Attachment 14.D

WEST BAY YARDS SHORELINE RESTORATION

INTERTIDAL SHELLFISH AND SUBMERGED AQUATIC VEGETATION SURVEY REPORT

Grette Associates LLC
ENVIRONMENTAL CONSULTANTS

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WEST BAY YARDS SHORELINE RESTORATION

INTERTIDAL SHELLFISH AND SUBMERGED AQUATIC VEGETATION SURVEY REPORT

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1 INTRODUCTION

Grette Associates is under contract with West Bay Development Group, LLC to conduct an Intertidal Shellfish and Submerged Aquatic Vegetation (SAV) Survey at the site of the proposed West Bay Yards Shoreline Restoration Project ("Site") in Budd Inlet. The Site is located at 1210 West Bay Drive Northwest, in Olympia, Washington (Figure 1).

The shellfish and SAV survey were conducted at the request of the Washington Department of Fish and Wildlife (WDFW). The intertidal sediments on Site have been documented by the WA State Department of Ecology as containing chemical contaminants of concern. As the proposed shoreline restoration action involves the placement of habitat fill material over existing substrates on the Site, existing shellfish and SAV populations at the Site could be affected (Figure 2).

The purpose of this Intertidal Shellfish and SAV Survey Report is to document the conditions observed on Site, including benthic shellfish population estimates, and any occurrence of submerged aquatic vegetation.

Figure 1. Site vicinity map for the West Bay Yards Shoreline Restoration Project, and Intertidal Shellfish & SAV Survey in Olympia, WA.

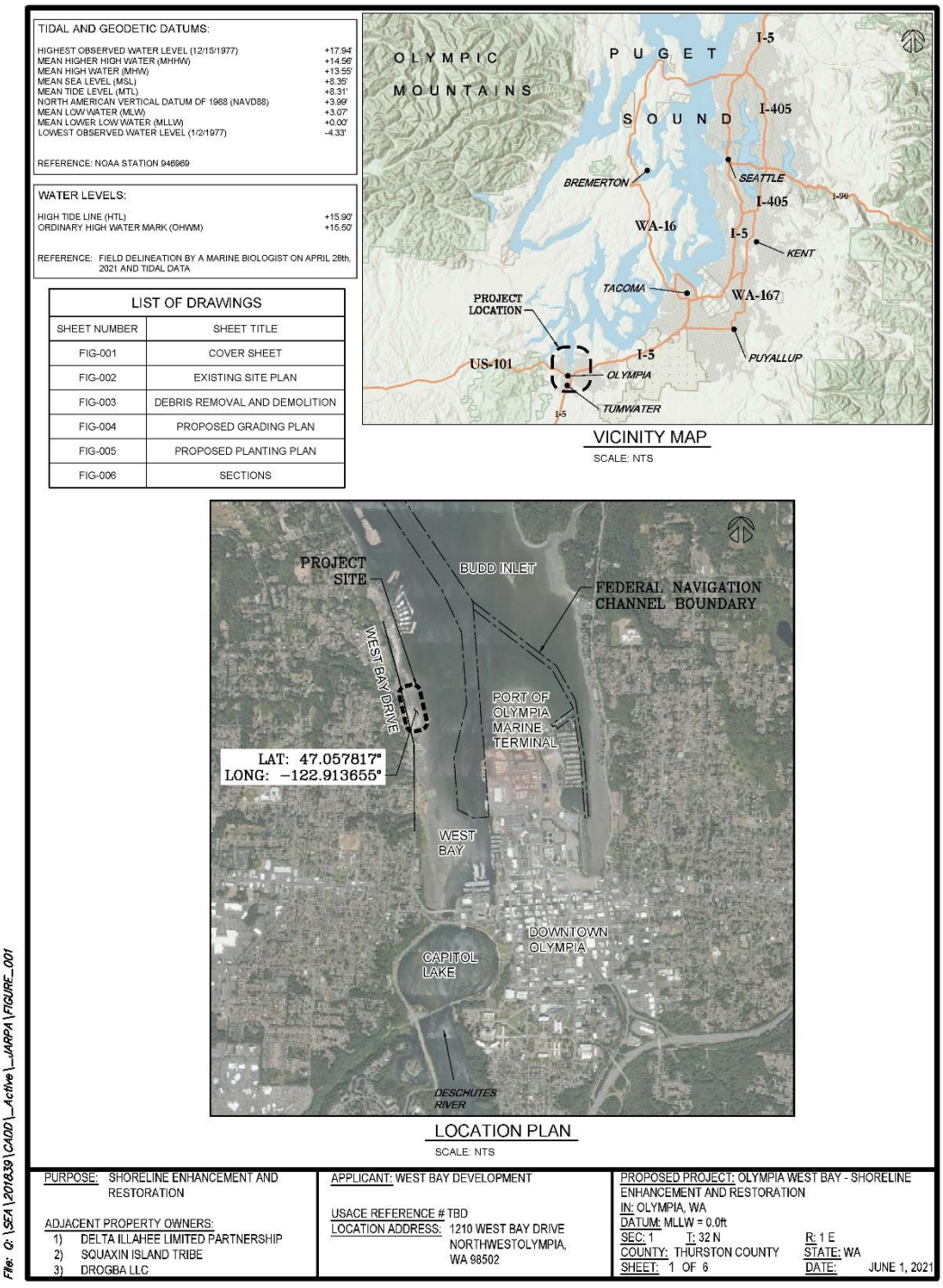
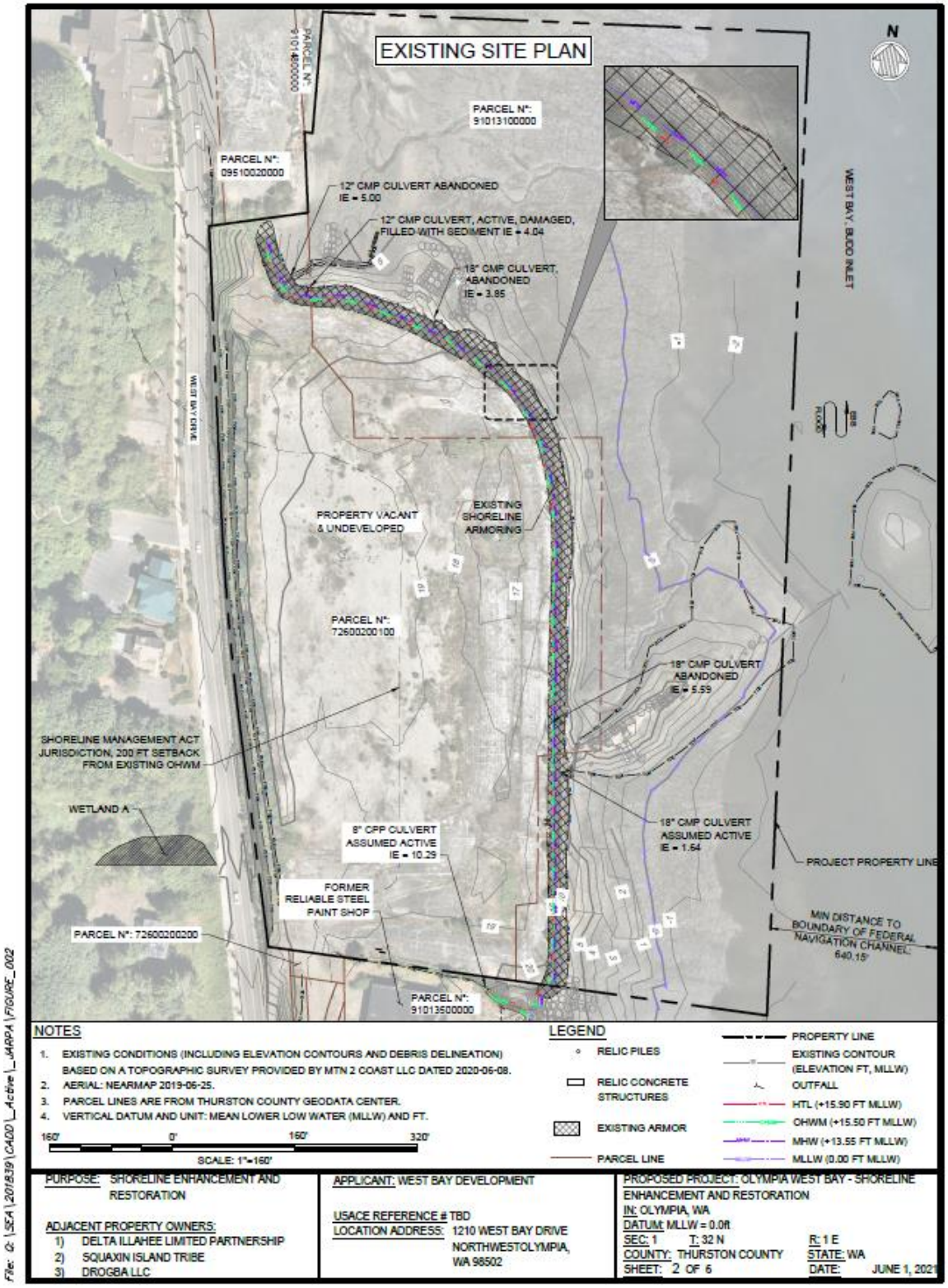


