TECHNICAL MEMORANDUM

To: Heather Page
Anchor QEA, LLC
720 Olive Way, Suite 1900
Seattle, WA 98101

Linda Berry-Maraist
Olympic Property Group
19950 7th Ave NE, Suite 200
Poulsbo, WA 98370

Date: August 1, 2019

From: Grette Associates LLC
2102 North 30th Street, Ste A
Tacoma, WA 98403

File No.: 348.007

Re: Port Gamble Cleanup Project (NWS-2013-1270) – Year 3 Voluntary Eelgrass Transplant Memorandum

1. INTRODUCTION

Port Gamble Bay located in Kitsap County, Washington, is a priority sediment cleanup site identified under the Washington State Department of Ecology's (Ecology's) Toxics Cleanup Program Puget Sound Initiative (Figure 1). In accordance with the requirements of a Consent Decree and a corresponding U.S. Army Corps of Engineers (USACE) Nationwide Permit (NWP) 38 (NWS-2013-1270), cleanup of Port Gamble Bay has been implemented by Pope Resources, LP/Olympic Property Group, LLC (PR/OPG).

Implementation of cleanup actions in some sediment management areas (SMAs) of Port Gamble Bay had the potential to effect native eelgrass (*Zostera marina*) beds at the site. In accordance with cleanup and permitting requirements, eelgrass within prospective dredging areas within these SMAs was to be transplanted into a designated mitigation site within SMA-2 of Port Gamble Bay (Figure 2).

The Eelgrass bench was constructed during the winter of 2015, had additional sand added to maintain correct elevations and stable edges and had the planting surface leveled 3 times before it was left to settle over the winter. Eelgrass transplanting at the SMA-2 mitigation site occurred during May and June in 2016. Grette Associates transplanted 16,340 eelgrass turions into the mitigation site, as described in the Eelgrass Transplant Report (Grette Associates 2016). Subsequent Year 1 and Year 2 monitoring revealed approximately 17% survival of the transplanted eelgrass (Grette Associates 2017 and 2018). As an adaptive management response, PR/OPG elected to proactively conduct a voluntary eelgrass transplant at the mitigation site in June 2019. During the June 2019 planting, it appeared that eelgrass coverage and density on the mitigation site, particularly to the south, had increased over the last year.

The purpose of this summary memorandum is to document the voluntary eelgrass transplant activities that were undertaken June 3 through 6, 2019. This report also describes the results of a qualitative assessment of the overall site with respect to eelgrass presence and coverage, as well as the eelgrass bed adjacent to the mitigation site. Attachment A to this report contains and Work Plan and Dive Safety Plan for this project. Attachment B contains still photographs from underwater video taken at the mitigation site. Figures 1-3 depict the areas of the site relevant to this voluntary action.

