of Ecology
MDNS	Mitigated Determination of Non-Significance
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
PGHD	Port Gamble Historic District
PR	Pope Resources LP
RCW	Revised Code of Washington
SEPA	Washington State Environmental Policy Act
SHPO	State Historic Preservation Officer
USACE	U.S. Army Corps of Engineers

1 INTRODUCTION

The Washington State Department of Ecology (Ecology) has worked collaboratively with OPG Properties LLC (OPG)/Pope Resources LP (PR) and the Washington Department of Natural Resources (DNR) for the past several years to effectively accomplish hazardous substance cleanup at the Port Gamble Bay and Mill Site (Site) located in Kitsap County, Washington. Ecology is now requiring PR to undertake an environmental cleanup of a portion the Site, in Port Gamble Bay. Under Ecology's Toxics Cleanup Program Puget Sound Initiative, Port Gamble Bay is one of seven bays in Puget Sound identified for focused sediment cleanup and integrated habitat restoration actions.

The purpose of this Cultural Resources Assessment Plan is to provide information regarding the process for cultural resource assessment and consultation activities associated with the cleanup. This process includes identifying cultural resources in Port Gamble Bay as depicted in the Cleanup Action Plan in Figure 1.1 (Bay), developing cultural resources work plans, and defining provisions to be incorporated into an Inadvertent Discovery Plan. This Cultural Resources Assessment Plan (Appendix B of the Cleanup Action Plan (CAP)) was prepared to accompany the Cleanup Action Plan (Exhibit A of the Consent Decree).

1.1 Background and Regulatory Context

As part of the development of the cleanup and restoration plans, a bay-wide cultural resources overview was previously developed to identify and map areas of known or possible historical, archaeological, and cultural resources within the Bay (Sharley et al. 2010). The overview—developed by a professional archaeologist for PR, DNR, and the Port Gamble S'Klallam Tribe—provided specific steps to complete identification, evaluation, and protection of cultural resources that may be affected by ground-disturbing activities. The Washington Department of Archaeology and Historic Preservation (DAHP), the Port Gamble S'Klallam Tribe, and the Suquamish Tribe each provided comments during the comment period on the Remedial Investigation/Feasibility Study documents. Future cultural resources documents developed for the cleanup will build on the overview and consider the comments received.

The Washington State Environmental Policy Act (SEPA), chapter 43.21C Revised Code of Washington (RCW), requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. The cleanup actions require analysis under SEPA and must comply with state laws related to archaeology (RCW 27.53 – Archaeological Sites and Records, and RCW 27.44 – Indian Graves and Records). SEPA requires consideration of potential impacts to cultural resources and consultation with DAHP. A SEPA Mitigated Determination of Non-Significance (MDNS) for the cleanup has been completed by Ecology and is included as Appendix C of the Cleanup Action Plan.

Some of the cleanup actions will also require permits from the U.S. Army Corps of Engineers (USACE) for those actions affecting waters of the United States. USACE must comply with Section 106 of the National Historic Preservation Act (NHPA), and its implementing regulations (36 CFR Part 800 and 33 CFR 325, Appendix C), and applicable USACE regulations and guidelines. Section 106 requires federal agencies to consider the effects of their undertakings on historic properties listed in (or eligible for listing in) the National Register of Historic Places (NRHP). Section 106 compliance includes the following steps:

- Consult with the State Historic Preservation Officer (SHPO), interested and affected tribes, other interested parties (if any), and the public. In Washington, the SHPO is the head of DAHP.
- Determine Area of Potential Effects (APE). An APE is "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties" (36 CFR 800.16(d)).
- Determine whether historic properties are present in the APE. A historic property is "any prehistoric or historic district, site, building, structure, or object…eligible for inclusion in the National Register of Historic Places" (36 CFR 800.16(l)(1)). Properties that are NRHP-eligible typically must be older than 50 years, possess historical significance, and retain integrity. Traditional cultural properties and cultural landscapes may be NRHP-eligible as sites or districts. USACE's consultation with Indian tribes is intended to ensure historic properties that may be of religious and cultural significance are identified and appropriately considered in the Section 106 review process.
- Determine whether the undertaking will adversely affect historic properties, if any are present.