Figure 2. The existing site plan and survey area for the West Bay Yards Shoreline Restoration Project, and Intertidal Shellfish & SAV Survey in Olympia, WA.



2 METHODS

2.1 Data Collection

The survey area extends from the base of the riprap revetment at approximately +5 to +8 ft MLLW down to -2 ft MLLW, and encompasses approximately 6 acres (262,180 sq ft). The intertidal shellfish & SAV survey was conducted on July 12-13 and July 27, 2022, using the protocols found in Campbell (1996). The methods were modified to include the use of a Trimble Geo7 XH Differential Global Positioning System (dGPS) in documenting the transect and sample locations for subsequent surveying. The protocols and modifications were followed as listed in Section 2 of the *West Bay Yards Shoreline Restoration: Intertidal Shellfish and Submerged Aquatic Vegetation Survey – Study Plan* ("Study Plan", Grette 2022) which is attached in Appendix A. In summary, a total of 12 transects (Table 1) were established on the Site, each 100 ft apart and perpendicular to shore. The first sampling point on each transect was a random number (0-10), within the first 10 ft of a transect, with subsequent sampling points spaced 40 ft apart. Nine transects were located along the north/south baseline, and three transects were located along the east/west baseline (Figure 3). A total of 20 sampling points were used to document shellfish populations (Table 1). Originally 65 sampling points were proposed (Figure 3), but Site conditions such as soft sediments (which are contaminated) or obstructions (e.g., riprap, cement blocks, pile) prevented sampling due to inaccessibility and compromised safety. The coordinate locations for each sample point were recorded using the dGPS datalogger and are listed in Appendix B.

Per Campbell 1996 and Grette 2022, at each sampling point one cubic foot of sediment was quickly excavated and all shellfish within the sample were collected. All shellfish were stored separately by sampling point, and were transported in coolers to the lab and frozen. All clams were thawed at a later time to identify the species and count the total number of shellfish collected.