Figure 1. Vicinity of Port Gamble Bay

Figure 2. Original eelgrass harvest and transplant locations

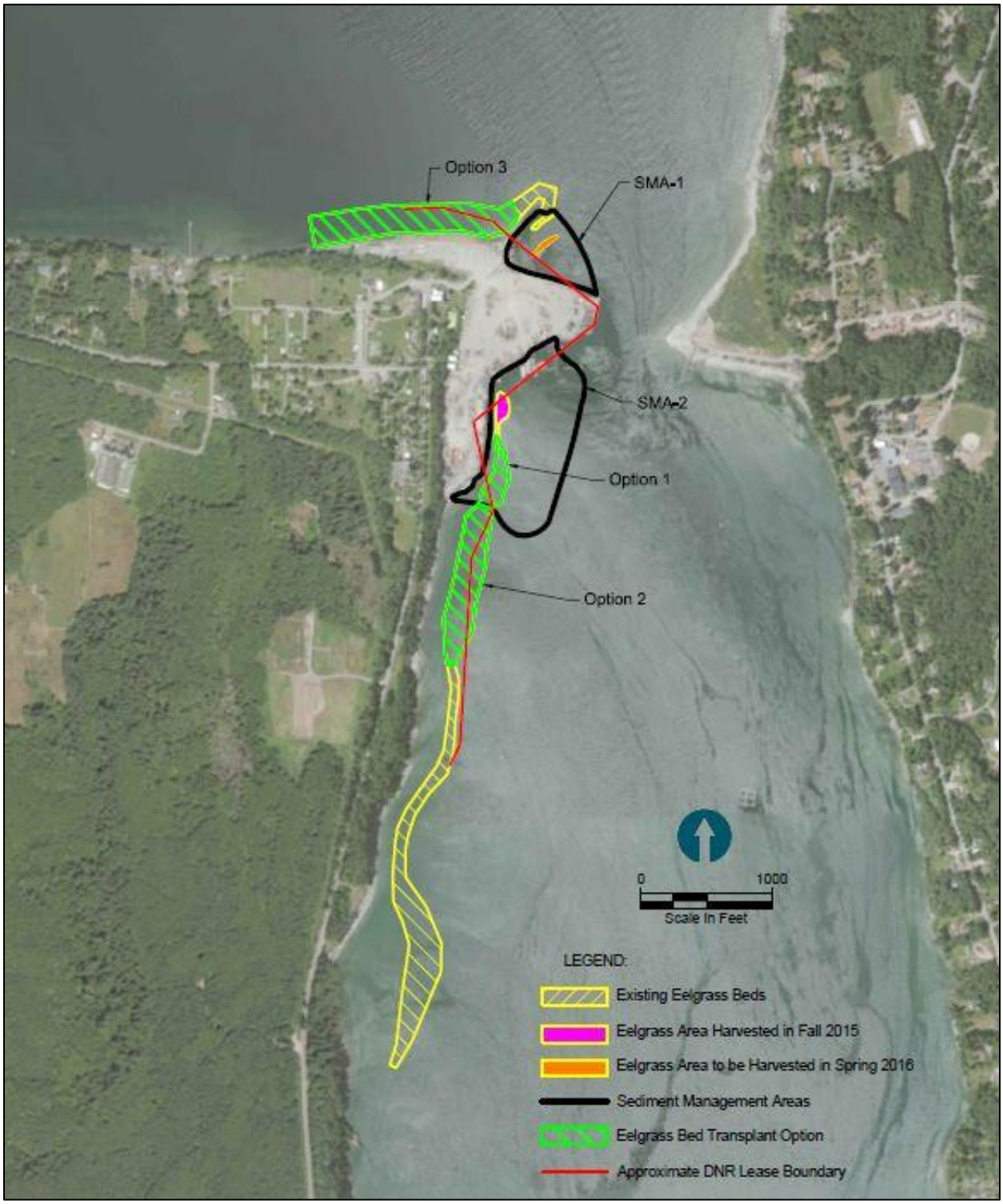


Figure 3. Location of mitigation site and 2019 eelgrass harvest area.

2. METHODS

All eelgrass reconnaissance and transplant activities performed for this voluntary adaptive management response were conducted in accordance with the Work Plan and Dive Safety Plan prepared for the project and reviewed by Anchor QEA and PR/OPG (Appendix A).

2.1 QUALITATIVE SITE RECONNAISSANCE

Grette Associates staff, diving in pairs, conducted a reconnaissance of the mitigation site and adjacent eelgrass bed to assess the relative density of eelgrass. Divers swam a "zig-zag" pattern

through the mitigation area from north to south and noted the presence of eelgrass patches, significant aggregations of macroalgae, and macroinvertebrate presence. Staff also inspected the adjacent eelgrass bed to the west to note any significant observations.

2.2 VOLUNTARY EELGRASS TRANSPLANT

2.2.1 Eelgrass Harvest

Divers worked in pairs to harvest eelgrass turions within the harvest area on June 3 and June 5 (Figure 2), collecting approximately 100 to 200 turions in mesh dive bags. The divers then transferred the harvested turions to the support vessel, placed them into a cooler with fresh seawater, and returned to harvesting. Once the cooler was full of harvested turions, the turions were processed and placed into a separate cooler, also containing fresh seawater (Photograph 1).

Photograph 1. Freshly harvested eelgrass (bottom cooler); partially-processed eelgrass (top cooler).

Onsite turion processing consisted primarily of cutting the eelgrass blades to approximately 6-8 inches in length. This makes separating and handling of the turions easier as well as stimulates shoot growth. Any excess sediment, dead rhizome or blade material, or macroalgae (e.g., *Smithora*) were also removed. Care was taken to keep the lids of the coolers closed when not processing, so as to keep water temperatures cool. Water was frequently cycled to maintain fresh, cold seawater.

2.2.2 Staple/Rebar Processing

To understand the potential impact of different planting methods on eelgrass success at this site, two different methodologies were used (landscape staples and rebar) and eelgrass was planted at two different densities.

After returning to shore, Grette staff processed the eelgrass turions into planting units (PUs) (Photograph 2). Staff tied four eelgrass turions onto landscape staples with paper-coated twist ties. Heavy gauge, 9-inch landscape staples with a 2-inch crown were used.

Photograph 2. Staff processing eelgrass turions onto staples to create planting units (PUs).

Staff also utilized jute twine to tie eelgrass turions to the landscape staples for a fraction of the processed PUs. This was done in an effort to evaluate the efficiency of using twine instead of twist ties.

In addition to the landscape staple PUs, Grette Associates tied turions onto 23 two-foot lengths of 3/8-inch rebar. Approximately 10 turions were tied to each piece of rebar using jute twine.

Once all turions were processed, the PUs were held overnight in a large cooler with fresh seawater. Blocks of blue ice in Zip-Lock bags were placed in the coolers to maintain cold water temperatures until morning, when the water could be cycled.

2.2.3 Eelgrass Transplanting

Transplant plots were located using dGPS coordinates and marked by placement of an anchored buoy. Once the plots were located and the boat anchored, paired divers descended holding a tote filled with enough PUs for the particular plot being planted. The transplant plots were laid out in accordance with the Work Plan, and transplanting occurred at the densities specified in the Plan (1-foot on-center [26 turions/m^2]and 1.5 feet on-center [53 turions/m^2]).

3.0 RESULTS

3.1 QUALITATIVE SITE RECONNAISSANCE

The qualitative site reconnaissance was conducted on Tuesday, June 4, after transplanting activities were concluded for the day. Care was taken to ensure qualitative observations of existing eelgrass did not include the newly transplanted eelgrass (eelgrass newly transplanted in rows is easily discerned from preexisting eelgrass spreading from rhizomes; Attachment B). Visibility during the reconnaissance was generally 6 to 7 feet, with a rising tide and moderate current. Eelgrass presence within the mitigation site appears to have expanded since Year 2 monitoring activities in 2018. Patches of eelgrass appeared more numerous and larger, particularly in the south half of the site, with some patches exceeding 100 sq ft. Several of the new transplant plots occurred adjacent to existing eelgrass patches within the mitigation site. The eelgrass observed also appeared healthy, with blade lengths of 3 to 4 feet, young eelgrass turions, and reproductive shoots all present.

