ATTACHMENT 5

Stormwater Pollution Prevention Plan

Construction Stormwater General Permit (CSWGP)

Stormwater Pollution Prevention Plan (SWPPP)

for

Norton Terminal Development & MTCA 3rd Interim Action
Former Kimberly Clark Site
Port of Everett

Relevant Regulatory Authority:
Department of Ecology
Northwest Regional Office

Permittee / Owner	Developer	Operator / Contractor
Port of Everett	Port of Everett	Contractor TBD

Port of Everett, Kimberly-Clark Worldwide Site Upland Area, Everett, WA

Certified Erosion and Sediment Control Lead (CESCL)

Name	Organization	Contact Phone Number
TBD	TBD	TBD

SWPPP Prepared By

Name	Organization	Contact Phone Number
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SWPPP Preparation Date
6/1/2021

Project Construction Dates

Activity / Phase	Start Date	End Date
Phase 1—Construct South Haul Road and Preload Ground Improvement	07/2021	09/2021
Phase 2—Selective Demolition	11/2021	01/2023
Phase 3 – Utility Work	11/2021	01/2023
Phase 4 – Paving	After 11/2021 (dry weather dependent)	
Phase 5 – Final paving & stormwater treatment	01/2023 expected construction completion	

List of Acronyms and Abbreviations

Acronym / Abbreviation	Explanation
303(d)	Section of the Clean Water Act pertaining to Impaired Waterbodies
BMP(s)	Best Management Practice(s)
CESCL	Certified Erosion and Sediment Control Lead
CO_2	Carbon Dioxide
CSWGP	Construction Stormwater General Permit
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
ERTS	Environmental Report Tracking System
ESC	Erosion and Sediment Control
GULD	General Use Level Designation
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Units
NWRO	Northwest Regional Office of the Department of Ecology
pH	Power of Hydrogen
RCW	Revised Code of Washington
SPCC	Spill Prevention, Control, and Countermeasure
su	Standard Units
SWMMWW	Stormwater Management Manual for Western Washington
SWPPP	Stormwater Pollution Prevention Plan
TESC	Temporary Erosion and Sediment Control
TMDL	Total Maximum Daily Load
WAC	Washington Administrative Code
WSDOT	Washington Department of Transportation
WWHM	Western Washington Hydrology Model

Project Information (1.0)

Project/Site Name: Norton Terminal Development & MTCA 3rd Interim Action
Street/Location: 2600 Federal Ave
City: Everett **State:** WA **Zip code:** 98201
Receiving waterbody: Port Gardner Bay, East Waterway

Existing Conditions (1.1)

Total acreage (including support activities such as off-site equipment staging yards, material storage areas, borrow areas).

Total acreage: 46 acres (upland area located landward of OHW)

Disturbed acreage: approximately 46 acres

Existing structures: All former mill structures were demolished in 2012 down to their foundation elements except for a warehouse having a footprint of about 131,820 square feet that remains at the south east corner of the site. The warehouse is currently vacant. Foundations from the former mill structures remain below a sand backfill material that was imported and placed over the majority of the site as part of a 2nd Interim Action in fall 2020.

Landscape topography: The site is relatively flat. Prior interim cleanup actions have graded the site to form a narrow 'bowl' shape that is oriented north-south and is located about 200-feet from the shoreline. The northwest and southwest corners of the site slope towards the west to an existing berm along the shoreline.

Drainage patterns: Stormwater on the site has been reported to fully infiltrate with no discharge from the site since the former mill structures were removed in 2012. During significant precipitation events, stormwater has been observed to pond in the graded 'bowl' condition and at the northwest and southwest corners of the site where stormwater is eventually infiltrated into the ground.

Existing Vegetation: The site is a former industrial property that has been cleared and graded in association with prior interim cleanup actions. Limited landscaping occurs on the site and vegetation is limited to opportunistic species adapted to disturbed areas (i.e. weeds and blackberry) and overgrown landscape areas including some medium sized trees on the northwest edge and near the northeast access at Norton Avenue.

Critical Areas (wetlands, streams, high erosion risk, steep or difficult to stabilize slopes): None.

List of known impairments for 303(d) listed or Total Maximum Daily Load (TMDL) for the receiving waterbody:

Based on review of Ecology's 303(d) list, the East Waterway adjacent to the project Site is listed for sediment (parameter: sediment bioassay). Port Gardner is not listed on Ecology's list of TMDLs in Snohomish County. Applicable 303(d) map and listing for Port Gardner, East Waterway, is provided in Appendix F.

Table 1 – Summary of Site Pollutant Constituents: Appendix G includes a list of suspected and/or known contaminants associated with site soil.

