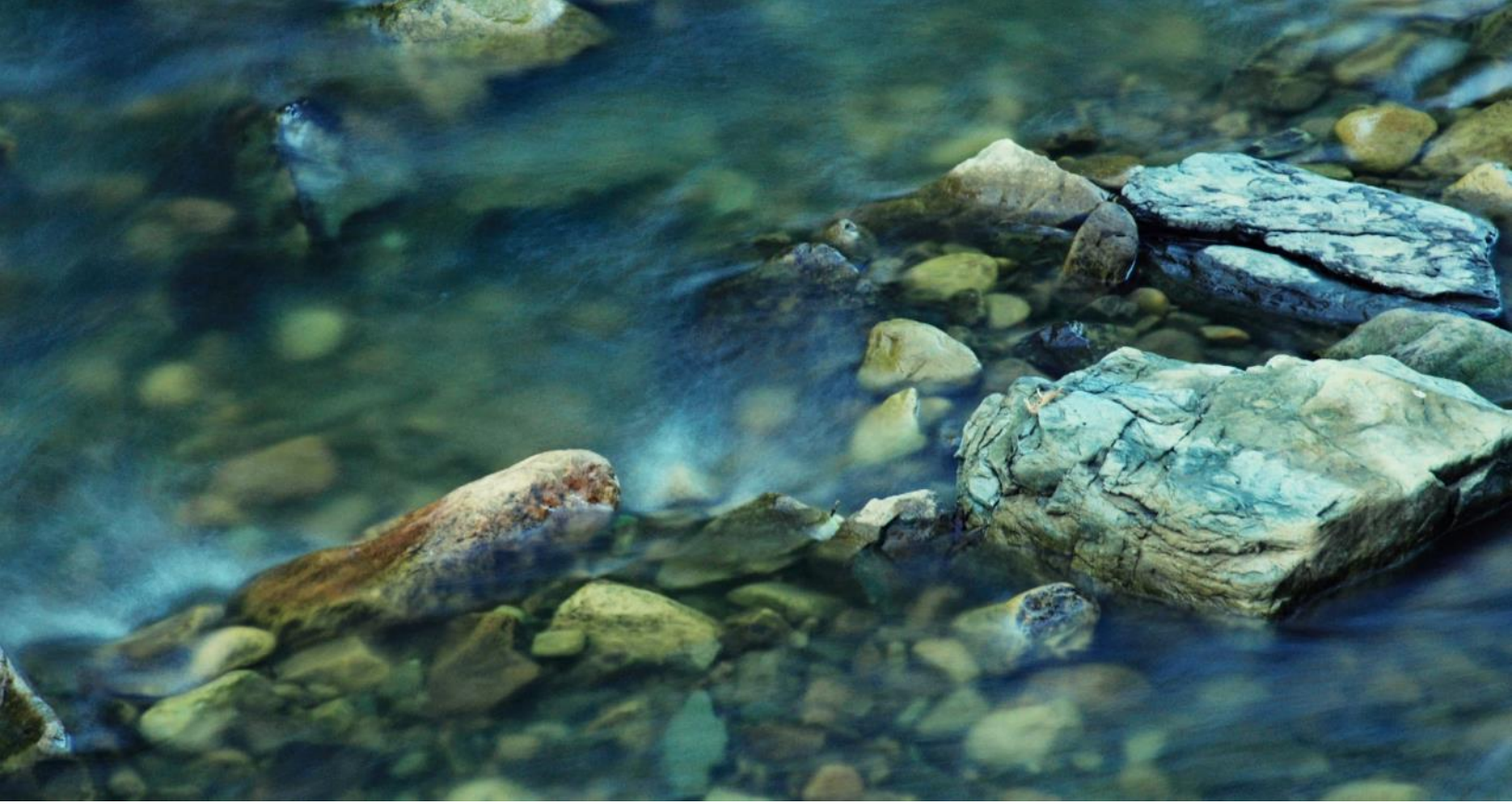

November 2017
Port Gamble Bay Cleanup Project

ANCHOR QEA

Port Gamble Season 1 and Season 2 Cleanup Action Report Summary

Prepared for Pope Resources, LP/OPG Properties, LLC

November 2017
Port Gamble Bay Cleanup Project

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Prepared for
Pope Resources, LP/OPG Properties, LLC
19950 Seventh Avenue NE, Suite 200
Poulsbo, Washington 98370

Prepared by
Anchor QEA, LLC
720 Olive Way, Suite 1900
Seattle, Washington 98101

Project Number: 160388-01.01
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ABBREVIATIONS

BMP	best management practice
CAP	Cleanup Action Plan
CAR	Cleanup Action Report
CD	Consent Decree
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CQAP	Construction Quality Assurance Plan
cy	cubic yards
DNR	Washington Department of Natural Resources
Ecology	Washington State Department of Ecology
EDR	Engineering Design Report
EMNR	enhanced monitored natural recovery
MAF	Model Airplane Field
Mill Site	sawmill facility
MNR	monitored natural recovery
MTCA	Model Toxics Control Act
OMCI	Orion Marine Contractors, Inc.
OMMP	Operations, Maintenance, and Monitoring Plan
PR/OPG	Pope Resources, LP/OPG Properties, LLC
RMC	residuals management cover
SCO	sediment cleanup objective
SMA	sediment management area
SMS	Sediment Management Standards
TEQ,	toxicity equivalency quotient
USACE	U.S. Army Corps of Engineers

1 Introduction

This report summarizes sediment cleanup actions successfully completed in Port Gamble Bay over two construction seasons between September 2015 and January 2017. Detailed descriptions of construction activities and performance standards are presented in two separate Cleanup Action Reports (CAR). Work was completed during two separate in-water construction seasons consistent with permit requirements. All sediment cleanup work was performed by Pope Resources, LP/OPG Properties, LLC (PR/OPG) or their designees, and overseen by the Washington State Department of Ecology (Ecology) under Model Toxics Control Act (MTCA) and Sediment Management Standards (SMS) requirements.

Construction and quality assurance activities performed during the first in-water construction season (Season 1) are summarized in the Ecology-approved Season 1 Cleanup Action Report (Anchor QEA 2016a). Similarly, construction and quality assurance activities performed during Season 2 are summarized in the Season 2 CAR (Anchor QEA 2017). Information regarding construction means and methods, equipment, sequencing, production rates, and quality assurance measures can be found in both Season 1 and Season 2 CARs.

Construction activities were implemented in accordance with the cleanup design approved by Ecology, and were also consistent with permit requirements. The cleanup design is detailed in the Engineering Design Report (EDR; Anchor QEA 2015), which describes the approach and criteria for the engineering design of sediment cleanup actions throughout Port Gamble Bay, as set forth in the Final Cleanup Action Plan (CAP; Ecology 2013), and in accordance with the requirements of Consent Decree (CD) 13-2-02720-0 between Ecology and PR/OPG entered in December 2013. The work was performed to achieve sediment cleanup standards for wood waste, carcinogenic polycyclic aromatic hydrocarbons (cPAH), dioxins/furans, and cadmium, as described in the CAP. The objectives of sediment cleanup actions are summarized as follows:

- Eliminate, reduce, or otherwise control, to the extent practicable, risks to benthic organisms in localized areas of Port Gamble Bay through exposure to sediments or porewater containing deleterious wood waste breakdown products that exceed SMS sediment cleanup objective (SCO) biological criteria.
- Eliminate, reduce, or otherwise control, to the extent practicable, Port Gamble Bay-wide human health risks from ingestion of seafood containing cPAHs, as measured by the toxicity equivalency quotient (TEQ), that exceed natural background concentrations.
- Eliminate, reduce, or otherwise control, to the extent practicable, human health risks in localized areas of Port Gamble Bay from ingestion of seafood containing dioxin/furan TEQ and/or cadmium concentrations that exceed natural background concentrations.