Reconnaissance of the existing eelgrass bed immediately west of the mitigation site showed little change in the appearance or density of the eelgrass in this area.

3.2 EELGRASS HARVEST AND TRANSPLANT

Grette Associates staff conducted transplant activities from June 3 through June 6, 2019. Due to a hazardous weather forecast for Friday, June 7 (thunderstorms and high winds), staff decided not to continue harvest and transplant efforts into Friday.

Visibility at the site was generally low throughout transplant activities (generally 5 to 7 feet), and tidal currents were moderate to strong but manageable. Conditions at the harvest site were favorable, with densities similar to what was observed during the 2016 transplant (~100-115 shoots/m^2). The substrate within the harvest areas consisted of somewhat compact sand and

silt, making harvesting in some locations difficult. Eelgrass harvest depths ranged from approximately -6 ft Mean Lower Low Water (MLLW) up to -2 ft MLLW.

Eelgrass harvesting occurred over two days: Monday, June 3 and Wednesday, June 5 (Table 1). A total of 3,266 eelgrass turions were harvested, and a total of 782 PUs were planted.

Table 1. Eelgrass turions harvested and planting units processed for transplant.

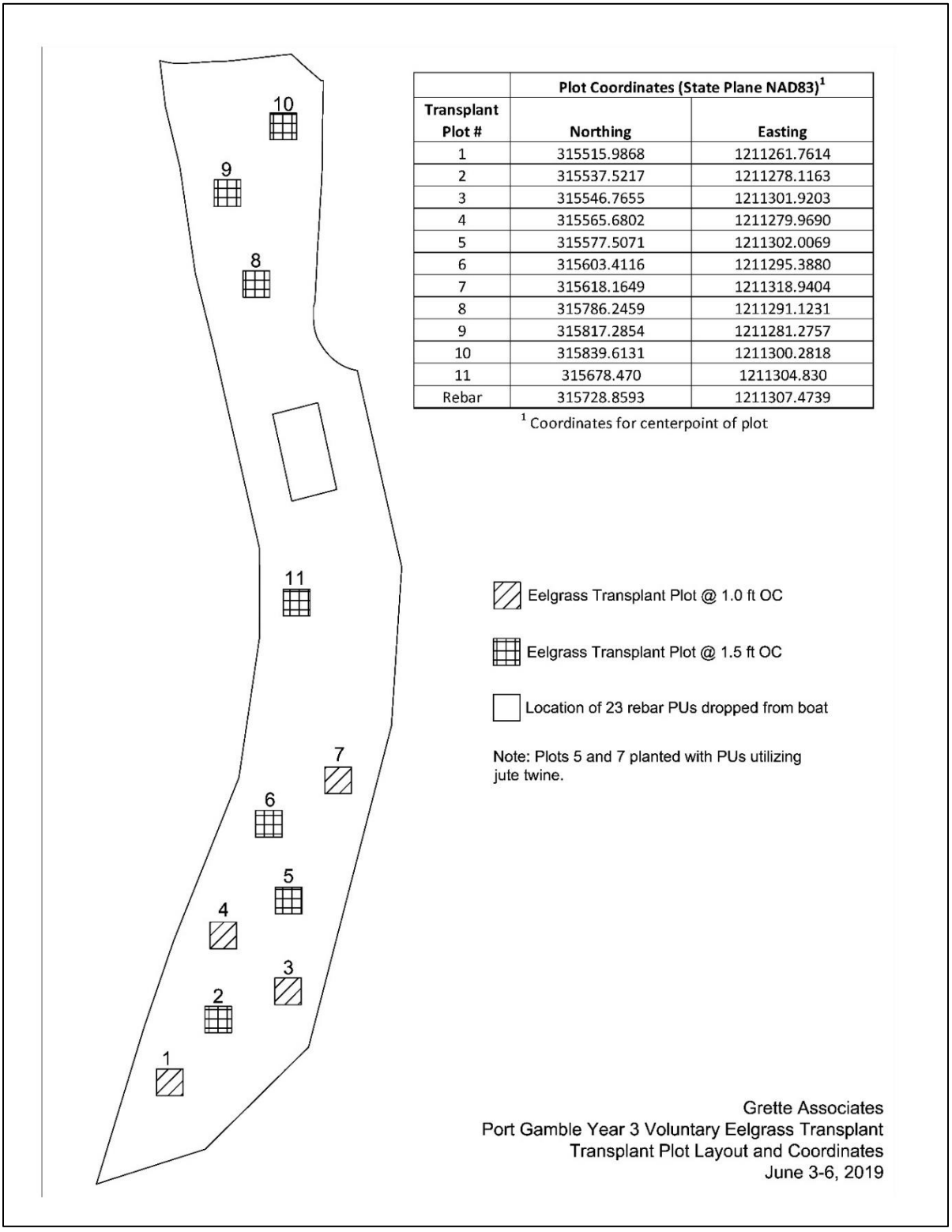
	Eelgrass Turions Harvested	Number of Planting Units[1]			Total Planting Units
		Staples w/ twist ties	Staples w/ jute ties	Rebar	
Monday (6/3)	1,692	423	-	-	423
Wednesday (6/5)	1,574	186	150	23	359
Total	3,266	609	150	23	782

[1] Landscape staple PUs consisted of 4 turions per staple; rebar PUs consisted of 10 turions per rebar.