The SAV survey was conducted during low tide and in conjunction with the shellfish survey. Photographs of the entire Site along the shellfish transects were taken during low tide to document the substrate condition and presence/absence of SAV. Only SAV that was attached via holdfast to the substrate or structure was documented, excepting *Ulva* spp. Photographs of the Site are in Appendix C.

2.2 Calculating Shellfish Population Estimates

Population estimates were calculated as described in Campbell 1996. The elevations of sample plots were estimated by overlaying sample plot dGPS locations on bathymetry data imported into AutoCAD LT. Each plot was assigned an elevation to the nearest MLLW foot marker (or averaged up if located exactly in the middle of two elevations). Shellfish samples were separated into two categories based on elevation and substrate type, being shellfish which occurred primarily in mud (0 to +4 ft MLLW), and shellfish which occurred primarily in gravel/sand (+5 to +8 ft MLLW). The total area for each elevation band was estimated in AutoCAD LT, with inaccessible areas covered with large debris excluded. Substrate type was determined by comparing Site photographs, data recorded, and Google Earth imagery (with the aid of imported dGPS sample plot locations). See Appendix D for raw shellfish counts, estimated elevation, and substrate type for each sample plot.

Table 1. Transect lengths and the number of samples (n) collected per transect for the West Bay Shellfish and SAV Survey in Olympia, WA.

Transect Number	Transect Length (ft)	Sample n
1	230	3
2	197	2
3	226	3
4	251	6
5	256	1
6	253	0
7	175	1
8	181	0
9	202	0
10	158	1
11	121	1
12	102	2
Total Samples		**20[1]**

[1] Data were collected from 20 instead of 65 sampling points due to soft sediments (which are contaminated) or obstructions (e.g., riprap, cement blocks, pile) which prevented sampling due to inaccessibility and compromised safety.

Figure 3. Transects and sample plot locations for the West Bay Intertidal Shellfish & SAV Survey in Olympia, WA. Transects (e.g., "T-1") are represented by the red lines, with the sample plots (e.g., "S1-1") locations noted by the yellow pins. Coordinates for sample plots are listed in Appendix B.

3 RESULTS

3.1 General Site Observations

Occasional anthropogenic woody debris was present on Site, in addition to sawdust and roofing shingles. Larger debris is also present on the Site, including large concrete blocks and pile caps, timber pile stubs, and timber decking remnants from historic overwater piers. The sediment was primarily a mix of silt, sand, and mud, with shell hash and gravel disbursed in some areas near the base of the riprap revetment. Below approximately +4 ft MLLW, the substrate transitions to finer silt and mud substrate. Fine, soft sediments often made deeper sample plots inaccessible. Though there was variation in sediment type, the overall characteristics of the Site were fairly uniform. Site photographs during low tide are in Appendix C.

3.2 Benthic Shellfish Population

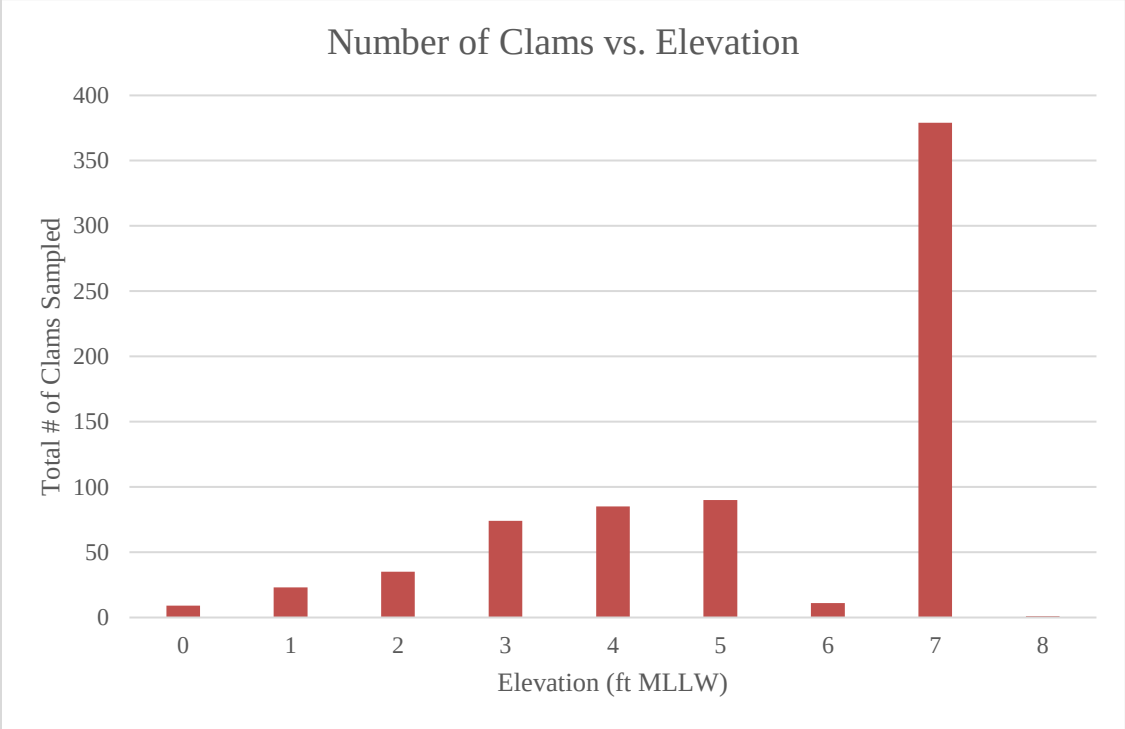
During survey efforts in 2022, Grette Associates collected a total of 707 shellfish consisting of five different species of clam. The species and total number of clams collected are listed in Table 2. The most abundant species sampled were Manila littleneck clam (*Venerupis philippinarum*) and Bent-nose Macoma clam (*Macoma nasuta*), with 430 and 147 specimens collected respectively (Table 2). Oyster shells were observed on Site, but were extremely few in number and did not appear in sampling plots. The raw data compiled from each sample plot is presented in Appendix D.