The construction activities performed to achieve these cleanup objectives are summarized in Sections 2 and 3 below. Primary construction element highlights of the cleanup project are the following:

- Creosote-treated and non-creosote treated pilings removed: 8,592 pilings
- Wood waste and sediment removed: 110,000 cubic yards (cy)
- Overwater and derelict structures removed: 56,500 square feet (approximately 1.3 acres)
- Clean capping and habitat materials placed: 220,000 tons
- Clean sand placed to accelerate natural recovery: 113,342 cy
- Length of shoreline improved: 3,485 feet
- Total aquatic area actively remediated: 106 acres

1.1 Site Location and Environmental Setting

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. Figure 1 depicts sediment management areas (SMAs) within Port Gamble Bay, as well as the cleanup site boundary defined in the CAP. The former sawmill facility (Mill Site) is located adjacent to SMA-1 and SMA-2 in the northwest portion of Port Gamble Bay in Township 27 North, Range 2 East, Section 5, at the foot of a steep bluff on a peninsula bounded by Hood Canal to the north and west (Figure 1). Prior to the cleanup project, the shoreline at the Mill Site contained aging creosote-treated-piling-supported structures and derelict pilings. Pre-project bank slopes were relatively steep and armored with large rock and concrete riprap. A more detailed discussion of the environmental setting is presented in the EDR (Anchor QEA 2015).

Under Ecology's Toxics Cleanup Program Puget Sound Initiative, Port Gamble Bay was 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 in addition to historic Port Gamble and Little Boston on opposite sides of the north end of the bay, more than 100 acres of the basin are currently in commercial land use, largely in the south end of the bay in the Gamble Creek watershed. The Port Gamble S'Klallam Tribal Reservation is located adjacent to the east side of the bay. The Port Gamble S'Klallam Tribe uses the bay for shellfish harvesting, fishing, and other resources; other tribes in the area have similar uses for the bay.

1.2 Summary of Previous Interim Actions

Between 2002 and 2005, PR/OPG excavated approximately 26,310 tons of contaminated soils from the Mill Site, and in 2003, Pope &Talbot dredged approximately 13,500 cy of sediment containing wood waste from a 1.8-acre area. Excavated upland soils and the 2003 wood waste dredge material were disposed of at approved upland facilities.

In early 2007, the Washington State Department of Natural Resources (DNR) and Ecology dredged an additional 17,500 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, Pope &Talbot took over the day-to-day management of the dredged material once it was transferred to shore and subsequently removed salt from the material, using 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 the spring of 2009, in accordance with Kitsap County Grading Permit 08-52323.

2 Site Cleanup Locations

As discussed in the CAP and EDR, additional locations in Port Gamble Bay required sediment cleanup to achieve SMS standards. The locations of the SMAs and the general construction activities performed in each area are shown in Figure 1. Figures 2 and 3 show more detailed construction activities within SMA-1 and SMA-2 respectively. Additional information regarding these areas and the summary of design basis for each area is presented in the EDR (Anchor QEA 2015).

- **North Mill (SMA-1):** An approximate 6-acre area located in the embayment north of the former Mill Site, SMA-1 contained localized deposits of subtidal wood waste (primarily wood chips) located near the former chip loading area. Construction activities performed in SMA-1 included:
  - Over-water structure demolition and large-scale removal of creosote-treated and non-creosote treated piling
  - Shoreline excavation within intertidal areas performed 'in the dry' during low tide periods
  - Engineered capping over shoreline excavated areas
  - Subtidal dredging to remove wood waste and wood waste impacted sediment followed by residuals cover sand placement
  - Subtidal thin-layer enhanced monitored natural recovery material (EMNR) sand placement
  - Subtidal capping (1.5 to 2-foot thickness)
  - Shellfish monitoring for biotoxins and chemicals of concern
  - Removal of large concrete debris from the jetty crest and placement of armor rock
- **South Mill (SMA-2):** An approximate 20-acre area located immediately south and east of (adjacent to) the former Mill Site, SMA-2 also contained localized deposits of subtidal wood waste (including sawdust, chips, and bark), particularly adjacent to the former alder mill chip loading area. Construction activities performed in SMA-2 included:
  - Over-water structure demolition and large-scale removal of creosote-treated and non-creosote treated piling
  - Shoreline excavation within intertidal areas performed 'in the dry' during low tide periods
  - Engineered capping over shoreline excavated areas
  - Subtidal dredging wood waste and wood waste impacted sediment followed by residuals cover sand placement
  - Additional excavation and dredging into shoreline and submerged slopes to remove additional wood waste in the former Pier 4 area
  - Subtidal thin-layer EMNR sand placement
  - Subtidal capping (4-foot thickness)

  - Eelgrass mitigation, habitat bench construction, and transplanting
  - Shellfish monitoring for biotoxins and chemicals of concern
- **Central Bay (SMA-3):** An approximate 61-acre area located in the south-central portion of Port Gamble Bay, SMA-3 exceeded SCO biological (i.e., bioassay toxicity) criteria, attributable at least in part to the presence of wood waste breakdown products in sediments. Construction activities performed in SMA-3 include subtidal placement of thin-layer EMNR sand material. At the time of CAP, SMA-3 was approximately 80 acres; however, subsequent bioassay sampling conducted in 2014 as part of the EDR reduced the size of SMA-3 requiring EMNR to 61 acres.
- **Former Lease Area (SMA-4):** At the time of the CAP, an approximate 20-acre area located along the western shoreline of the south-central portion of Port Gamble Bay, including portions of a former DNR lease area, exceeded SCO biological criteria, attributable at least in part to the presence of wood waste breakdown products in sediments. The sediment sampling stations that previously delineated SMA-4 were resampled in 2014 as part of the EDR and submitted for bioassay testing. Since all SMA-4 stations passed SCO biological criteria, no EMNR was required in this area (the former SMA-4 area was subsequently incorporated into SMA-5; see below).
- **cPAH Background Area (SMA-5):** An approximate 600-acre area that encompasses all other areas of Port Gamble Bay with surface sediment cPAH TEQ concentrations exceeding site-specific cleanup levels (based on natural background), SMA-5 also includes more localized areas with dioxin/furan TEQ and cadmium concentrations exceeding natural background levels. While the primary sediment cleanup remedy identified in the CAP for SMA-5 is monitored natural recovery (MNR), construction activities completed in SMA-5 included overwater structure and piling removal.

3 Construction Activities

This section provides a summary description of the activities undertaken to construct and implement the cleanup actions. Details on specific construction activities can be found in the Season 1 and Season 2 CARs and a document roadmap for each activity and each Season is shown below in Section 3.1. Construction quantities are summarized in Section 3.2. A chronology of key dates during the pre-construction phase are listed below:

- PR/OPG submitted the Final EDR and Technical Specifications to Ecology on May 22, 2015.
- Ecology issued a National Pollutant Discharge Elimination System Construction Stormwater General Permit on May 28, 2015.
- U.S. Army Corps of Engineers (USACE) approval of the Nationwide Permit 38 (NWS-2013-1270) was received on June 18, 2015.
- PR/OPG conducted a pilot pile-removal demonstration project in July 2015.
- PR/OPG received final approval from Ecology on the Technical Specifications on August 4, 2015.
- PR/OPG received final approval from DNR of the Aquatic Lands Right of Entry and Aquatic Land Sediment Remediation Easement on August 14, 2015.
- A fully executed contract between PR/OPG and Orion Marine Contractors, Inc. (OMCI) was in place on September 4, 2015.
- OMCI began to mobilize land- and water-based equipment to Port Gamble Bay and construction preparation, including stockpiling of materials, began on September 9, 2015.
- After Ecology approval of pertinent workplans, in-water construction began September 28, 2015.

3.1 Summary of Construction Activities

Construction activities are summarized by Season 1 and Season 2 in the following sections. Representative photos from before, during, and after construction are shown on Figure 4 (site aerials and SMA-2 shoreline) and Figure 5 (SMA-1 shoreline and jetty).