- Mitigate adverse effects to historic properties, with the scope of mitigation developed with consulting parties.

The cleanup actions described in the Cleanup Action Plan) also include appropriate compliance monitoring provisions during implementation of the cleanup actions, consistent with Section 106 requirements of the NHPA and Washington State laws. Detailed compliance plans will be developed during the remedial design and permitting phase, consistent with regulatory requirements. Appropriate cultural resource work plans and an Inadvertent Discovery Plan will be included in the remedial design.

2 ASSESSMENT AND CONSULTATION APPROACH

2.1 Previous Research and Consultations

There are no recorded archaeological sites in the vicinity of the west side of the entrance to Port Gamble Bay. There are, however, two recorded sites on the east side of the entrance to Port Gamble Bay (outside the Bay). One is the former Little Boston townsite (45KP00021), a Port Gamble S'Klallam settlement occupied until the 1930s. The townsite is both an archaeological site and a Traditional Cultural Property. The other archaeological site, 45KP00023, includes both a pre-contact archaeological site and an historic-era Port Gamble S'Klallam cemetery.

The Bay is part of the Port Gamble Historic District (PGHD), which was designated a National Historic Landmark in 1966, and listed on the NRHP in 1977 (McKithan 1977). The PGHD comprises built environment resources, and does not include any archaeological sites. The sawmill was part of the PGHD at the time of nomination, but was demolished in 1995.

The Bay is near several historic resources of exceptional significance and sensitivity: the PGHD itself, a Traditional Cultural Property, a cemetery, and archaeological materials associated with the Native American communities. Several cultural resources assessments have been produced for projects around the Bay, as outlined below.

In 2001, the Washington State Department of Transportation developed a plan to rehabilitate facilities at Port Gamble to accommodate ferry traffic during the closure of the Hood Canal Bridge. Although the project was never constructed, a cultural resources survey was completed (Emerson 2001). The survey recommended that the project could avoid affecting any remaining historic structures associated with the mill. Surveys did not locate any archaeological materials, but no subsurface testing was conducted (Emerson 2001).

In 2007, Ecology, DNR, Pope & Talbot, and PR dredged approximately 17,500 cubic yards of wood waste from a 1-acre area located next to the Site. The dredge plan was designed to remove wood waste, with little to no removal of underlying native sediments. However, due to the sensitivity of the area, the dredging was monitored by archaeologists (DeJoseph and Butler 2007). No pre-contact cultural materials were observed by the monitor during the 18

days of dredging. Historic and modern cultural materials that were observed included a large cast-iron wheel, presumably a part of milling machinery, and assorted modern debris.

In 2008, Ecology contacted DAHP regarding additional removal activities. DAHP communicated to Ecology that they would require archaeological monitoring of any ground disturbance.

As discussed above, in 2010, PR retained a professional archaeologist to prepare a Cultural Resources Overview. (Sharley et al. 2010). The overview included a history of the Bay and abutting uplands developed in coordination with the Port Gamble S'Klallam Tribe, and an assessment of archaeological potential throughout the northern portion of Port Gamble Bay. The assessment concluded that archaeological potential in the immediate vicinity of the Bay is mostly low, but that further research is required. The overview, which was reviewed by DAHP, informed Ecology's development of the Cleanup Action Plan. The overview also provided specific steps to complete identification, evaluation, and protection of cultural resources that may be affected by ground-disturbing activities in the area.