Proposed Construction Activities (1.2)

Description of site development (example: subdivision):
The project includes two interrelated proposed actions—an interim action cleaup under MTCA and development of a secure marine cargo terminal (named Norton Terminal) through the Port of Everett Maritime Industrial Expansion (MIE) program. Site redevelopment will be limited to the upland area above ordinary high water. Development will include grading and paving of the site and installation of utilities including water, sewer, electrical, communications, lighting andstormwater collection, conveyance and treatment, including outfall replacement.

Description of construction activities (example: site preparation, demolition, excavation):

Construction Activities are split into 5 main phases:

- Phase 1: south haul road and preload stockpiling for ground improvement.
- Phase 2: selective demolition
- Phase 3: installation of utilities (storm drain, sewer, water, power and communications) and earthwork including grading site to pavement subgrade
- Phase 4: phased site paving, stormwater treatment system installation
- Phase 5: final paving (transition to final post-construction conditions)

At the completion of construction and final site paving of approximately 30 acres of the site, the facility will transition from coverage under the CSWGP to coverage under the Industrial Stormwater General Permit (ISGP). For that post-construction phase, precipitation falling on final site paving will be collected by the permanent storm drain system where it will be routed to a new Chitosan-Enhanced Sand Filtration (CESF) system for treatment before discharge to East Waterway. The existing berm along wharf will be maintained, where a portion of the site will remain undeveloped to accommodate a future wharf renovation project. An area at northwest corner of site is reserved for a future maritime tenant. This area will be covered with compacted gravel. Surface runoff will be collected by a gravel interceptor trench and routed to the CESF system for treatment.

Description of site drainage including flow from and onto adjacent properties:

Under the previous cleanup action (Second Interim Action), the following activities were completed and now constitute the existing condition prior to this proposed construction:

- Plugging outfalls and pipes along the shoreline to prevent discharge from the site.
- Grading the site to form a slight bowl condition about 200-feet from the shoreline. This condition maintains stormwater on-site where it is infiltrated into the ground.
- Construction of a berm along the shoreline as an added measure of protection. The berm is approximately 2-feet high and 3-feet wide at its top.
- Placement of a granular/sand backfill material over the site that allows stormwater to infiltrate.

See Site Maps in Appendix A. Construction activites are split into 5 main phases as described above. During Phases 1-3, the existing berm will be maintained. Stormwater will infiltrate onsite; no discharge will come from the site.

During Phase 4, the existing berm will be maintained. Stormwater from non-paved areas of the site will infiltrate and not discharge. Prior to Phase 5, Stormwater from paved areas of the site will be collected and treated by a Chitosan-Enhanced Sand Filtration unit (CESF) before discharge to the East Waterway.

Description of final stabilization (example: extent of revegetation, paving, landscaping):

Final developed conditions (Phase 5):

- Maintains existing berm along wharf where a portion of the site will remain undeveloped to accommodate a future wharf renovation project.
- Pave approximately 30 acres of the site. Precipitation falling on final site paving will be collected by the permanent storm drain system where it will be routed to the CESF system for treatment before discharge to East Waterway.
- An area at northwest corner of site is reserved for a future maritime tenant. This area will be covered with compacted gravel. Surface runoff will be collected by a gravel interceptor trench and routed to the CESF system for treatment.

***Contaminated Site Information*:**
Proposed activities regarding contaminated soils or groundwater (example: on-site treatment system, authorized sanitary sewer discharge):

Contamination at the Site upland has been thoroughly investigated under close supervision of Department of Ecology Toxics Cleanup Program (TCP) staff since 2012, including collection of thousands of soil samples, groundwater monitoring at more than 130 monitoring wells, and sampling sediment porewater and seeps along the intertidal shoreline. Figure 1 depicts locations for the hundreds of explorations completed for soil and/or groundwater sampling at the Site.1 In addition, a pair of MTCA interim actions (2013–2014 and 2020) accomplished substantial cleanup of the Site—specifically removing soil contamination that posed the greatest risk to groundwater quality. Finally, approximately 250,000 tons of demolition debris (crushed concrete predominantly) that created high-pH groundwater was fully removed from the Site in 2020. Following the removal actions, widespread, low-level contamination in soil and groundwater remains across much of the Site. The Port's Third Interim Action will construct a low-permeability pavement section across a portion of the Site that will minimize long-term infiltration into site soil. Information related to site soil contamination is provided in Appendix G.

Construction Stormwater Best Management Practices (BMPs) (2.0)

The SWPPP is a living document reflecting current conditions and changes throughout the life of the project. These changes may be informal (i.e. hand-written notes and deletions). Update the SWPPP when the CESCL has noted a deficiency in BMPs or deviation from original design.

The 13 Elements (2.1)

Applicable construction BMPs from the Stormwater Management Manual for Western Washington are provided in Appendix B.