3.1.1 Season 1 Construction

Season 1 construction primarily occurred in SMA-2, with limited activity in SMA-1 and SMA-3. Primary Season 1 construction elements included the following:

- Upland site preparation
- Preparation of loading facilities including conveyor improvements for loading sand onto barges in SMA-1, improvements to Pier 4, and construction of the transloading facility in SMA-2
- Demolition and/or removal of creosote-treated and non-creosote treated structures and pilings

- Intertidal excavation performed 'in the dry' at low tide and follow-on shoreline capping
- Dredging and post-dredge residuals management cover (RMC) sand placement
- Sand placement in subtidal capping and EMNR areas
- Confirmation of wood waste removal, design dredge elevations, cap layer, and sand placement minimum thickness by required methods including hydrographic survey, post-dredge coring and sampling, and probing
- Demobilization

Season 1 construction activities were implemented in accordance with the cleanup design detailed in the EDR, (Anchor QEA 2015); however, due to delays in acquiring all required permits, rights of entry, and easements, as well as time necessary for equipment mobilization, material stockpiling, and work plans, in water construction began September 28, 2015, approximately 10 weeks after the USACE July 15, 2015 permit for the start of in-water work. The original permitted window to complete subtidal dredging was between November 1 and January 14. Given the start of in-water construction in September 2015 and the need to work "in the dry", intertidal excavation and capping work was completed during the nighttime lowest tides.

Construction was generally sequenced south to north across SMA-2 with structure demolition occurring in the north of SMA-2. For capping areas that were adjacent to dredging areas, cap materials were not placed until dredging was complete. For the area of the north SMA-1 dredge prism where dredging was only partially completed in Season 1, temporary RMC material was placed over the Season 1 dredging footprint immediately following Season 1 dredging. Debris present in the SMA-2 dredge prism slowed dredge production rates as the cleanup progressed to the north. Consequently, dredging and capping of wood waste in SMA-2 that had been targeted for Season 1 was started, but not completed in the initial season.

While performing subtidal dredging in SMA-2, additional wood waste material below the design elevation was encountered on the western slope of the dredge prism. In this area, sawdust-type wood waste was encountered at depths greater than the original dredge design elevation, and in some locations very close to the shoreline (generating concern about steep side slopes). Additional investigations to delineate the extent of the remaining wood waste were required between Season 1 and Season 2 and consequently the dredge prism in this area was revised in consultation with Ecology to protectively address this condition during Season 2.

3.1.1.1 Upland Site Preparation

Following mobilization to the site, OMCI began site preparation activities that included a pre-construction survey, installation of temporary erosion and sediment controls, setup of a contained creosote processing area, construction of temporary offloading bulkhead and stockpile berms, clean stockpile areas, and truck wheel wash and weigh scales.

3.1.1.2 Structure Demolition and Piling Removal

For the demolition phase of construction, existing creosote and non-creosote-treated piles, dolphins, and structures were removed from both intertidal and subtidal areas of SMA-2 and the eastern wharf. In general, intertidal pilings were removed at low tides using a land-based excavator and vibratory hammer, and subtidal pilings were removed with the water-based crane and vibratory hammer. Specific structures removed within SMA-2 are listed in Table 1. The vibratory extraction methods identified during the pilot project, as well as the equipment sizes and types selected for use by OMCI, resulted in only two piles (0.06 percent of the piles removed) breaking during piling extraction, and all piles being completely removed—a remarkable success rate for pile extractions during Season 1.

3.1.1.3 Shoreline Excavation and Capping

Intertidal excavation and capping activities began on October 6, 2105, with removal and stockpiling of large riprap from the SMA-2 intertidal shoreline. On October 26, 2015, following the removal of riprap from the shoreline, OMCI began intertidal excavation and capping in SMA-2. Intertidal areas were excavated "in the dry" using land-based excavation and dozer type equipment. To accomplish this, work shifts were scheduled during nighttime low tides. Intertidal excavation progressed from south to north within SMA-2, and the excavation was generally sequenced from higher elevations to lower elevations.

Intertidal capping was completed concurrent with excavation actions. Excavation equipment as well as excavated material was kept separate from equipment hauling or placing cap material to prevent potential cross-contamination between excavated sediments and cap materials. Stockpiles of clean cap materials and excavated intertidal material were kept separate from each other to avoid cross-contamination. At a minimum, an initial (6-inch) layer of cap material was placed over the excavated area during the same tide cycle that the excavation occurred, prior to the incoming tide. The full cap thickness was constructed generally within the same day or during the work shift immediately following completion of excavation. Intertidal excavation and capping during Season 1 was completed on December 29, 2015.

All of the required intertidal excavation and capping in SMA-2 was completed during Season 1, with the exception of a small area in the footprint of a former pier structure (Pier 4), which was completed following the removal of the structure in Season 2. Pier 4 was not removed in Season 1 because it was needed as a contingency loading/off-loading area during Season 2 (the potential use of all three loading facilities was maintained for both seasons). All excavation areas and engineered cap layers were surveyed as the work progressed to confirm that the required depth of excavation and cap layer thickness was successfully achieved.

3.1.1.4 Dredging and Post-Dredge Residual Cover Sand Placement

Subtidal dredging in SMA-2 began on November 6, 2015, started at the southernmost end of SMA-2, and was generally sequenced from south to north across the SMA. Following post-dredge verification sampling, contingency re-dredge prisms were developed with Ecology and were successfully completed on January 5, 2016. Consistent with permit requirements, much of the dredging was performed with an enclosed clamshell Young bucket, which yielded relatively slow production rates when debris was encountered. As a result of the lower production rate and the additional wood waste encountered below the design dredge elevation, dredging in SMA-2 was not completed in Season 1. Following confirmation by survey that all dredge design elevations were achieved, post-dredge core sampling was conducted to delineate remaining wood waste deposits requiring removal. Additional contingency re-dredging was subsequently performed.

An average 6-inch-thick layer of RMC was placed over dredged areas within SMA-2 as soon as practicable after successful completion of Season 1 dredging. Placement of RMC began on December 23, 2015, and continued until January 11, 2016.

3.1.1.5 Subtidal Sand Placement

Subtidal capping, EMNR material placement, and eelgrass bench material placement were performed using similar water-based equipment as used for dredging. The subtidal cap constructed in SMA-2 consisted of a 4-foot-thick placement of clean sand, and the EMNR areas consisted of an average 6-inch thickness of clean sand over subtidal sediment.

Capping was generally sequenced from south to north across the SMA and a buffer area maintained between the dredge activity and cap footprint to minimize the potential for impacts to the clean cap material resulting from materials resuspended by dredging activities and for existing eelgrass beds to remain undisturbed. Subtidal cap placement in SMA-2 began on November 12, 2015, and was successfully completed on December 22, 2015. Placement of EMNR material in SMA-2 began on November 6, 2015, and was successfully completed January 19, 2016.

Subtidal sand placement also included the construction of an eelgrass mitigation bench. Placement of eelgrass habitat bench material began on October 27, 2015. Material was placed working from the offshore portion of the bench toward shore and from south to north. The initial placement of eelgrass bench material was completed on November 4, 2015. The bench was leveled to flatten the surface and then additional sand was placed, targeting low spots throughout the area. This sand placement occurred over 3 days, with daily surveys conducted, in order to bring the entire surface to the required elevation. Eelgrass bench construction was successfully completed on January 18, 2016. Based on progress surveys and material volume/area measurements, all subtidal cap construction, EMNR material placement, and RMC material placement activities successfully conformed with the project design (e.g., placed thickness requirements).

3.1.1.6 Season 1 Demobilization

On January 20, 2016, following the closure of the in-water work window, OMCI began demobilizing equipment for Season 1. The equipment remaining on site was retained for general site maintenance required during the off-season between Season 1 and Season 2. OMCI performed housekeeping of the upland area and upland construction features were left in place for use during Season 2.