2.2 Documents and Data Needs

At the start of the remedial design and permitting phase of the project, the implementing parties, in consultation with DAHP, USACE, and tribes, will further evaluate the entire area where cultural resources may be affected by cleanup actions (Study Area). These areas include locations where ground disturbance may occur, such as dredging and shoreline excavation areas, staging areas, transport routes, and mooring areas, as appropriate. The USACE will determine the APE based their permit area as defined in 33 CFR 325. More detailed cultural resource evaluations, as necessary, will be integrated with studies for engineering design as practicable.

Early during the remedial design phase, the following process will be used to facilitate early evaluation by USACE, DAHP, DNR, tribes, and others:

1. Determination of the Study Area (which may be different than the APE to be determined by the USACE), with specific description of:
   a. The location and extent of ground disturbances
   b. Any demolition or modification of existing structures

2. Assessment of whether NRHP-eligible properties exist, or are likely to exist, in the Study Area, including:
   a. Review of existing cultural resources research, geotechnical data, historical documents, and ethnographic information to identify data gaps and refine probability models
   b. Preparation of a Cultural Resources Study Plan, including archaeological fieldwork and subsurface testing as necessary and possible in marine waters and upland areas where ground and sediment disturbance is planned (for efficiency, opportunities will be identified to conduct subsurface testing in conjunction with collection of data as part of other elements of remedial design); the plan will also include consultation with Native American tribes and discussion of analysis of tribal historical and modern connections to the area
   c. Geoarchaeological and geomorphological analysis
   d. Documentation of built environment resources (e.g., piles) that will be removed
   e. Documentation of potential Traditional Cultural Properties, Cultural Landscapes, and Sacred Sites
3. Determination of whether the project will have adverse effects to NRHP-eligible properties (archaeological, built environment, and cultural), and recommendations for mitigating any adverse effects
4. Coordination with the National Park Service if effects to the Port Gamble National Historic Landmark are identified
5. Documentation of coordination and consultation activities with tribes and DAHP, as described in Section 2.3
6. Development of plans for archaeological monitoring and inadvertent discoveries during construction

Items 1 through 4 will be addressed in a Cultural Resources Survey Report for the cleanup actions, and item 5 will be addressed in an Archaeological Monitoring Plan and associated Inadvertent Discovery Plan, also for the combined project.

2.3 Tribal and DAHP Engagement and Consultation

As part of the federal permitting process, USACE will consult with DAHP, and with tribes in a government-to-government setting, under Section 106 and 36 CFR 800. To facilitate this consultation, USACE typically submits a cultural resources assessment to tribes and DAHP to review.

Although USACE cannot delegate government-to-government responsibilities to applicants, applicants can coordinate with tribes and DAHP, especially in the interest of early communication. Interested and affected tribes who have been involved in the project to date include the Port Gamble S'Klallam Tribe, Suquamish Tribe, Jamestown S'Klallam Tribe, Lower Elwha Klallam Tribe, and Skokomish Tribe. Other tribes may potentially request consultation in the future.

To facilitate early communication in the Section 106 process, Ecology, DNR, and other interested agencies will continue their existing dialogue with tribes and DAHP. The Cultural Resources Study Plan described above will be provided for early review by tribes, DAHP, and USACE. Other opportunities for early review of documents and dialogue will continue to be identified as the design and permitting efforts progress.

3 TENTATIVE SCHEDULE

Steps to completion of cultural resources work are tentatively scheduled as follows. Timeframes may vary as necessary during implementation to meet the schedule described in the Consent Decree.