Table 2. Shellfish collected during sampling efforts in 2022 for the West Bay Intertidal Shellfish and SAV Survey.

Common Name	Species Name	Total
Manila littleneck clam	*Venerupis philippinarum*	430
Bent-nose Macoma clam	*Macoma nasuta*	147
Native littleneck clam	*Leukoma staminea*	85
Eastern softshell clam	*Mya arenaria*	43
Cockle clam	*Clinocardium* sp.	1
Unidentified	N/A	1

Overall, the shellfish on Site seemed to appear more frequently in sandy and gravely sediments (from +5 ft to +8 ft MLLW), instead of the fine silty sediments (from 0 ft to +5 ft MLLW). The mean number of clams per square foot sampled (i.e., sample plot, n = 20) was 35.4 clams. From 0 ft to +5 ft MLLW, the total area was 140,352 ft^2, with a mean of 20.5 clams per sample plot (n = 11), and an estimated population total of 2,877,216 clams. For estimates from +5 ft to +8 ft MLLW, the total area was 32,134 ft^2, with a mean of 53.4 clams per sample plot (n = 9), and an estimated population of 1,715,956 clams. Figure 4 presents the total number of clams sampled (n = 20) at each foot of elevation.

Figure 4. Total number of clams sampled and the approximate elevation of the corresponding sampling locations for the West Bay Intertidal Shellfish and SAV Survey in 2022.



3.3 Submerged Aquatic Vegetation

While traversing the Site, no submerged aquatic vegetation was observed. All substrate and debris were completely void of algae and vegetation.

4 DISCUSSION

Overall, this Site appears to be a mudflat below a riprap revetment which supports a clam population of assorted species. In total, 707 clams of five different species were collected during 2022 surveying efforts (Table 2, Appendix D). The most common species were Manila littleneck clam and Bent-nose Macoma clam. Though oyster shells were observed on Site, they were extremely low in abundance and no oysters appeared within the sample plots excavated during surveying efforts. The Site was void of macroalgae and SAV, and was relatively uniform in composition with silty, sandy mud.

When looking at population estimates on Site, more clams appeared at higher elevations from +5 ft to +8 ft MLLW (Figure 4). The mean number of clams present in the samples at the +5 ft to +8 ft MLLW elevation band was 53.4 clams, compared with a mean number of clams at the 0 ft to +5 ft MLLW elevation band of 20.5 clams. One study suggests most hardshell clams (like those encountered during this survey) prefer sediments which are a mix of gravel and sand, whereas fine sediments increase the risk of filter feeder suffocation, and decrease the ability for larval settlement (Dethier 2006). The upper sections of the beach above +5 ft MLLW consisted of sediments that were a mix of gravel and sand much like that described by Dethier (2006), which could be one explanation as to why more clams were found at higher elevations below the riprap revetment during this survey.

A total number of 65 sample plots were originally proposed for this survey. However, due to Site conditions the number of sample plots were reduced to 20. Many areas were inaccessible due to extremely soft and contaminated sediments, or obstructions including riprap and large debris. These Site conditions also restricted sampling efforts to higher elevations, with no samples collected beyond 0 ft MLLW.

As documented by the WA State Department of Ecology (WDOE), the water and sediments on Site have documented concentrations of contaminants of concern and are listed on the 303(d) list according to the Water Quality Atlas Map. A total of six chemicals of concern were found in invertebrate tissue samples on Site, and *Enterococci* bacteria, nickel, and copper were also recorded within the water column (WDOE Water Quality Atlas Map, accessed September 2022). With these classifications and pollutants present, along with the WA Department of Health's shellfish harvest closure of all of Budd Inlet due to water pollution concerns, this beach is not suitable for shellfish harvesting.

With the proposed Shoreline Restoration efforts for West Bay Yards, filling in these areas could affect the current existing shellfish populations. Though shellfish populations may be lost during construction, the overall end result will be an improvement in the shellfish habitat conditions on Site. This project proposes to fill the Site with a mix of clean sand and gravel, as well as stabilize the shoreline, plant vegetation, and remove the debris on Site, thereby creating a more suitable habitat for shellfish and other aquatic species.

5 BIOLOGIST QUALIFICATIONS

5.1 Scott Maharry

Scott Maharry is an Associate Scientist/Senior Biologist with extensive experience in terrestrial and aquatic habitat surveys, and has been conducting natural resource assessments in the Puget Sound region for over 20 years. Scott has extensive professional

experience in fisheries and marine ecology, mitigation planning, design and monitoring, and fish and wildlife habitat assessments. Scott is a Pierce County Qualified Wetland, Fisheries and Wildlife Specialist, and earned a Bachelor's degree in Biology from Central Washington University. A brief biography can be found here: https://www.gretteassociates.com/about-us/scott-maharry

For a list of representative projects, please contact him at Grette Associates.

6 REFERENCES

Campbell, W.H. 1996. Procedures to determine intertidal populations of *Protothaca staminea, Tapes philippinarum*, and *Crassostrea gigas* in Hood Canal and Puget Sound, Washington.

Dethier, M. 2006. Native Shellfish in Nearshore Ecosystems of Washington State. Puget Sound Nearshore Partnership Report No. 2006-04. Published by Seattle District, U.S. Army Corps of Engineers, Seattle, Washington.