A total of 11 staple transplant plots were established and planted, as well as one rebar transplant plot (Figure 3). Of the staple transplant plots, four plots were planted at 1.0 ft on-center (49 PUs) and seven plots were planted at 1.5 ft on-center (100 PUs). Coordinates for the center point of each transplant plot are shown on Figure 3.

Based on the results of prior monitoring, the majority of eelgrass was to be planted in the south portion of the site where eelgrass survival appears to be highest. A total of seven transplant plots (Plots 1 through 7) were located in the south portion of site, consisting of 547 PUs (2,188 turions) (Figure 3). The north portion of the site contains Plots 8 through 10 with a total of 147 PUs (588 turions). The two remaining plots were planted in the center of the mitigation site. The rebar plot was planted with 23 lengths of rebar (230 turions), while Plot 11 was planted at 1.5 ft on-center resulting in 49 PUs (196 turions) planted.

Figure 4. Transplant Plot Layout and Coordinates.



Transplant Plot #	Plot Coordinates (State Plane NAD83)[1] Northing	Easting
1	315515.9868	1211261.7614
2	315537.5217	1211278.1163
3	315546.7655	1211301.9203
4	315565.6802	1211279.9690
5	315577.5071	1211302.0069
6	315603.4116	1211295.3880
7	315618.1649	1211318.9404
8	315786.2459	1211291.1231
9	315817.2854	1211281.2757
10	315839.6131	1211300.2818
11	315678.470	1211304.830
Rebar	315728.8593	1211307.4739

[1] Coordinates for centerpoint of plot

4.0 DISCUSSION

4.1 QUALITATIVE SITE RECONNAISSANCE

Based on underwater video taken at the site during the eelgrass transplant activity, the mitigation site appears to be maturing (see Appendix B). Organic detritus was observed on the substrate surface, and macroalgae and macroinvertebrates were frequently observed. While large-bladed algal species such as *Saccharina latissima* and *Costaria costata* were observed throughout the site, it did not appear that their presence was limiting eelgrass extent. Overall, it appeared that eelgrass coverage and density on the site, particularly to the south, has increased over the last year. Eelgrass distribution over the north portion of the site appeared to have increased, though the increase was not as apparent.

Visibility during the reconnaissance was poor to moderate and generally ranged from 5 to 7 feet, increasing to up to 10 feet at times. However, it should be noted that extensive algal blooms in the area were not noted, and visibility was greater than in previous surveys at the site. Currents at the site, while strong at times, did not inhibit the reconnaissance survey or harvest/transplant activities.

4.2 VOLUNTARY EELGRASS TRANSPLANT

Eelgrass harvest and transplant activities occurred over four days in early June. While a fifth day of harvest and transplant work was anticipated, thunderstorms and high winds prevent work on the site for the final day. However, the amount of eelgrass expected to be harvested and transplanted (3,000 turions) was exceeded in the four-day effort (3,266 turions). Eelgrass harvest and transplant activities when relatively smoothly, with no unforeseen situations arising. Representative photographs of newly transplanted eelgrass are presented in Attachment B.

5.0 REFERENCES

Grette Associates LLC. 2016. 2016 Eelgrass Transplant Report. Prepared for Anchor QEA LLC, Seattle, Washington.

Grette Associates LLC. 2017. 2017 Eelgrass Monitoring-Year 1. Prepared for Anchor QEA LLC, Seattle, Washington

Grette Associates LLC. 2018. Year 2 Voluntary Eelgrass Monitoring: ROV Results. Prepared for Anchor QEA LLC, Seattle, Washington

PORT GAMBLE BAY CLEANUP

YEAR 3 VOLUNTARY EELGRASS TRANSPLANT AS-BUILT TECHNICAL MEMORANDUM

APPENDIX A

WORK PLAN AND DIVE SAFETY PLAN

WORK PLAN AND DIVE SAFETY PLAN

To: Heather Page
Anchor QEA, LLC
720 Olive Way, Suite 1900
Seattle, WA 98101

Linda Berry-Maraist
Olympic Property Group
19950 7th Ave NE, Suite 200
Poulsbo, WA 98370

May 20, 2019

From: Grette Associates LLC
2102 North 30th Street, Ste A
Tacoma, WA 98403

File No.: 348.007

Re: Port Gamble Cleanup Project – Voluntary Eelgrass Transplant: Work Plan and Dive Safety Plan

At the request of Anchor QEA, LLC and Pope Resources/Olympic Property Group, Grette Associates (Grette) has prepared this Work Plan and Dive Safety Plan to summarize the proposed voluntary eelgrass transplanting activities that will occur at the Port Gamble Bay Cleanup Project (NWS-2013-1270) site. Grette divers will conduct an eelgrass transplant on the SMA-2 eelgrass mitigation area. Activities will include a qualitative assessment of the mitigation area prior to transplant to identify approximate coverage of eelgrass, harvesting eelgrass from the donor bed immediately south of the site, and transplanting eelgrass into the eelgrass mitigation area. SCUBA diving will occur at the mitigation area and eelgrass donor bed in water depths not to exceed 40 FSW.

Eelgrass Harvest

During eelgrass harvesting, divers will work in pairs to collect and count eelgrass turions, which will be stored in mesh dive bags carried by the divers. Turions will be harvested by gently agitating the substrate beneath the turions by hand to expose the rhizomes. Rhizomes and turions together will be pulled from the substrate, taking care not to break the turions from the rhizomes.