3.1.2 Season 2 Construction

Season 2 construction occurred in SMA-1, SMA-2, SMA-3, and SMA-5. Similar to Season 1, primary Season 2 construction elements included the following:

- Upland site preparation
- Demolition and/or removal of creosote-treated and non-creosote structures and pilings
- Demolition and debris removal at the former log transfer facility located in south SMA-5
- Beach debris removal over multiple events
- Intertidal excavation performed 'in the dry' at low tide and follow-on shoreline capping
- Dredging and post-dredge RMC sand placement
- Sand placement in subtidal capping and EMNR areas
- Confirmation of wood waste removal, design dredge elevations, cap layer, and sand placement minimum thickness using hydrographic surveys, post-dredge coring and sampling, and probing methods
- Demobilization
- Planting of eelgrass throughout the habitat bench constructed during Season 1

Season 2 construction activities were implemented in accordance with the cleanup design detailed in the EDR (Anchor QEA 2015); however, there were several modifications required and approved by Ecology to address additional wood waste at depth within the northern portion of SMA-2 and conditions encountered in the field during construction as detailed in the Season 2 CAR. As discussed in Section 3.1.1, additional investigations to delineate the extent of the wood waste in SMA-2 were required between Season 1 and Season 2, resulting in revisions to the SMA-2 dredge design slopes, cut elevations, slope buttressing, and capping designs, and increasing dredge quantities.

PR/OPG and Anchor QEA worked closely with Ecology to develop these design changes. Feedback from Ecology on draft submittals and design alternates was incorporated into revised designs, and frequent meetings between PR/OPG, Ecology, Anchor QEA, and OMCI were held to address these changes expeditiously to keep construction on schedule. Collaboratively, the project team arrived at final design revisions that were consistent with the performance standards identified in the EDR and met the overall objectives and original timeframe of the project.

3.1.2.1 Upland Site Preparation

OMCI maintained upland site construction support features described in Section 3.1.1.1 for Season 2 construction activities. In addition, OMCI made improvements to the sediment transload facility. The improvements included the installation of temporary mooring pilings in SMA-1 and temporary pilings and a trestle platform at the transload facility which required a modification to the NWP 38. This modification was approved by USACE on August 11, 2016.

3.1.2.2 Structure Demolition and Piling Removal

Creosote and non-creosote-treated piles, dolphins, structures, and beach debris were removed from both intertidal and subtidal areas of SMA-1, SMA-2, the former log transfer facility, the eastern wharf, and areas within SMA-5. Piling removal in these areas was performed prior to and during excavation, dredging, capping, and other construction activities. In general, intertidal pilings were removed at low tides using a land-based excavator and vibratory hammer and subtidal pilings were removed with the water-based crane and vibratory hammer. Divers were also used to locate and assist in the extraction of submerged pilings. Following the initial demolition and piling removal at the former log transfer facility, further excavation of the adjacent upland slope area was performed. This additional excavation resulted in a flatter slope and additional debris removal. Specific structures removed during Season 2 are listed in Table 1. The vibratory extraction methods identified during the pilot project, as well as the equipment sizes and types selected for use by OMCI, resulted in a 99.9 percent success rate for piling extractions during Season 2. During the subtidal dredging during Season 2, a number of pilings were encountered that were below the surface. There was some breakage of pilings when they were discovered and removed during subtidal dredging, but many of those were the oldest pilings and were not creosote treated.

3.1.2.3 Shoreline Excavation and Capping

Intertidal excavation and capping activities began in late July 2016, following the removal and stockpiling of large riprap from the SMA-1 intertidal shoreline. Intertidal areas were excavated "in the dry" using land-based excavation and dozer type equipment. To accomplish this, work shifts were scheduled during daytime low tides in late July and August 2016, and for work in proximity to the loading facilities, shifts were scheduled during nighttime low tides in late November and December 2016 (former Pier 4 area). In SMA-1, localized areas of erosion due to seeps in the shoreline bank were encountered during excavation and resulted in over steepened banks. This issue was addressed by a cap design modification and included backfilling over-steepened sections of the intertidal slope with layers of armor rock and aggregate to construct a stable slope.

Intertidal excavation progressed from south to north, and the excavation was generally sequenced from higher elevations to lower elevations. Intertidal capping was completed concurrently with the excavation as described above in Section 3.1.1.3. Intertidal excavation and capping in Season 2 was completed in early January 2017. All excavation areas and engineered cap layers were surveyed as

the work progressed to confirm that the required depth of excavation and cap layer thickness was successfully achieved.

3.1.2.4 Dredging and Post-Dredge Residual Cover Sand Placement

During Season 2, a USACE permit modification was obtained allowing subtidal work to start 2 weeks earlier. Subtidal dredging in SMA-2 began in mid-October 2016 with additional night shifts and weekend shifts. Work started at the southernmost end of the northern SMA-2 dredge prism and progressed from higher elevations to lower elevations, working from west to east across SMA-2. The initial pass of dredging in SMA-2 was completed in early November 2016. Contingency re-dredging was performed from late November through early December 2016. In addition, the former Pier 4 area required dredging below the (revised) design elevation to remove wood waste along subtidal and intertidal slopes, and removal of 7,000 cy of material was required from upland of Pier 4 to remove wood waste that extended beyond the shoreline and was 10 to 20 feet below the land surface. Following confirmation by survey that all dredge design elevations were achieved, post-dredge core and/or grab verification sampling was conducted. Additional contingency re-dredging was performed as required to meet cleanup requirements. Final verification sampling data documented that all wood waste deposits were successfully removed.

An average 6-inch-thick layer of RMC was placed over dredge areas within SMA-1 and SMA-2 as soon as practicable after final dredging. Placement of RMC occurred from mid-November through mid-December 2016 following acceptance of post-dredge surveys and confirmatory sample data.

3.1.2.5 Subtidal Sand Placement

Subtidal capping, EMNR material placement, and capping within the former Pier 4 area were performed using similar water-based equipment as used for dredging. The subtidal cap in SMA-1 consisted of a minimum 1.5-foot cap and in SMA-2 consisted of a 4-foot-thick placement of clean sand. Ecology directed the placement of EMNR material in the northernmost SMA-1 eelgrass bed area, at the tip of the jetty, as eelgrass was not present in that area at the time of construction (Figure 2). The EMNR areas in SMA-1 and SMA-2 consisted of an average 6-inch thickness of clean sand over subtidal sediment.

Capping was generally sequenced from south to north across the SMA-2, and a buffer area was maintained between the dredge activity and cap footprint to minimize the potential for impacts to the clean cap material resulting from materials resuspended by dredging activities and for existing eelgrass beds to remain undisturbed. Subtidal sand placement activities occurred over a range of dates during Season 2 as detailed in the Season 2 CAR starting in late September 2016 and ending January 2017. Based on progress surveys and material volume/area measurements, all subtidal cap construction, EMNR material placement, and RMC material placement activities successfully conformed with the project design (e.g., placed thickness requirements).

3.1.2.6 Season 2 Demobilization and Material Management

On January 16, 2017, following the closure of the in-water work window, OMCI began demobilizing equipment from the site. Upland sparging (rinsing with freshwater) and characterization of stockpiled sediments and leachate was completed in August 2017. All stockpiled sediments were removed from the Mill Site uplands and relocated to either the Model Airplane Field (MAF)[1] upland containment area or commercial landfill by September 2017.