Grette Associates. 2022. West Bay Yards Shoreline Restoration: Intertidal Shellfish and Submerged Aquatic Vegetation Survey – Study Plan. Prepared by Grette Associates, June 2022.

Washington State Department of Ecology (WDOE). 2022. Water Quality Atlas Map [map online]. Accessed September 30, 2022. URL: https://apps.ecology.wa.gov/waterqualityatlas/WQA/Map

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INTERTIDAL SHELLFISH & SUBMERGED AQUATIC VEGETATION SURVEY REPORT

APPENDIX A: STUDY PLAN (GRETTE 2022)

WEST BAY YARDS SHORELINE RESTORATION

INTERTIDAL SHELLFISH AND SUBMERGED AQUATIC VEGETATION SURVEY – STUDY PLAN

Grette Associates LLC
ENVIRONMENTAL CONSULTANTS

WEST BAY YARDS SHORELINE RESTORATION

INTERTIDAL SHELLFISH AND SUBMERGED AQUATIC VEGETATION SURVEY – STUDY PLAN

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JUNE 2022
DATE

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1 INTRODUCTION

Grette Associates is under contract to West Bay Development Group, LLC to conduct an Intertidal Shellfish and Submerged Aquatic Vegetation (SAV) Survey at the site of the West Bay Yards Shoreline Restoration Project ("Site") in Budd Inlet. The Site is located at 1210 West Bay Drive Northwest, in Olympia, Washington (Figure 1).

The shellfish and SAV survey is being conducted at the request of the Washington Department of Fish and Wildlife (WDFW). As the proposed shoreline restoration action involves the placement of habitat fill material over existing substrates on the Site, existing shellfish and SAV populations at the Site could be affected (Figure 2). This Intertidal Shellfish and SAV Survey Study Plan has been prepared to document the methods and proposed outcomes of the survey activities at the Site for the purpose of obtaining a Scientific Collection Permit from WDFW.

The intertidal sediments on the site have been documented by the WA State Department of Ecology as containing chemical contaminants of concern. A Health and Safety Plan is being prepared to ensure the safety of the biologists conducting the sampling. Because of the contaminated sediments at the Site along with the limited number of clams anticipated to be encountered, all clams will be kept for ID verification.

2 INTERTIDAL SHELLFISH SURVEY METHODOLOGY

The following sections describe the specific methods to be employed to conduct the intertidal shellfish survey at the Site. The survey area extends from the base of the riprap revetment at approximately +5 to +6 ft MLLW down to -2 ft MLLW, and encompasses approximately 6 acres (262,180 sq ft).

2.1 Sampling Design

The intertidal shellfish survey will be conducted using the protocols found in Campbell (1996). The methods have been modified to include the use of a Trimble Geo7 XH Differential Global Positioning System in documenting the transect and sample locations for subsequent surveying.

2.1.1 Baseline and Transect Locations

Two baselines were established in accordance with Campbell (1996). The first baseline starts at the south property line and runs north-northwest along the top of the shoreline bank (Figure 3). The second baseline runs roughly west-southwest along the northern shoreline of the Site, perpendicular to the first baseline. All transects run perpendicular to these baselines.

The location of the first transect (T-1) was determined using a random number generator in Excel. A random number between 0-100 was generated, and the first transect was placed 72 feet from the start of the baseline at the south end of the site. Each subsequent transect was spaced 100 feet apart. At the location where the two baselines intersect, the next transect was spaced 100 feet west of the intersection point (Figure 3).

Following this procedure, a total of 12 transects were established on the Site. Nine transects are located along the north/south baseline, and three transects are located along the east/west baseline (Figure 3).

2.1.2 Sample Locations

Per Campbell (1996), each transect is to start at the top of the clam bed. Because this beach has not been previously surveyed, the top of the bed for the purposes of this survey was determined to be the toe of the riprap revetment, which occurs at approximately +5 to +6 ft MLLW. Each transect extends out to approximately -2 ft MLLW, which is approximately one vertical foot below the proposed extent of fill material placement.

To establish the location of the first sample point, a random number between 0-10 was chosen. The random number chosen was the distance from the transect start location to the first sample point (Sample n; Table 1). Each subsequent sample point along the transect was spaced 40 feet apart. Sample points located less than 40 feet from the end of the transect became the last sample point for the transect, in accordance with Campbell (1996). This process was repeated for each transect. The coordinate locations of each sample point will be input into the dGPS datalogger for field location. A total of 65 samples will be analyzed.

Table 1. Transect length and sample number

Transect No.	Transect Length (ft)	Sample n
1	230	6
2	197	5
3	226	6
4	251	7
5	256	7
6	253	7
7	175	5
8	181	5
9	202	6
10	158	4
11	121	4
12	102	3
Total Samples		**65**

2.2 Field Survey Methods

Sample collection will start as soon as the falling tide exposes the top of the clam bed. Three biologists will participate in the sample collection. As the tide exposes a sample location, one biologist will locate the sample point using the dGPS datalogger and place a labeled pin flag. That biologist will continue to locate sample points with the dGPS and mark them with pin flags while the other two biologists begin sampling.

The biologist will place a 1 sq ft hoop over the pin flag denoting the sample location. The biologist will excavate the substate from within the hoop to a depth of one foot, placing the material on a sorting board. The biologist will sort the substrate material back into the sample hole, while retaining all clams observed in a sample bag. Each sample bag will be labeled as follows:

- Project Name (West Bay Yards)
- Sample ID
- Date
- Sampler's Initials

The sample identification number will be formatted as follows:

Example: 0302

Where: "03" denotes the transect number, and "02" denotes the sample number.