As much rhizome material as possible will be collected along with the turions. Once the bags are full, the divers will ascend to the boat to deliver the mesh bags containing the eelgrass to the Safety Officer/Diver Tender. Diver ascents/descents will be minimized to the greatest extent possible. The eelgrass turions will be placed into a large cooler containing fresh seawater. After the divers have finished harvesting for the day, the eelgrass turions will be separated and trimmed to approximately 8-10 inches in length. They will then be placed into a separate cooler

containing fresh seawater and kept out of direct sunlight. If necessary, bagged blue ice will be used to maintain cool water temperatures.

Staple/Rebar Processing

After returning to shore, Grette staff will begin processing the eelgrass turions into planting units (PUs). Staff will tie four eelgrass turions onto landscape staples with paper-coated twist ties and jute twine. The heavy gauge landscape staples will be a minimum of 9 inches long with a minimum 1-inch crown. The turions will be crossed on the staples, with two turions facing one direction and two facing the other, such that paired blades extend from either side of the staple.

Three of the plots to be planted in the south portion of the site will utilize PUs assembled using jute twine to tie the turions to the landscape staple. This will be done to evaluate the effectiveness of the twine in holding the turions to the staple while not damaging the leaf blades.

In addition to the landscape staple PUs, Grette Associates will tie turions onto 2-foot lengths of rebar for planting. Approximately 10 turions will be tied to each piece of rebar using jute twine. It is anticipated that up to 22 rebar PUs will be used, depending on the quantity of eelgrass that can be harvested during the project. Once the turions have been tied to the rebar, they will be kept in the coolers with the prepared staples prior to transplanting.

Eelgrass Transplanting

It is anticipated that approximately 3,000 turions will be harvested for transplanting into the eelgrass mitigation area. As survival has appeared to be highest in the southern portion of the mitigation bench, up to seven (7) eelgrass plots will be planted in that area. An additional three (3) plots will be established in the northern portion of the bench. The plots in the south portion are intended to augment the established eelgrass in this area from which volunteer eelgrass can spread to other areas of the mitigation bench. The additional plots in the north portion are intended to establish persistent eelgrass in that area, where most of the low eelgrass survival has occurred to date. In addition to the plots in the northern portion of the bench, the rebar will be placed in this area as well.

Turion Density

The transplant plots will be 9 ft by 9 ft square, for a total of 81 square feet (7.53 m^2). The seven plots in the south will be planted at two densities: 1.5 feet on-center (26 turions/m^2) and 1 foot on-center (53 turions/m^2). The four plots planted at 1 foot on-center will contain 400 PUs (1,600 turions), and the three plots planted at 1.5 feet on-center will contain 147 PUs (588 turions). This will establish eelgrass within the seven southern plots at approximately 42 turions/m^2.

The three plots planted in the northern portion of the bench will all be planted at 1.5 feet on-center for a density of 26 turions/m^2 (147 PUs; 588 turions). Additionally, the rebar PUs will be dropped in an area approximately 15 feet by 30 feet (see attached figure for plot layout and coordinates).

Transplant Methods

Prior to transplanting, each plot location will be identified by dropping a weighted buoy from the boat at the pre-determined coordinates. Paired divers will then establish the four corners of each plot using rebar to create the 9 ft by 9 ft square plot. Once the plots have been established, plastic totes filled with a pre-determined number of PUs will be submerged near the plots.

The paired divers will then use transect tapes and a knotted line to indicate the locations where the PUs are to be planted within the plots. Nylon lines tied at either 1-ft or 1.5-ft intervals will be used depending on the density of the particular plot being planted.

This process will be repeated for the transplant plots established in the northern portion of the site. In addition, the rebar PUs will be carefully dropped over the side of the boat at the pre-determined location(s) in the northern area. Once the rebar has been dropped from the boat, divers will descend to inspect the rebar and evaluate the rhizome contact with the substrate. If necessary, the rebar will be repositioned to maximize rhizome contact with the substrate.

Transplant activities are expected to occur June 3-7, 2019. After the field effort, Grette Associates will prepare a technical report summarizing the eelgrass transplant activities at the mitigation site.

Dive Safety Plan

Grette Associates divers will perform an eelgrass transplant on the mitigation area for the Port Gamble cleanup. Activities will include surveying eelgrass coverage, harvesting eelgrass, and transplanting eelgrass harvested into the eelgrass mitigation area. Diving will occur inside the mouth of Port Gamble Bay in water depths of approximately -5 ft to -15 ft MLLW and not to exceed 40 FSW. The diving activities will be scheduled to coincide with the slack tide to the greatest extent possible to avoid potentially strong currents during the tidal exchange. Diver ascents/descents will be minimized to the greatest extent possible. This project will be completed over the course of 5 days and includes a diving supervisor/project manager, two diver biologists, and a safety supervisor/dive tender.

Prior to the dive, a pre-dive safety meeting will be held prior to launching the boat, during which any final questions about the dive survey, objectives, or safety will be discussed. While divers are conducting the work as described above, a suited Safety Diver will be located in the anchored dive boat and will maintain sight of diver bubbles at all times. The dive tender will monitor vessel traffic within 300 feet. While on-site, a copy of this dive plan, a first aid kit, VHF radio and/or cellular phone, and supplemental oxygen will be available. Accurate records will be kept of diver time in and out of the water, maximum depth, and starting and ending tank pressures.