Item	Timeframe*
1. Development of Study Area documentation (OPG/PR and Ecology)	Within 15 days of completion of draft Consent Decree for Bay
2. Review of Study Area by USACE, DAHP, DNR, tribes, and others	30 days completion of item 1
3. Development of Draft Cultural Resources Study Plan (OPG/PR and Ecology)	Within 30 days of the end of the Study Area review period
4. Review of Cultural Resources Study Plan by USACE, DAHP, DNR, tribes, and others (including meetings, as needed)	30 days following receipt of item 3
5. Development of Final Cultural Resources Study Plan (OPG/PR and Ecology)	10 days following review period for item 4
6. Completion of fieldwork (traditional cultural places, geoarchaeology, historic structures, and archaeology) (PR/OPG)	Within 60 days of completion of the Final Cultural Resources Study Plan
7. Development of Draft Cultural Resources Survey Report with draft APE (PR/OPG and Ecology)	Within 50 days of the completion of fieldwork
8. Review of Draft Cultural Resources Survey Report by USACE	30 days following submission of item 7
9. Development of Final Cultural Resources Survey Report (PR/OPG) for submittal to USACE	15 days following review period for item 8

* USACE's consultation and review will follow its own schedule once the final report is provided.

Other documents, such as a Section 106 Memorandum of Agreement, an Archaeological Monitoring Plan, and an Inadvertent Discovery Plan, will be developed as needed following determinations of NRHP-eligibility and project effects.

4 REFERENCES

DeJoseph, D., and J. Butler, 2007. *Report of Archaeological Monitoring for the Pope & Talbot Port Gamble Mill Site*. Remediation Project Port Gamble, Washington. On file at the Department of Archaeology and Historic Preservation, Olympia, WA.

Emerson, S., 2001. *A cultural resources survey of the Washington State Department of Transportation's proposed passenger ferry terminal sites, South Point and Port Gamble, Jefferson and Kitsap Counties, Washington*. On file at the Department of Archaeology and Historic Preservation, Olympia, WA.

McKithan, C.N., 1977. *Port Gamble Historic District*. National Register of Historic Places Nomination Form. On file at the Department of Archaeology and Historic Preservation, Olympia, WA.

Sharley, A., B. Rinck, C.M. Hodges, R. Smith, J. Shea, and C.J. Miss, 2010. *Cultural Resources Overview for the Port Gamble Bay Cleanup and Restoration Project, Kitsap County, Washington*. On file at the Department of Archaeology and Historic Preservation, Olympia, WA.

APPENDIX C

SEPA MITIGATED DETERMINATION OF NONSIGNIFICANCE

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47600 • Olympia, Washington 98504-7600
(360) 407-6000 • TDD Only (Hearing Impaired) (360) 407-6006

STATE ENVIRONMENTAL POLICY ACT
MITIGATED DETERMINATION OF NON-SIGNIFICANCE (MDNS)

PROJECT NAME: Port Gamble Bay Cleanup Project

LOCATION OF PROPOSAL: Port Gamble Bay, is located in Kitsap County east of the former Pope and Talbot mill that is situated at the eastern terminus of NE View Drive in Port Gamble, WA. The Bay encompasses more than two square miles of subtidal and shallow intertidal habitat just south of the Strait of Juan de Fuca.

PROJECT APPLICANT:

Pope Resources LP/OPG Properties, LLC
19950 7th Avenue NE, Suite 200
Poulsbo, WA 98370

DESCRIPTION OF PROPOSAL: The Washington State Department of Ecology (Ecology) and Pope Resources LP/OPG Properties, LLC (PR/OPG) have worked collaboratively for more than 10 years to accomplish hazardous substance cleanup in Port Gamble Bay. Ecology is now requiring PR/OPG to undertake further environmental cleanup of Port Gamble Bay under a Consent Decree.

Port Gamble Bay is located east of the former mill that is situated at the eastern terminus of NE View Drive in Port Gamble, WA. The "Project" is defined as the cleanup activities in the Bay that are more specifically described in the Cleanup Action Plan.

Under Ecology's Toxics Cleanup Program Puget Sound Initiative, Port Gamble Bay is one of seven bays in Puget Sound identified for focused sediment cleanup and integrated habitat restoration. The sediment cleanup action focuses on controlling exposure to hazardous substances by removing or isolating contaminants to protect human health and the environment. The outcome of the sediment cleanup action will result in a net positive effect on human health and the environment because the Bay would be improved over current conditions.