The biologist will fill out the field datasheet at each sample location. The datasheet will include information such as sample collection date and time, transect number, sample ID, number and species of clams found, substrate type, and sampler's initials.

After the sample has been collected and the hold filled, the sample bag will be placed into a cooler with blue ice. The biologist will then proceed to the next sample location. All clams identified during the survey will be retained.

Though not expected, if oysters are encountered during the survey the surveying biologists will document the location of the oyster bed with the dGPS and document the bed with photographs. If possible, the 1-sq ft hoop will be dropped onto the bed and the number of oysters within the hoop will be estimate to provide an approximate density of oysters within the bed. Oysters will not be collected or disturbed for this survey.

At the conclusion of each sampling day, the project lead will collect the datasheets and ensure that the cooler(s) contains the correct number of sample bags. They will also mark those sample locations that have been completed on the site map to prevent duplicate sampling, and to prevent missed samples. The project lead will then place the sample bags into a chest freezer for later analysis.

2.3 Data Analysis and Reporting

Data analysis and quality assurance/quality control will be conducted to determine the clam population within the site by species. Each sample bag will be checked against the master data sheet to ensure the correct sample bag is examined. The contents of the bag will be emptied onto a sorting board, and the number and species of clams within the sample will be verified. The sample will be returned to the bag and the bag returned to the freezer for storage. The sample number will be logged as verified on the master data sheet.

The results of the survey and population estimate will be summarized in a data report to be submitted to WDFW no later than 90 days after the survey.

2.4 Submerged Aquatic Vegetation Survey Methods

The SAV survey will be conducted during low tide and in conjunction with the shellfish survey described above. Photographs of the entire Site along the shellfish transects will be taken during low tide to document the substrate condition and presence/absence of SAV. If SAV is observed, its location will be delineated using the dGPS. All SAV will be identified by species and quantified through delineation. Only SAV that is attached via holdfast to the substrate or structure will be documented, excepting *Ulva* sp.

The results of the SAV survey will be included in the shellfish data report described above.

3 BIOLOGIST QUALIFICATIONS

3.1 Scott Maharry

Scott Maharry is an Associate Scientist/Senior Biologist with extensive experience in terrestrial and aquatic habitat surveys, and has been conducting natural resource assessments in the Puget Sound region for over 20 years. Scott has extensive professional experience in fisheries and marine ecology, mitigation planning, design and monitoring, and fish and wildlife habitat assessments. Scott is a Pierce County Qualified Wetland, Fisheries and Wildlife Specialist, and earned a Bachelor's degree in Biology from Central Washington University. A brief biography can be found here: https://www.gretteassociates.com/about-us/scott-maharry

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Campbell, W.H. 1996. Procedures to determine intertidal populations of *Protothaca staminea*, *Tapes philippinarum*, and *Crassostrea gigas* in Hood Canal and Puget Sound, Washington.