DIVER INFORMATION

Scott Maharry – Diving Supervisor/Project Manager
Emergency contact: Nora Maharry (spouse), 6224 27th St. Ct. NW, Gig Harbor, WA 98335, 425-306-2196
SCUBA certifications: NAUI Open Water, SDI Night-Limited Visibility Diver, Computer Diver, Underwater Navigation Diver, Deep Diver, Advanced Open Water, certified to 130 fsw
Other active certifications: Diving First Aid for the Professional Diver, CPR (exp. 9/1/2020)
Washington State Boater Certification: Boater EC 00026559; 12/01/2008

Jay Dirkse –Diver Biologist
Emergency contact: Anna Dirkse (spouse), 8447 Main St, Peshastin, WA 98847, 509-548-0308
SCUBA certifications: PADI Open Water, certified to 60 ft
Washington State Boater Certification: Boater EC 00056457; 07/06/2012

Thomas Peterman –Diver Biologist
Emergency Contact: Tana Peterman (spouse), 12450 80th Ave S. Seattle, WA 98178, 206-849-7370
SCUBA Certifications: PADI, Deep Diver, Advanced Open Water, certified to 130 fsw
Other active certifications: Diving First Aid for the Professional Diver, CPR (exp. 9/1/2020)
Washington State Boater Certification: Boater EC 00226173; 04/27/2015

Chad Wallin – Safety Supervisor/Dive Tender
Emergency contact: Lauren Wallin (spouse) 12930 Fagerud Rd. SE Olalla, WA 98359 (253) 330-3120
SCUBA certifications: SDI Open Water, certified to 60 ft
Other active certifications: Diving First Aid for the Professional Diver, CPR (exp. 9/1/2020)
Washington State Boater Certification: Boater EC 00102740 issued 04/16/2012

GENERAL CONTACT INFORMATION

Grette Associates Health and Safety Managers

Matthew Boyle	253-573-9300
Matthew Boyle Cell	206-276-0808
Glenn Grette	509-663-6300
Glenn Grette Cell	509-669-6374

Local Emergency Contacts

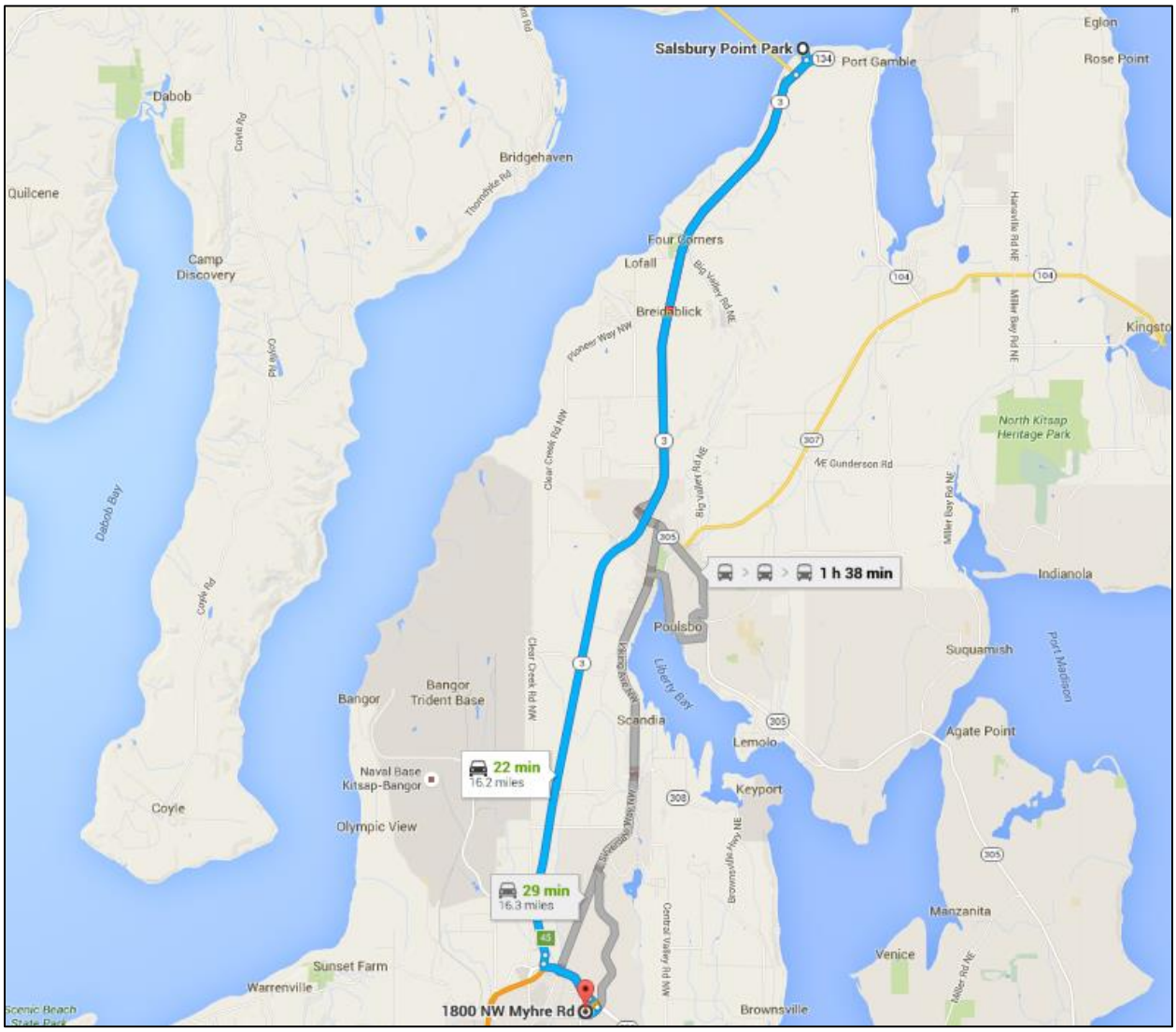
General Emergencies	911
Virginia Mason Medical Center, 1100 9th Ave., Seattle, WA 98101	206-223-6600
Emergency Room	206-583-6433
Virginia Mason Hyperbaric Chamber, 1100 9th Ave., Seattle, WA 98101	206-583-6543
Diver's Alert Network (DAN)	919-684-8111
Kitsap County Sheriff's Office	360-337-7101
Coast Guard Rescue	206-217-6001