Table 1
Summary of Construction Activities by Season 1/Season 2 and CAR Document Roadmap

Construction Activity	Season 1	Season 2	Primary CAR Section(s) Reference
Upland Site Preparation and Demobilization			
Installation and Maintenance of temporary erosion and sediment controls	X	X	(Section 3) Season 1 & 2 CARs
Pre-construction surveys	X		(Section 3) Season 1 CAR
Construction of a contained creosote processing area for cutting pilings shipped off-site for disposal	X		(Section 3) Season 1 CAR
Installation of a conveyor system for loading clean capping material onto barges	X		(Section 3) Season 1 CAR
Installation of temporary moorage pilings at the conveyor for loading clean capping material onto barges		X	(Section 3) Season 2 CAR
Construction of a temporary shoreline bulkhead for off-loading dredged material barges	X		(Section 3) Season 1 CAR
Construction of a trestle platform extension and temporary pilings to improvement function of the off-loading bulkhead		X	(Section 3) Season 2 CAR
Setup of the upland stockpile areas and perforation of impervious surfaces within the stockpile areas to facilitate infiltration of stormwater and stockpile leachate	X	X	(Section 3) Season 1 & 2 CARs
Assembly and installation of on-Site truck scales	X		(Section 3) Season 1 CAR
Construction of a truck wheel wash	X		(Section 3) Season 1 CAR
Installation of marine access floats	X	X	(Section 3) Season 1 & 2 CARs
Stockpiling of clean capping materials		X	(Section 3) Season 2 CAR
Demobilization	X	X	(Section 3.8) Season 1 & 2 CARs

[1] MAF design, permitting, and construction were conducted under a separate process outside the scope of the cleanup project.

Construction Activity	Season 1	Season 2	Primary CAR Section(s) Reference
Demolition and/or removal of creosote-treated and non-creosote structures and pilings			
Pilings in SMA-1		X	(Sections 3.1, 3.1.1, 3.1.2, & 3.1.2.1) Season 2 CAR
Pilings in SMA-2	X	X	(Sections 3.1, 3.1.1, 3.1.2, & 3.1.3) Season 1 CAR (Sections 3.1, 3.1.1, 3.1.2, & 3.1.2.2) Season 2 CAR
Pilings in SMA-5		X	(Sections 3.1, 3.1.1, 3.1.2, & 3.1.2.5) Season 2 CAR
Alder Chip Pier	X		(Sections 3.1.2 & 3.1.4) Season 1 CAR
Eastern Wharf and associate pilings	X	X	(Sections 3.1.2 & 3.1.4) Season 1 CAR (Sections 3.1, 3.1.1, 3.1.2, & 3.1.2.4) Season 2 CAR
Pier 4		X	(Sections 3.1, 3.1.1, 3.1.2, & 3.1.2.7) Season 2 CAR
Pier 5	X		(Sections 3.1.2 & 3.1.4) Season 1 CAR
Log Transfer Dock		X	(Sections 3.1, 3.1.1, 3.1.2, & 3.1.2.9) Season 2 CAR
Breakwater	X		(Sections 3.1.2 & 3.1.4) Season 1 CAR
Overhead Chip Conveyor	X		(Sections 3.1.2 & 3.1.5) Season 1 CAR
Former Log Transfer Facility Demolition and Vessel Removal		X	(Sections 3.1, 3.1.1, 3.1.2, & 3.1.3) Season 2 CAR
Jetty Concrete and Piling Removal		X	(Section 3.1.6) Season 2 CAR
Eastern Wharf Concrete and Asphalt Removal		X	(Section 3.1.5) Season 2 CAR
Beach debris removal from former Landfill Area 4 (4a/4b) and Beach Area 1		X	(Sections 3.1.4 & 3.1.8) Season 2 CAR
Intertidal Excavation and Capping (in-the-dry)			
SMA-1		X	(Sections 3.3, 3.3.1, 3.3.2, & 3.3.2.1) Season 2 CAR
SMA-2	X	X	(Sections 3.3, 3.3.1 & 3.3.2) Season 1 CAR (Sections 3.3, 3.3.1, 3.3.2, & 3.3.2.2) Season 2 CAR
Subtidal Dredging & RMC Placement			
SMA-1 Dredging		X	(Sections 3.2, 3.2.1, 3.2.2, & 3.2.3) Season 2 CAR
SMA-2 Dredging	X	X	(Sections 3.2, 3.2.1, 3.2.2, & 3.2.3) Season 1 CAR (Sections 3.2, 3.2.1, 3.2.5, 3.2.6, & 3.2.7) Season 2 CAR
SMA-1 RMC Placement		X	(Sections 3.2, 3.2.1, & 3.2.4) Season 2 CAR

Construction Activity	Season 1	Season 2	Primary CAR Section(s) Reference
SMA-2 RMC Placement	X	X	(Sections 3.2, 3.2.1 & 3.2.4) Season 1 CAR (Sections 3.2, 3.2.1, & 3.2.8) Season 2 CAR
Transloading dredge sediments onto the former Pope & Talbot sawmill facility (Mill Site) and into stockpiles for subsequent sparging with fresh water	X	X	(Section 3.5) Season 1 & 2 CARs
Subtidal Capping & EMNR Placement			
SMA-1 Capping		X	(Sections 3.4, 3.4.1, & 3.4.2) Season 2 CAR
SMA-2 Capping	X	X	(Sections 3.4, 3.4.1, & 3.4.2) Season 1 CAR (Sections 3.4, 3.4.1, & 3.4.4) Season 2 CAR
Placement of backfill material to flatten subtidal slopes (SMA-1 and SMA-2)		X	(Section 3.2.9) Season 2 CAR
SMA-1 EMNR Placement		X	Section 3.4, 3.4.1, & 3.4.3) Season 2 CAR
SMA-2 EMNR Placement	X	X	(Sections 3.4, 3.4.1, & 3.4.3) Season 1 CAR (Sections 3.4, 3.4.1, & 3.4.6) Season 2 CAR
SMA-3 EMNR Placement		X	(Sections 3.4, 3.4.1, & 3.4.7) Season 2 CAR
Former Pier 4 Area Subtidal Capping and Backfill		X	(Sections 3.4, 3.4.1, & 3.4.5) Season 2 CAR
Former Pier 4 Area Intertidal Capping and Backfill		X	(Sections 3.3, 3.3.1, 3.3.2, & 3.3.2.2) Season 2 CAR
Construction eelgrass mitigation habitat bench in SMA-2	X		(Section 3.4.4) Season 1 CAR

Notes:
CAR: Cleanup Action Report
EMNR: enhanced monitored natural recovery
RMC: residuals management cove
SMA: sediment management area

3.2 Summary of Construction Quantities

Construction activities and quantities for the Cleanup Action are summarized by each SMA in Table 2. A breakdown of quantities by Season 1 and Season 2 is available in the Season 2 CAR.

Table 2
Summary of Cleanup Action Construction Quantities by Sediment Management Area

Construction Activity	Location	Description and Quantity Completed	Total Quantity
Demolition	SMA-1	5,500 sf	56,500 sf
	SMA-2	45,000 sf	
	SMA-5	6,000 sf	
Piling Removal	SMA-1	2,044	8,592 pilings
	SMA-2	5,412	
	SMA-5	1,136	
Intertidal Excavation and Capping	SMA-1	11,230 sy capping; 25,340 cy excavation	3,485 lf (26,104 sy capping; 33,840 cy excavation)
	SMA-2	14,874 sy capping; 7,900 cy excavation	
	SMA-5	600 cy excavation	
Subtidal Dredging	SMA-1	19,757 cy	77,797 cy
	SMA-2	57540 cy	
	SMA-5	500 cy	
Subtidal Capping	SMA-1	2.6 acres	7.9 acres
	SMA-2	5.3 acres	
Subtidal Cover (EMNR)	SMA-1	0.2 acres	68.3 acres
	SMA-2	6.7 acres	
	SMA-3	61.4 acres	
Beach Cleanup	SMA-5	1,400 lf	1,400 lf

Notes:
cy: cubic yards
EMNR: enhanced monitored natural recovery
lf: linear feet
sf: square feet
SMA: Sediment Management Area
sy: square yards

The final quantities for piling removal, dredging, bank excavation, and capping were significantly higher than pre-construction estimates. As a result, additional work shifts were needed to meet the original construction completion date. To ensure all in-water work could be completed during Season 2, a second weekday shift and additional weekend shifts were added as needed to maintain the overall construction schedule. Initially, 61 work shifts were planned for dredging activities (Monday through Friday from October 17, 2016 to January 14, 2017).