Figure 1 . Site vicinity map

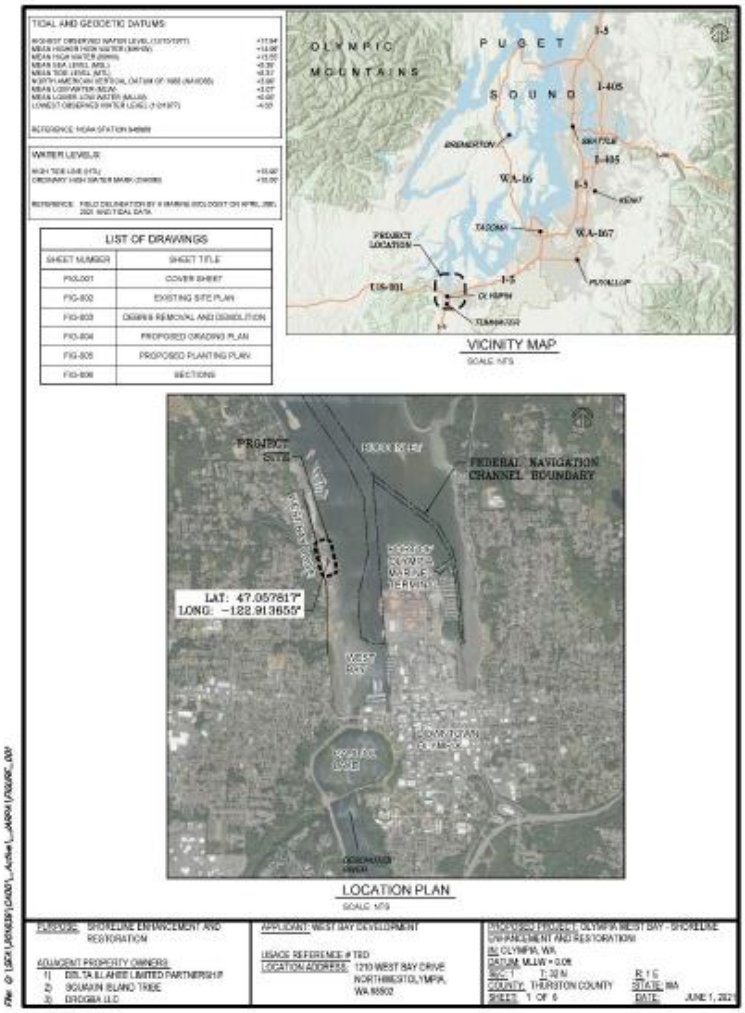

Figure 2. Proposed fill placement and survey area

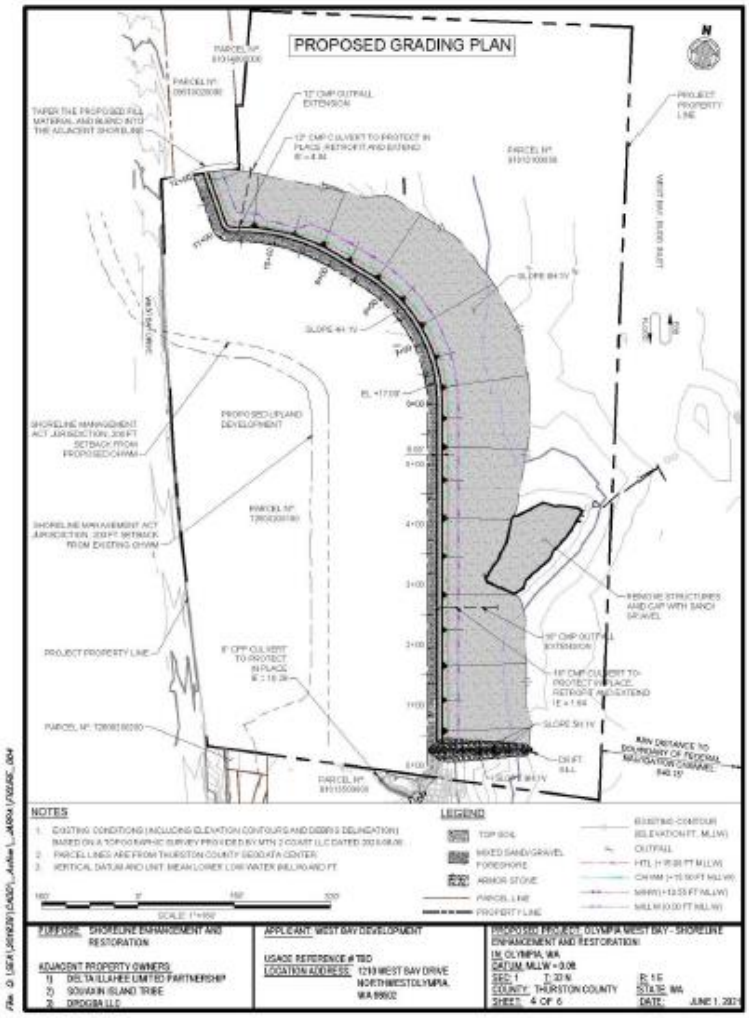

Figure 3. Transect and sample design

WEST BAY YARDS SHORELINE RESTORATION

INTERTIDAL SHELLFISH & SUBMERGED AQUATIC VEGETATION SURVEY REPORT

APPENDIX B: TRANSECT AND SAMPLING POINT COORDINATES

*Coordinates sampled during 2022 surveying efforts are highlighted in blue.

Transect	Sampling Point	Coordinates	
		Latitude	Longitude
1	S1-1	47° 3'24.94"N	122°54'45.42"W
1	S1-2	47° 3'24.98"N	122°54'44.84"W
1	S1-3	47° 3'25.02"N	122°54'44.27"W
1	S1-4	47° 3'25.06"N	122°54'43.69"W
1	S1-5	47° 3'25.10"N	122°54'43.12"W
1	S1-6	47° 3'25.14"N	122°54'42.54"W
2	S2-1	47° 3'25.93"N	122°54'45.71"W
2	S2-2	47° 3'25.97"N	122°54'45.14"W
2	S2-3	47° 3'26.01"N	122°54'44.57"W
2	S2-4	47° 3'26.05"N	122°54'43.99"W
2	S2-5	47° 3'26.09"N	122°54'43.42"W
3	S3-1	47° 3'26.90"N	122°54'45.90"W
3	S3-2	47° 3'26.94"N	122°54'45.32"W
3	S3-3	47° 3'26.98"N	122°54'44.75"W
3	S3-4	47° 3'27.02"N	122°54'44.17"W
3	S3-5	47° 3'27.07"N	122°54'43.60"W
3	S3-6	47° 3'27.10"N	122°54'43.02"W
4	S4-1	47° 3'27.88"N	122°54'46.10"W
4	S4-2	47° 3'27.92"N	122°54'45.53"W
4	S4-3	47° 3'27.97"N	122°54'44.95"W
4	S4-4	47° 3'28.01"N	122°54'44.38"W
4	S4-5	47° 3'28.05"N	122°54'43.80"W
4	S4-6	47° 3'28.09"N	122°54'43.23"W
4	S4-7	47° 3'28.14"N	122°54'42.65"W
5	S5-1	47° 3'28.86"N	122°54'46.30"W
5	S5-2	47° 3'28.91"N	122°54'45.72"W
5	S5-3	47° 3'28.95"N	122°54'45.15"W
5	S5-4	47° 3'28.99"N	122°54'44.57"W
5	S5-5	47° 3'29.03"N	122°54'44.00"W
5	S5-6	47° 3'29.08"N	122°54'43.42"W
5	S5-7	47° 3'29.12"N	122°54'42.85"W
6	S6-1	47° 3'29.84"N	122°54'46.47"W
6	S6-2	47° 3'29.88"N	122°54'45.89"W
6	S6-3	47° 3'29.92"N	122°54'45.32"W
6	S6-4	47° 3'29.96"N	122°54'44.74"W
6	S6-5	47° 3'30.00"N	122°54'44.17"W
6	S6-6	47° 3'30.04"N	122°54'43.59"W
6	S6-7	47° 3'30.08"N	122°54'43.02"W
7	S7-1	47° 3'30.82"N	122°54'46.84"W
7	S7-2	47° 3'30.86"N	122°54'46.27"W
7	S7-3	47° 3'30.91"N	122°54'45.70"W
7	S7-4	47° 3'30.95"N	122°54'45.12"W
7	S7-5	47° 3'30.99"N	122°54'44.55"W
8	S8-1	47° 3'31.79"N	122°54'47.13"W