Remediation of contaminated sediments in Port Gamble Bay would be consistent with current Washington State Model Toxics Control Act (Chapter 173-340 Washington Administrative Code [WAC]) and Sediment Management Standards (Chapter 173-204 WAC) regulatory requirements. The sediment cleanup action is focused on the following:

- Reducing toxicity to sediment-dwelling organisms due to wood waste breakdown products;
- Reducing potential human health risks associated with ingestion of carcinogenic polynuclear aromatic hydrocarbons toxicity equivalent quotient (TEQ); and
- Reducing dioxin/furan TEQ and cadmium concentrations that may be present at elevated levels in shellfish.

Activities performed for the sediment cleanup action include the following elements:

- Creosote-treated piling and overwater structure removal;
- Intertidal and subtidal dredging/excavation;
- Intertidal and subtidal capping and clean silt/sand placement; and
- Enhanced monitored natural recovery (EMNR).

LEAD AGENCY: The lead agency under the State Environmental Policy Act is the Washington State Department of Ecology's Toxics Cleanup Program.

SEPA DETERMINATION: The Toxics Cleanup Program, after reviewing the completed environmental checklist and other supporting documents, has determined that the Project will not have a probable significant adverse impact on the environment. An environmental impact statement is not required under Revised Code of Washington 43.21C.030 (2)(c), provided SEPA conditions listed below are used to mitigate potential adverse impacts. Ecology will not act before November 13, 2013.

DATE ISSUED: October 9, 2013

COMMENT PERIOD: This MDNS is issued under WAC 197-11-340(2); the lead agency will not act on this proposal for 30 days from the date of issue listed above. Agencies, Tribes, and members of the public are invited to comment on the MDNS. Written comments must be postmarked no later than November 12, 2013 and should be mailed to the agency contact below:

Russ McMillan, Site Manager
Washington State Department of Ecology
Toxics Cleanup Program
300 Desmond Drive
Lacey, WA 98504-7600

Comments may also be submitted to the Department of Ecology by:

a) E-mail to: rmcm461@ecy.wa.gov;
b) Fax to (360) 407-7154; or
c) Providing spoken public testimony during the public hearing scheduled for October 29, 2013, 6 pm – 8:30 pm at the Hood Canal Vista Pavilion in Port Gamble. See Fact Sheet for more information about this hearing.

Comments will not otherwise be accepted by telephone or personal conversation.

Signed and dated this 9th day of October, 2013 by Barry Rogowski, Section Manager, SEPA Responsible Official.

SIGNED: Barry Rogowski

Barry Rogowski, Section Manager
Ecology SEPA Responsible Official

DATE: October 9, 2013

SEPA CONDITIONS

Conditions imposed pursuant to SEPA assume implementation of measures identified in the environmental checklist. The following conditions shall apply based on the specific analysis of the sediment cleanup action and will be included as commitments in design and specifications for the construction activities identified for this Project:

General Conditions:

- All permit conditions issued by regulatory agencies shall be complied with for the sediment cleanup action, including development of maintenance and monitoring plans and specific measures to protect existing natural and other resources including shellfish beds and cultural and historic resources, as required.
- Additional avoidance and minimization measures and/or mitigation requirements identified prior to and during construction shall also be met.
- A pre-application meeting for the Joint Aquatic Resource Permit Application (JARPA) shall be scheduled by PR/OPG with attendance from Ecology, regulatory agencies, and the tribes.
- A monitoring plan shall be developed to accompany the sediment cleanup action, consisting of: 1) monitoring during construction, 2) monitoring immediately following construction, and 3) long-term monitoring of chemical and biological conditions.
- During the design and permitting process, best management practices (BMPs) shall be further evaluated by the regulatory agencies and tribes. Selected BMPs determined during the design and permitting process shall be implemented during construction to protect fish and wildlife.
- In coordination with Ecology, a communication outreach plan shall be developed prior to construction that is responsive to the needs of the community. The outreach plan will include strategies and opportunities to be implemented for the Project for identifying community events, whether on land or in water, that could be affected during construction as well as avoidance and minimization measures to mitigate these potential effects. This plan will also identify a process for informing interested or affected communities and businesses about the cleanup action and to provide an avenue for communication about the action, such as by phone, texting, internet and at the location of the cleanup. To support this effort, an on-site coordinator shall be present on a routine basis during construction activities to support communication and outreach needs for north Port Gamble Bay including the Town of Port Gamble and the Port Gamble S'Klallam community.