To complete the additional piling removal, dredging, excavation, and angular backfill placement required to meet the cleanup objectives, an additional 75 evening and weekend shifts were needed from October 17, 2016 to January 14, 2017. Table 3 summarizes the increased construction quantities.

Table 3
Summary of Increased Cleanup Action Construction Quantities

	Pilings	Subtidal dredging	Intertidal Excavation	Capping
Season One Totals	3,314	22,360 CY	19,098 CY	69,051 tons
Season Two Totals	5,278	54,937 CY	14,142 CY	155,040 tons
Totals	8,592	77,297 CY	33,240 CY	224,091 tons
Pre-construction estimate	5,500	46,800 CY	23,900 CY	*158,000 tons
Quantity Increase	**3,092 56% increase**	**30,497 CY 65 % increase**	**9,340 CY 28% increase**	***66,000 tons 42% increase**

Note:
cy: cubic yards
*Estimated tons of various capping materials (cap material was bid in SY of coverage not tons).

4 Construction Oversight, Outreach, and Monitoring

The following sections summarize the construction oversight, environmental monitoring, outreach communications to tribes and the public, performed throughout construction activities and the forthcoming long-term monitoring actions. Table 4 identifies the various outreach, coordination, and monitoring activities.

Table 4
Season 1 and 2 Outreach, Coordination, and Environmental Monitoring

- Vessel management coordination
- Water quality monitoring
- Archaeological monitoring
- Shellfish tissue monitoring
- Sediment verification sampling
- Weekly updates with Ecology
- Social media and weekly updates for the public
- Marine mammal monitoring during temporary piling installation

4.1 Construction Oversight

Construction oversight was performed by Anchor QEA to confirm that construction activities were performed in accordance with Project Technical Specifications and Drawings and to implement the Construction Quality Assurance Plan (CQAP). Construction activities were tracked to confirm progress and best management practices (BMPs) throughout construction. Anchor QEA and Ecology coordinated on appropriate modifications to project design as necessitated by field conditions to meet the overall objectives for the project. The Season 1 and Season 2 CAR documents summarize design modifications.

Construction oversight included inspection of construction activities, implementation of quality assurance measures, and environmental and archeological monitoring. Quality assurance measures included:

- Collection of post-dredge sediment samples to confirm required removal of wood waste or inform additional re-dredging as needed
- Reviewing surveys and performing thickness verification measurements to verify cap and EMNR placement thickness
- Quantity/progress tracking
- Reviewing contractor submittals

- Characterization of sediment stockpiles and leachate to determine suitability for off-site disposal

Anchor QEA's construction oversight also included identification of field conditions that warranted discussion of potential deviations from the Ecology-approved design documents, and coordinating with the design team and Ecology to obtain agreement of any necessary changes to meet the overall objectives of the project. Anchor QEA worked with OMCI to resolve construction issues and address questions and requests for information. Anchor QEA also coordinated with regulatory agencies as needed during construction. Weekly agency progress meetings were held at the town site to discuss safety, environmental concerns, work progress and schedule, vessel traffic coordination, and other project concerns, as needed. Weekly summary progress reports were prepared and submitted to Ecology (See Appendix B and E of the Season 1 CAR and Season 2 CAR, respectively). Ecology also provided oversight of the remedial activities, with regular site visits to observe the construction activities.

Anchor QEA performed environmental monitoring to confirm compliance with the approved design and permits. Environmental monitoring included the following:

- Water quality monitoring was conducted throughout in-water construction in accordance with the Water Quality Monitoring Plan included as Appendix E of the EDR.
  - During Season 1, standards for turbidity were exceeded during approximately 2 percent of the monitoring activities (i.e., at 11 stations on 7 different days); all other samples were compliant with turbidity and pH standards.
  - During Season 2, standards for turbidity were exceeded during a single monitoring event, other samples were compliant with turbidity and pH standards.
- Archaeological monitoring was conducted during construction in accordance with the Archaeological Monitoring Plan and Inadvertent Discovery Plan (Bundy 2015).
  - No significant archaeological materials were identified during Season 1 monitoring. No intact features were identified. Many historic and modern artifacts were observed, including some potentially diagnostic artifacts. One possible pre-contact artifact was observed on the active beach, outside of the work area. This artifact was collected and transferred to the Port Gamble S'Klallam Tribe by PR/OPG.
  - No significant archaeological materials were identified during Season 2 monitoring, and no intact features were identified. Many historic and modern artifacts were observed. Unlike in Season 1, very few diagnostic items were observed, and most were modern. This is probably because much of the Season 2 work was in SMA-1, which contained mostly engineered fill (unlike SMA-2, which contained some areas where domestic demolition debris had been deposited in the mid-20th century). No precontract archaeological materials were observed.

- Shellfish monitoring was performed in accordance with the *Port Gamble Bay Cleanup Project Shellfish Monitoring Plan* (Anchor QEA and Port Gamble S'Klallam Tribe 2015)
  - Biotoxin levels in shellfish tissue remained below health advisory criteria throughout in-water construction.
  - While some small localized increases in polycyclic aromatic hydrocarbon concentrations in shellfish tissue and water column passive samplers were detected, levels in shellfish tissue remained below health advisory criteria throughout in-water construction, and localized increases were less than had been anticipated pre-construction.
- Marine mammal monitoring during temporary piling installation was conducted in accordance with the Port Gamble Bay Cleanup Project Marine Mammal Monitoring Plan (Anchor QEA 2016b). No Southern Resident killer whales were observed during in-water vibratory or impact pile installation; therefore, construction did not need to be suspended to avoid incidental harassment.

4.2 Tribal and Public Outreach

PR/OPG, Ecology, and Anchor QEA performed outreach during construction to keep the public informed about the work. The various outreach efforts included the following:

- Vessel management coordination
- Weekly updates with Ecology
- Social media and weekly updates for the public including a website updated weekly during construction (http://www.portgamblebaycleanup.com) showing current and ongoing photos, a live video, project information, contact information, and including all previous weekly updates
- Personal outreach whenever PR/OPG was contacted, either by phone or email, messages that were returned personally
- Large signs with weekly updated fliers located in Port Gamble and in Little Boston; a large sign including a boaters warning was located at Salisbury Park, which is the closest boat launch
- Weekly emails to nearby residents and contact with the Port Gamble S'Klallam Tribe through their communications representative
- Two tribal open house events held in Port Gamble S'Klallam Tribal facilities prior to the start of each construction season, these events were requested by the Tribe and open to tribal members
- A Port Gamble S'Klallam Tribe and PR/OPG co-hosted Tribal blessing ceremony that was open to the public, in advance of construction
- An Anchor QEA and PR/OPG presentation at the West Sound Local Science event, which was open to the public

- PR/OPG representatives and Anchor QEA staff present on site throughout construction; the PR/OPG project manager with regular office hours nearby, in Poulsbo, and readily available to talk with people
- The PR/OPG townsite manager, on site in Port Gamble, who participated in the weekly construction meetings

4.3 Operations, Maintenance, and Monitoring

The Operations, Maintenance, and Monitoring Plan (OMMP; Appendix F of the EDR; Anchor QEA 2015) and Section 5 of the Season 2 CAR describe long-term monitoring and adaptive management of engineered caps to ensure their long-term integrity and protectiveness. These documents also describe long-term monitoring that will be performed by PR/OPG to document the anticipated recovery of sediments throughout Port Gamble Bay. Separate requirements for eelgrass monitoring are being performed by PR/OPG under USACE's Nationwide Permit 38 (NWS-2013-1270), as amended.

5 References

Anchor QEA (Anchor QEA, LLC), 2015. *Engineering Design Report – Port Gamble Bay Cleanup Project*. Prepared for Pope Resources, LP/OPG Properties, LLC. May.

Anchor QEA, 2016a. *Season 1 Cleanup Action Report*. Prepared for Pope Resources, LP/OPG Properties, LLC. December.