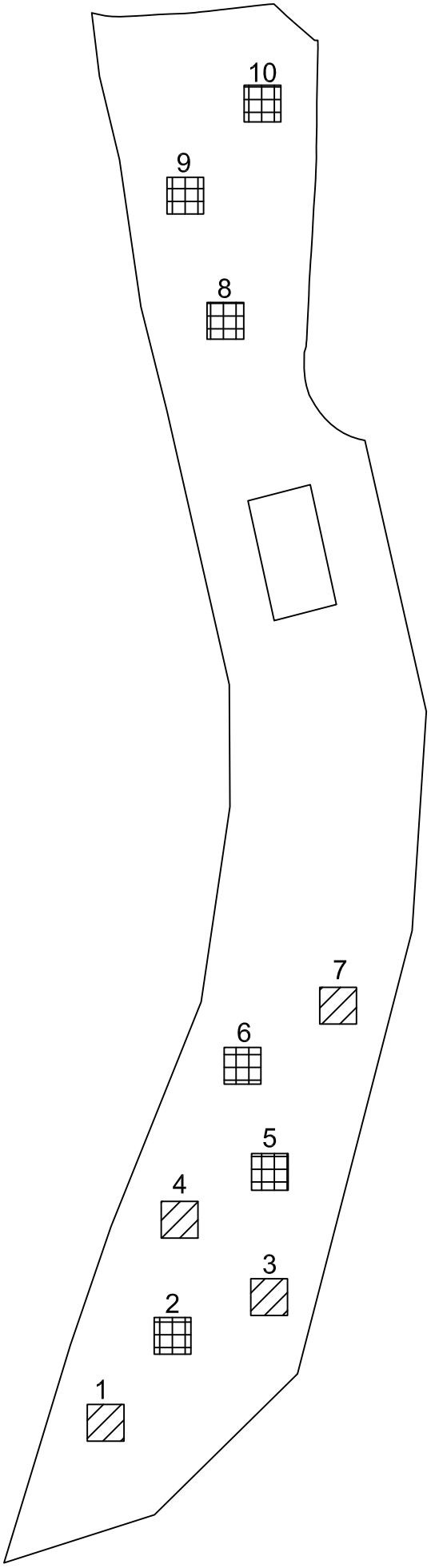
Directions to Harrison Medical Center (Silverdale) from Salsbury Point Park (16 miles):

Head south on Whitford Rd toward NE Beach Ln (0.2 mi);
Turn left onto Wheeler St NE (0.2 mi);
Turn right onto WA-104 W (0.4 mi);
Continue onto WA-3 S (13.8 mi);
Take exit 45 for Washington 303 toward Silverdale/East Bremerton (0.1 mi);
Use the left two lanes to turn left onto WA-303 S/NW Waaga Way (signs for East Bremerton);
Continue to follow WA-303 S (0.9 mi);
Take the Ridgetop Blvd exit (0.2 mi)

Turn right onto Ridgetop Blvd NW (0.2 mi)
Turn right (151 ft)
Turn left, Destination will be on the right

Harrison Medical Center
1800 NW Myhre Road
Silverdale, WA 98383
360-744-8800





	Plot Coordinates (State Plane NAD83)[1]	
Transplant Plot #	Northing	Easting
1	315515.9868	1211261.7614
2	315537.5217	1211278.1163
3	315546.7655	1211301.9203
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9	315817.2854	1211281.2757
10	315839.6131	1211300.2818
Rebar	315728.8593	1211307.4739

[1] Coordinates for centerpoint of plot

7 Eelgrass Transplant Plot @ 1.0 ft OC

5 Eelgrass Transplant Plot @ 1.5 ft OC

Location of rebar dropped from boat

Note: Plots 2, 5 and 7 to be planted with PUs utilizing jute twine.

Grette Associates
Port Gamble Year 3 Voluntary Eelgrass Transplant
Transplant Plot Layout and Coordinates
May 17, 2019