Transect	Sampling Point	Coordinates	
		Latitude	Longitude
8	S8-2	47° 3'31.84"N	122°54'46.56"W
8	S8-3	47° 3'31.88"N	122°54'45.98"W
8	S8-4	47° 3'31.92"N	122°54'45.40"W
8	S8-5	47° 3'31.96"N	122°54'44.83"W
9	S9-1	47° 3'32.78"N	122°54'47.35"W
9	S9-2	47° 3'32.83"N	122°54'46.77"W
9	S9-3	47° 3'32.87"N	122°54'46.20"W
9	S9-4	47° 3'32.91"N	122°54'45.62"W
9	S9-5	47° 3'32.95"N	122°54'45.05"W
9	S9-6	47° 3'32.99"N	122°54'44.47"W
10	S10-1	47° 3'32.44"N	122°54'48.86"W
10	S10-2	47° 3'32.83"N	122°54'48.94"W
10	S10-3	47° 3'33.22"N	122°54'49.01"W
10	S10-4	47° 3'33.61"N	122°54'49.09"W
11	S11-1	47° 3'32.66"N	122°54'50.37"W
11	S11-2	47° 3'33.06"N	122°54'50.46"W
11	S11-3	47° 3'33.45"N	122°54'50.55"W
11	S11-4	47° 3'33.83"N	122°54'50.63"W
12	S12-1	47° 3'32.73"N	122°54'51.87"W
12	S12-2	47° 3'33.12"N	122°54'51.97"W
12	S12-3	47° 3'33.51"N	122°54'52.07"W

WEST BAY YARDS SHORELINE RESTORATION

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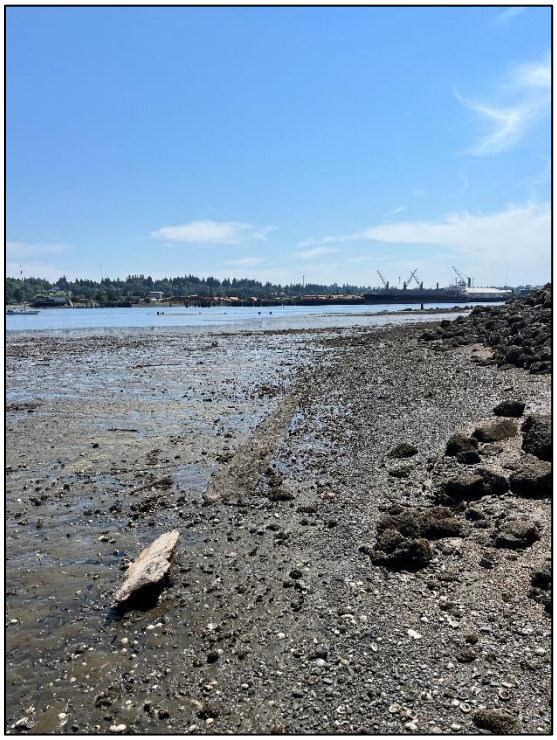
APPENDIX C: SITE PHOTOGRAPHS

Photograph 1. Site during low tide conditions, looking east towards the exposed silty/sandy mud which was void of macroalgae and aquatic vegetation. Photo taken July 27, 2022.

Photograph 2. Upper shoreline conditions, looking north during low tide. Photo taken July 27, 2022.

Photograph 3. Upper shoreline conditions, looking south during low tide. Photo taken July 27, 2022.



Photograph 4. Example of a sample plot along a transect on Site during low tide. Photo taken July 27, 2022. The flag and ring indicate the location of the sample plot.

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APPENDIX D: SAMPLE PLOT DATA

Sample Plot	MLLW Elevation (ft)	Substrate Type	Clam Species						Total Clams per Sample Plot
			Manila Littleneck	Native Littleneck	Eastern Softshell	Bent-nose Macoma	Cockle	Unidentified	
S1-1	7	Gravel/Sand	56	3	12	2	0	0	**73**
S1-2	4	Mud	0	1	0	2	0	0	**3**
S1-3	2	Mud	1	0	11	12	0	0	**24**
S2-1	7	Gravel/Sand	45	4	2	1	0	0	**52**
S2-2	3	Mud	1	1	0	53	0	0	**55**
S3-2	3	Mud	0	0	0	9	0	0	**9**
S3-3	2	Mud	1	0	0	3	1	0	**5**
S3-4	1	Mud	0	0	0	2	0	0	**2**
S4-1	7	Gravel/Sand	159	37	3	8	0	0	**207**
S4-3	3	Mud	3	0	0	7	0	0	**10**
S4-4	5	Gravel/Sand	21	9	0	8	0	0	**38**
S4-5	4	Gravel/Sand	51	11	11	9	0	0	**82**
S4-6	1	Mud	3	0	0	17	0	1	**21**
S4-7	0	Mud	0	1	0	8	0	0	**9**
S5-2	2	Mud	1	2	0	3	0	0	**6**
S7-1	7	Gravel/Sand	11	4	0	0	0	0	**15**
S10-1	5	Gravel/Sand	37	12	3	0	0	0	**52**
S11-1	8	Gravel/Sand	1	0	0	0	0	0	**1**
S12-1	7	Gravel/Sand	32	0	0	0	0	0	**32**
S12-2	6	Mud	7	0	1	3	0	0	**11**
Total Clams per Species			**430**	**85**	**43**	**147**	**1**	**1**	**707**