Anchor QEA, 2016b. Port Gamble Bay Cleanup Project Marine Mammal Monitoring Plan. Prepared for Pope Resources LP/OPG Properties, LLC. July.

Anchor QEA, 2017. *Draft Season 2 Cleanup Action Report*. Prepared for Pope Resources, LP/OPG Properties, LLC. May 2017.

Anchor QEA and Port Gamble S'Klallam Tribe, 2015. Port Gamble Bay Cleanup Project Shellfish Monitoring Plan. Prepared for Pope Resources, LP/OPG Properties, LLC. May.

Bundy, B.E., 2015. Archaeological Monitoring Plan and Inadvertent Discovery Plan. Port Gamble Bay Cleanup. Report on file at the Department of Archaeology and Historic Preservation, Olympia, Washington.

Ecology (Washington State Department of Ecology), 2013. *Final Cleanup Action Plan*. Exhibit A to the Port Gamble Bay Consent Decree No. 13-2-02720-0.

Figures

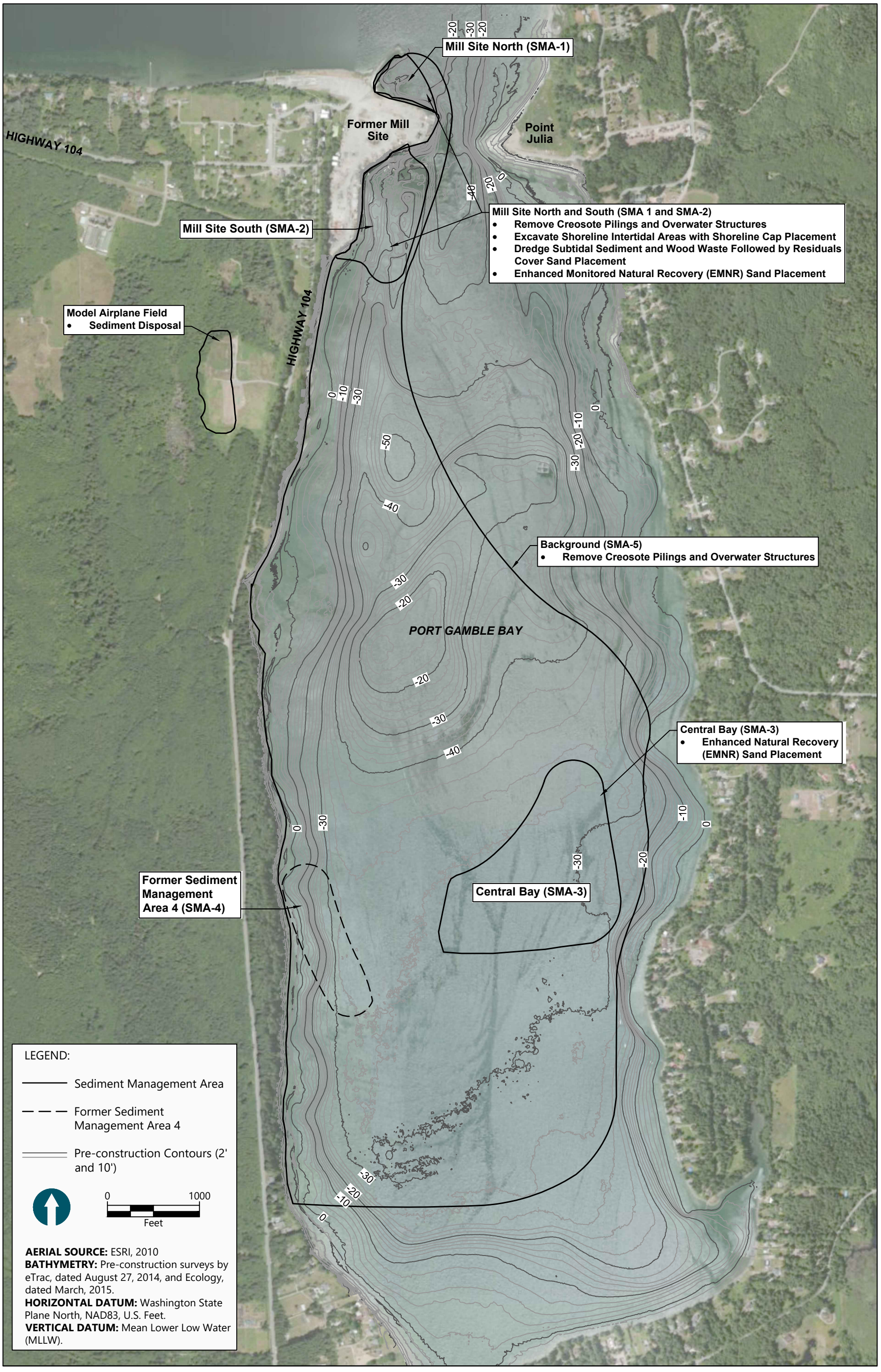

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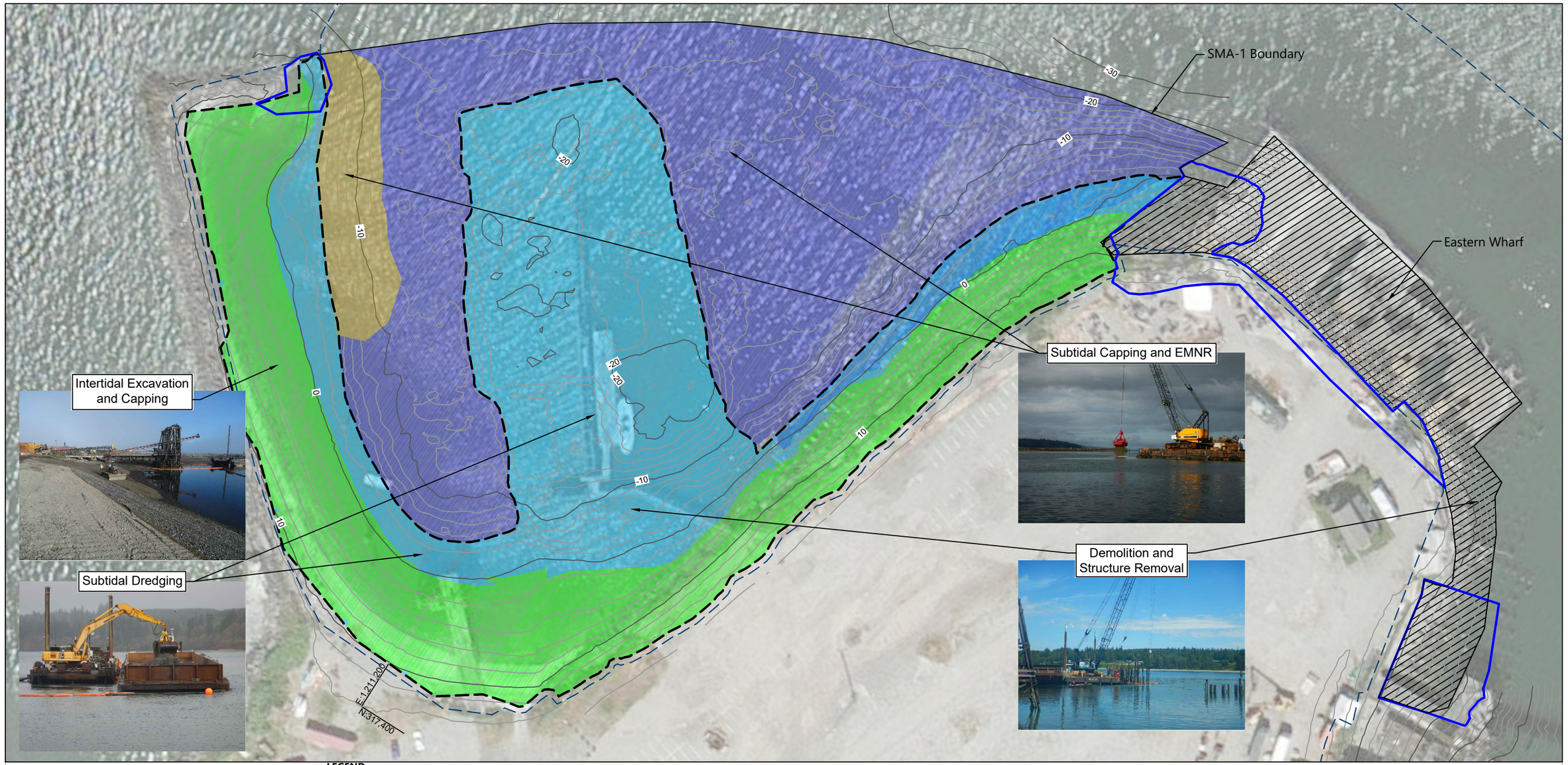
Figure 1
Sediment Management Areas