PORT GAMBLE BAY CLEANUP

YEAR 3 VOLUNTARY EELGRASS TRANSPLANT AS-BUILT TECHNICAL MEMORANDUM

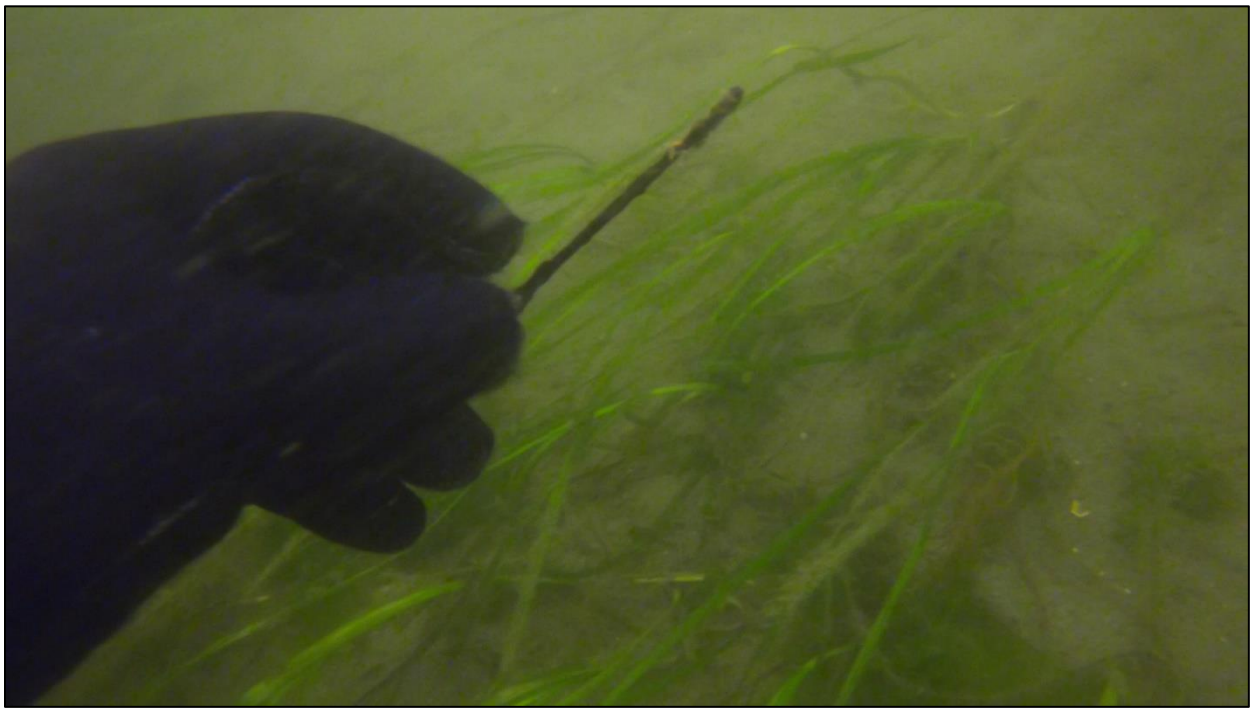
APPENDIX B

UNDERWATER VIDEO STILL PHOTOGRAPHS

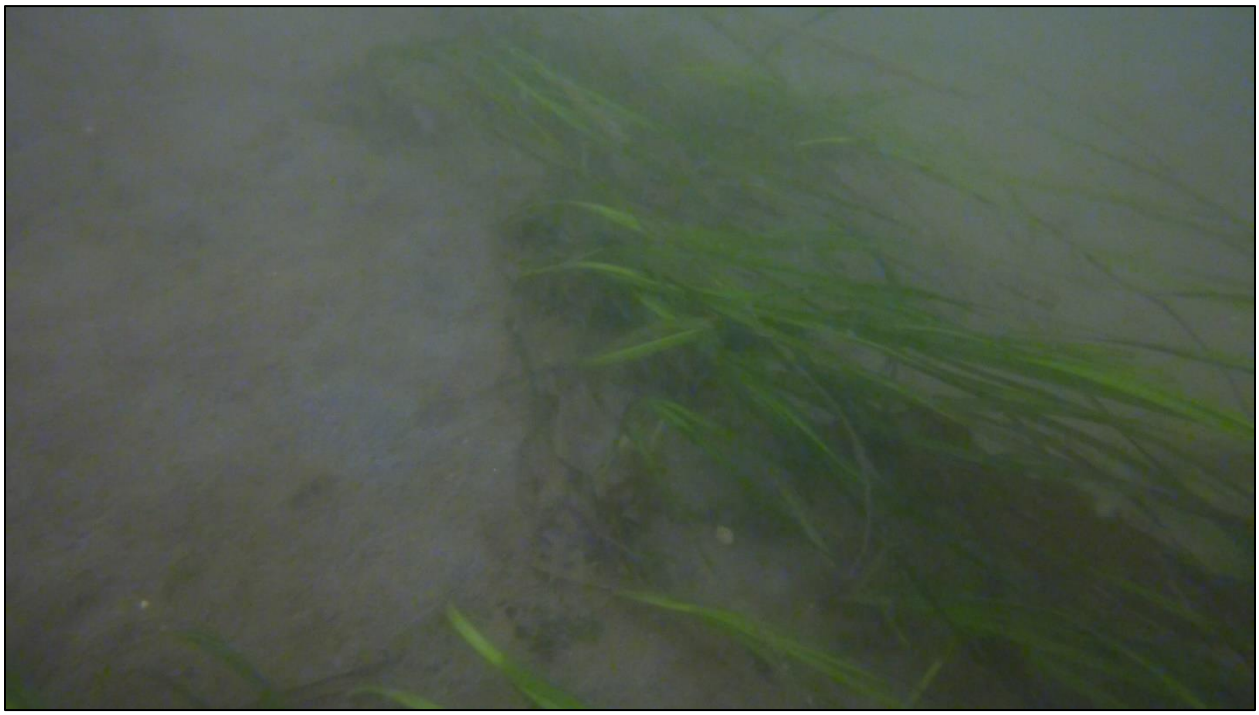
Photograph 1. Planting Units after installation.

Photograph 2. Planting Unit (left) installed adjacent to existing eelgrass (right).

Photograph 3. Piece of landscape staple from 2016 eelgrass transplant found within existing eelgrass patch on mitigation site.



Photograph 4. Portion of existing eelgrass patch on mitigation site.



Photograph 5. Length of rebar dropped from boat with eelgrass turions. Rhizomes were subsequently buried by divers.