Conditions by Environmental Element:

Earth

- Erosion could occur from the Project during and after grading and fill activities. BMPs, including preparation of a Temporary Erosion and Sedimentation Control (TESC) Plan in

- Imported fill material necessary to complete the Project shall be clean and obtained from an approved source. Material shall be characterized and tested in accordance with Ecology protocols to determine whether it is suitable for its intended use.

Plants

- No native trees or shrubs shall be removed or altered as part of this Project. Existing native vegetation on or adjacent to the cleanup areas shall be protected prior to and for the duration of construction, as needed.
- Impacts to marine vegetation shall be minimized to the extent possible, however some impacts to marine vegetation may occur as a result of dredging and capping activities. The post-Project conditions in dredge or material placement areas are anticipated to provide suitable substrates for natural marine vegetation colonization.
- PR/OPG shall advise the selected contractor(s) of where the eelgrass beds are located and that they are protected under both state and federal laws. If required by the Washington Department of Fish and Wildlife (WDFW), an eelgrass survey will be prepared prior to construction activities. If eelgrass impacts cannot be avoided to accommodate the sediment cleanup action, discussions with WDFW will occur to determine appropriate mitigation measures and requirements.

Animals

- In-water construction shall be timed to occur within approved work windows to prevent impacts to salmonids and shall not occur when juvenile and adult Chinook salmon, steelhead, or bull trout are abundant in nearshore areas. Due to fisheries protective restrictions, no in-water construction work can be performed in Port Gamble Bay during the period from January 14 through July 15 of any year unless otherwise allowed by applicable regulatory agencies. Additional in-water work restrictions may apply and shall be adhered to.
- Forage fish spawning could occur year-round in Port Gamble Bay. Migrating juvenile salmonids use the Bay during portions of the year. Discussions with WDFW indicate that in-water work can occur between July 16 and January 14. Work windows and BMPs to be implemented to protect forage fish and juvenile salmonids will be further developed in coordination with WDFW and the tribes. PR/OPG and Ecology shall work with the tribes to determine if further reductions to in-water work windows would be required to accommodate fishing and other harvesting activities (e.g., shellfish), as well as tribal events. The overall schedule for the Project shall be adjusted to accommodate any reductions in work windows required by the regulatory agencies and tribes.

Energy and Natural Resources

- Construction practices that encourage efficient energy use, such as limiting idling equipment, encouraging carpooling of construction workers, and locating staging areas near work sites shall be implemented.

coordination with Ecology and other applicable agency requirements, shall be implemented before, during and after construction activities so that any potential erosion from stockpiling and grading/filling activities would be avoided or minimized to the maximum extent practicable. Beneficial use fill areas shall be stabilized upon completion of grading (with seeding and/or other appropriate measures) to prevent potential future erosion.

Air

- Construction equipment used on the Project shall be maintained in good working order to minimize airborne emissions. BMPs (e.g., application of water as necessary) for dust control shall be employed during construction.