Port Gamble Season 1 and Season 2
Cleanup Action Report Summary



SOURCE: Post-construction bathymetry from eTrac, dated January 19, 2017.
HORIZONTAL DATUM: Washington State Plane North, NAD83, U.S. Feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- SMA-1 — Sediment Management Area 1
- Existing Contours (2' and 10' Interval)
- Approx. Dredge/Excavation Limits
- Armoring Area
- Creosote Piling and Structure Removal Area
- Subtidal Dredge Sediment/Wood Waste Deposit with Residuals Cover Sand Placement
- Intertidal Excavation and Cap
- Post-pile Removal Habitat Substrate Cover
- EMNR (6-in Thickness)
- Subtidal Cap Area (1.5-ft Thickness)

0 80
Feet

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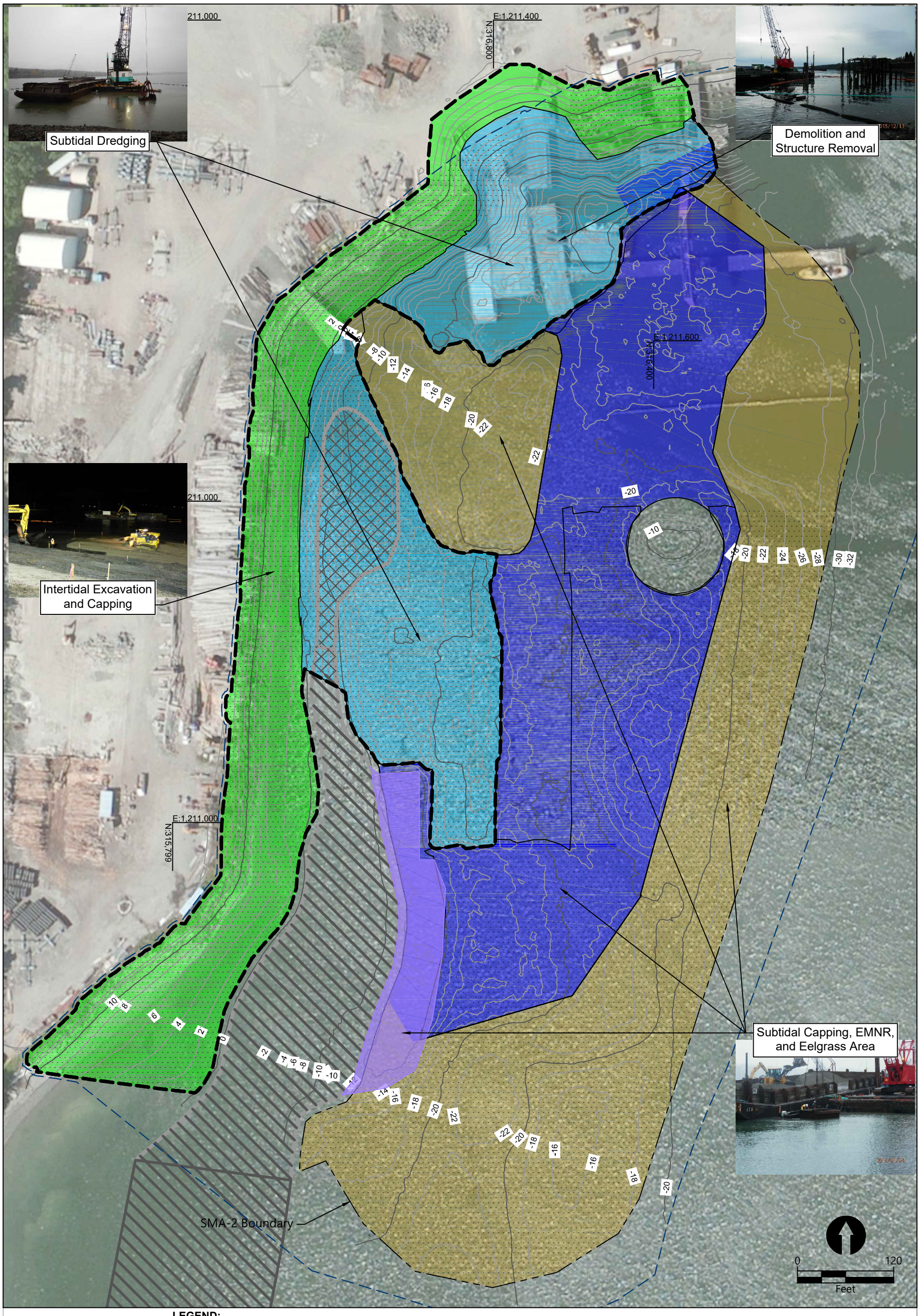
Figure 2
Mill Site North (SMA-1)
Port Gamble Season 1 and Season 2
Cleanup Action Report Summary



SOURCE: Bathymetry from eTrac, dated January 19, 2017.
HORIZONTAL DATUM: Washington State Plane North, NAD83, U.S. Feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- **SMA-2** Sediment Management Area
- Existing Contours (2' and 10' Interval)
- Intertidal Excavation and Cap
- Subtidal Dredge Sediment/Wood Waste Deposit with Residuals Cover Sand Placement
- Cap (4-ft Thickness)
- EMNR (6-in Thickness)
- Dredge/Excavation Area
- Creosote Piling and Structure Removal Area
- Eelgrass Beds
- Transplanted Eelgrass Bed
- Eelgrass Mitigation Area
- Work Constructed in Season 1

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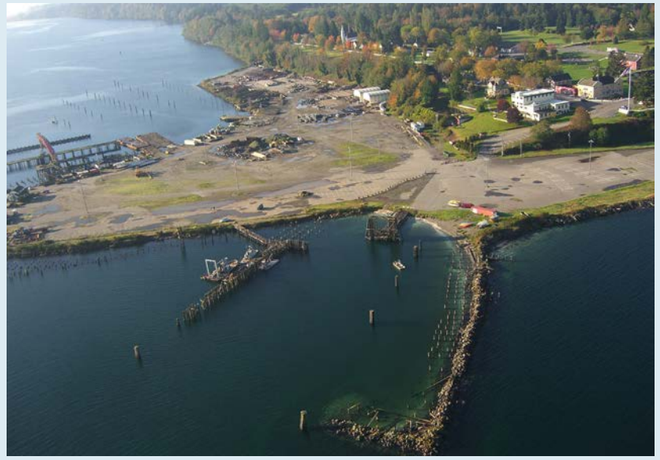
Figure 3
Mill Site South (SMA-2)

Port Gamble Season 1 and Season 2
Cleanup Action Report Summary



Pre-Construction Aerial

During Construction Aerial

Post Construction Aerial

Pre-Construction SMA-2 Shoreline

During Construction SMA-2 Shoreline

3.

Post-construction SMA-2 Shoreline

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Pre-Construction SMA-1 Shoreline

During Construction SMA-1 Shoreline

Post Construction SMA-1 Shoreline

Pre-Construction Jetty

During Construction Jetty

Post-Construction Jetty

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Figure 5
Construction Photographs – SMA-1 Shoreline and Jetty
Port Gamble Season 1 and Season 2
Cleanup Action Report Summary