Element 1: Preserve Vegetation / Mark Clearing Limits (2.1.1)

List and describe BMPs:

A. Before beginning land-disturbing activities, including clearing and grading, clearly mark all clearing limits, sensitive areas and their buffers, and trees that are to be preserved within the construction area.
B. Retain the duff layer, native topsoil, and natural vegetation in an undisturbed state to the maximum degree practicable

Site Response: Clearing limits have already marked by existing chain link fence and concrete block barrier and berm perimeter protection as part of prior interim cleanup actions. Vegetation on site consists mostly of invasive species that will not be preserved.

Installation Schedules: Not applicable, already installed.

Inspection and Maintenance plan: Weekly inspections will include examining the condition of construction area perimeter fencing, ecology blocks, and earthen berms. Any necessary repairs will be noted (form in Appendix D) and promptly implemented.

Element 2: Establish Construction Access (2.1.2)

List and describe BMPs:

A. Limit construction vehicle access and exit to one route, if possible.
B. Stabilize access points with a pad of quarry spalls, crushed rock, or other equivalent BMPs, to minimize tracking sediment onto roads.
C. Locate wheel wash or tire baths on site, if the stabilized construction entrance is not effective in preventing tracking sediment onto roads.
D. If sediment is tracked off site, clean the affected roadway thoroughly at the end of each day, or more frequently as necessary (for example, during wet weather). Remove sediment from roads by shoveling, sweeping, or pickup and transport of the sediment to a controlled sediment disposal area.
E. Conduct street washing only after sediment removal in accordance with Special Condition S9.D.2.d.
F. Control street wash wastewater by pumping back on site or otherwise preventing it from discharging into systems tributary to waters of the State.

Site Response: Construction access will be provided in conformance with City of Everett Standard Drawing 201. Wheel wash will be provided as needed.

Installation Schedules: The haul road will be constructed during Phase 1 of construction, July-September 2021.

Inspection and Maintenance plan: The condition of the haul road, and the potential need to establish a wheel wash to better control truck tracking of sediment, will be assessed during each weekly inspection (form in Appendix D).

Element 3: Control Flow Rates (2.1.3)

List and describe BMPs:

A. Protect properties and waterways downstream of construction sites from erosion and the associated discharge of turbid waters due to increases in the velocity and peak volumetric flow rate of stormwater runoff from the project site, as required by local plan approval authority.
B. Where necessary to comply with Special Condition S9.D.3.a, construct stormwater infiltration or detention BMPs as one of the first steps in grading. Assure that detention BMPs function properly before constructing site improvements (for example, impervious surfaces).
C. If permanent infiltration ponds are used for flow control during construction, protect these facilities from sedimentation during the construction phase.

Site Response: Precipitation falling on site has been maintained by infiltration with no surface water discharge since the mill was demolished in 2012. Precipitation will continue to be controlled by infiltration across the site during construction.

Installation Schedules: Not applicable, already in place.

Inspection and Maintenance plan: Confirmation of continued infiltration of all site stormwater will be part of the weekly inspection (form in Appendix D).

Responsible Staff: The site CESCL is responsible for conducting the weekly inspections.

Element 4: Install Sediment Controls (2.1.4)

List and describe BMPs:

The Permittee must design, install and maintain effective erosion controls and sediment controls to minimize the discharge of pollutants. At a minimum, the Permittee must:

A. Construct sediment control BMPs (sediment ponds, traps, filters, infiltration facilities, etc.) as one of the first steps in grading. These BMPs must be functional before other land disturbing activities take place.
B. Minimize sediment discharges from the site. The design, installation and maintenance of erosion and sediment controls must address factors such as the amount, frequency, intensity and duration of precipitation, the nature of resulting stormwater runoff, and soil characteristics, including the range of soil particle sizes expected on the site.
C. Direct stormwater runoff from disturbed areas through a sediment pond or other appropriate sediment removal BMP, before the runoff leaves a construction site or before discharge to an infiltration facility. Runoff from fully stabilized areas may be discharged without a sediment removal BMP, but must meet the flow control performance standard of Special Condition S9.D.3.a.
D. Locate BMPs intended to trap sediment on site in a manner to avoid interference with the movement of juvenile salmonids attempting to enter off-channel areas or drainages.
E. Provide and maintain natural buffers around surface waters, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration, unless infeasible.
F. Where feasible, design outlet structures that withdraw impounded stormwater from the surface to avoid discharging sediment that is still suspended lower in the water column.

Site Response: Construction access will be provided in conformance with City of Everett Standard Drawing 201. As part of prior interim cleanup actions, the site has been graded to form a closed, internal depression that infiltrates all precipitation falling on the site. There is no surface water discharge from the site. As an added measure of protection, a concrete block barrier and berm has been constructed along the site’s west and north boundary. Each of these elements will be maintained during construction. Temporary silt fence will be used to supplement the existing berm protection and compost socks, wattles, or sand bags will be used around soil stockpile management areas. Outfall replacement excavation will be performed in dry weather during low tide in a single tide cycle. If the work cannot be completed in a single tide cycle, exposed soils will be temporarily stabilized with rock or other approved measures prior to tidal submersion. Work will continue during the next low tide period.