Water

- PR/OPG and/or their selected contractor(s) shall be responsible for the preparation of a Spill Prevention, Control, and Countermeasures (SPCC) plan to be used for the duration of the Project to safeguard against an unintentional release of fuel, lubricants, or hydraulic fluid from construction equipment.
- Construction of the Project shall comply with Ecology's water quality requirements, which will specify water quality standards that must be met during construction.
- Surface water runoff shall be managed using BMPs as appropriate, consistent with Ecology's 2012 Stormwater Management Manual for Western Washington. Conditions of the National Pollutant Discharge Elimination System (NPDES) construction stormwater general permit to be issued for the Project shall be adhered to during construction.
- Decant water from upland settling basins may be discharged back into Port Gamble Bay according to final design documents to be approved by Ecology to meet Washington State Surface Water Quality Standards (Chapter 173-201A WAC).
- Shoreline excavation and fill proposed as part of the cleanup action shall occur in the dry during low tide cycles to the extent practicable to minimize working in the water.
- The removal of all creosote-treated piles shall be consistent with conditions issued as part of other local, state and/or federal permit requirements. This action shall be sequenced with removal of existing overwater structures adjacent to the former mill and removal of the former Log Transfer Dock and pilings from staging and rafting areas throughout the Bay. BMPs identified in the statewide *Hydraulic Project Approval (HPA) - Creosote Piling and Structural Removal* (WDFW 2011) and the accompanying DNR *Puget Sound Initiative – Derelict Creosote Piling Removal, BMPs for Pile Removal and Disposal* (DNR 2011) shall be implemented. Pile removal shall occur using vibratory extraction or a direct pull method to the extent practicable. If conditions do not allow for use of one of these two methods, PR/OPG or the selected contractor will consult with Ecology prior to employing other pile removal methods. Piles shall be disposed of at an approved off-site upland disposal facility.

Environmental Health

- Hazards shall be limited to those encountered during or as a result of construction. Workers shall be properly trained for work at the Site; proper construction methods, personal protective equipment and safety equipment shall be employed.
- Environmental health hazards that could result from a spill of fuel and/or oil from operating equipment shall be addressed within the SPCC Plan and TESC Plan prepared for the Site.
- All creosote-treated wood that is removed from the Site shall be disposed of in accordance with Washington State's Dangerous Waste Regulations (WAC 173-303), including regulations pertaining to excluded categories of waste (WAC 173-303-071).
- Appropriate material generated by the Project shall be collected and screened to remove debris, and the screened material reused or disposed of in upland areas within or near the Bay as allowed following characterization and approval by Ecology. If no other on-site allowed reuse or disposal alternatives are available, the material shall be disposed at an approved off-site upland disposal facility. Dredged material that is not used for on-site reuse alternatives, and is determined to be suitable for in-water disposal, shall be disposed at a DMMP managed in-water disposal site.
- Temporary closures to shellfish harvesting beds or areas in Port Gamble Bay may be necessary during or following the cleanup action to protect human health and safety due to the presence of heavy construction equipment, in-water activity, and sediment disturbance associated with the cleanup action.

Noise

- The Project shall follow local noise control regulations during all construction activities.
- All equipment shall comply with pertinent U.S. Environmental Protection Agency equipment noise standards.

Historic and Cultural Preservation

- A cultural resources survey shall be prepared by PR/OPG in consultation with Washington State Department of Archaeology and Historic Preservation, the U.S. Army Corps of Engineers, tribes, and other parties prior to implementing the cleanup action.
- A cultural resources monitoring and management plan shall be prepared that is informed by and based on the outcome of the cultural resources survey and consultation.
- An Inadvertent Discovery Plan shall be prepared and maintained onsite and implemented if needed during all project work.
- Access shall be provided to an on-site archaeologist at appropriate times and opportunities shall be available for tribal monitors to access the Bay during construction activities. Monitors will be informed of Bay activities in an effort to maintain a safe working environment and awareness of project actions.

Transportation

- In coordination with Ecology, a transportation management plan (TMP) shall be prepared prior to construction. The TMP will contain strategies to be implemented for the Project for managing traffic during construction including, but not limited to, traffic control and notifications to property owners.