Installation Schedules: The haul road will be constructed during Phase 1 of construction, July-September 2021. Construction phases 2-5 are scheduled for November 2021 – January 2023.

Inspection and Maintenance plan: Inspection to confirm that erosion control BMPs are in place are part of the weekly inspection (form in Appendix D).

Responsible Staff: The site CESCL is responsible for conducting the weekly inspections.

Element 5: Stabilize Soils (2.1.5)

West of the Cascade Mountains Crest

Season	Dates	Number of Days Soils Can be Left Exposed
During the Dry Season	May 1 – September 30	7 days
During the Wet Season	October 1 – April 30	2 days

Soils must be stabilized at the end of the shift before a holiday or weekend if needed based on the weather forecast.

List and describe BMPs:

A. The permittee must stabilize exposed and unworked soils by application of effective BMPs that prevent erosion. Applicable BMPs include but are not limited to: temporary and permanent seeding, sodding mulching, plastic covering, erosion control fabrics and matting, soil application of polyacrylamide (PAM), the early application of gravel base on areas to be paved, and dust control.
B. The Permittee must control stormwater volume and velocity within the site to minimize soil erosion.
C. The Permittee must control stormwater discharges, including both peak flow rates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and stream bank erosion.
D. The Permittee must stabilize soils at the end of the shift before a holiday or weekend if needed based on the weather forecast.
E. The Permittee must stabilize soil stockpiles from erosion, protected with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways, and drainage channels.
F. The Permittee must minimize the amount of soil exposed during construction activity.
G. The Permittee must minimize the disturbance of steep slopes.
H. The Permittee must minimize soil compaction and, unless infeasible, preserve topsoil.

Site Response: Stockpile management areas will be stabilized with plastic covering. Dust control BMP’s will be implemented.

Outfall replacement work will be constructed in the ‘dry’ during low tide in a single tide cycle. If the work cannot be completed in a single tide cycle, exposed soils will be temporarily stabilized with rock or other approved measures prior to tidal submersion. Work will continue during the next low tide period.

Upon completion of project, the majority of site will be covered with pavement, except for separately delineated leasehold areas along north end and warehouse area at south east corner which will be developed by a future tenant. Precipitation will continue to infiltrate into the ground at these areas until developed.

Anticipated project dates: Start date: June 2021 End date: January 2023

Inspection and Maintenance plan: There will be construction activity during the wet season for this project, and soil stabilization BMPs will be inspected weekly and maintained as needed.

Responsible Staff: The site CESCL is responsible for conducting the weekly inspections and completing the inspection form (Appendix D).

Element 6: Protect Slopes (2.1.6)

Will steep slopes be present at the site during construction?
No

List and describe BMPs:

A. The Permittee must design and construct cut-and-fill slopes in a manner to minimize erosion. Applicable practices include, but are not limited to, reducing continuous length of slope with terracing and diversions, reducing slope steepness, and roughening slope surfaces (for example, track walking).
B. The Permittee must divert off-site stormwater (run-on) or groundwater away from slopes and disturbed areas with interceptor dikes, pipes, and/or swales. Off-site stormwater should be managed separately from stormwater generated on the site.
C. At the top of slopes, collect drainage in pipe slope drains or protected channels to prevent erosion.
D. West of the Cascade Mountains Crest: Temporary pipe slope drains must handle the peak 10-minute flow rate from a Type 1A, 10-year, 24-hour frequency storm for the developed condition. Alternatively, the 10-year, 1-hour flow rate predicted by an approved continuous runoff model, increased by a factor of 1.6, may be used. The hydrologic analysis must use the existing land cover condition for predicting flow rates from tributary areas outside the project limits. For tributary areas on the project site, the analysis must use the temporary or permanent project land cover condition, whichever will produce the highest flow rates. If using the Western Washington Hydrology Model (WWHM) to predict flows, bare soil areas should be modeled as “landscaped” area”.
E. Place excavated material on the uphill side of trenches, consistent with safety and space considerations.
F. Place check dams at regular intervals within constructed channels that are cut down a slope.

Site Response: Not applicable, site is flat.

Installation Schedules: N/A

Inspection and Maintenance plan: N/A

Responsible Staff: N/A

Element 7: Protect Drain Inlets (2.1.7)

List and describe BMPs:

A. Protect all storm drain inlets made operable during construction so that stormwater runoff does not enter the conveyance system without first being filtered or treated to remove sediment.
B. Clean or remove and replace inlet protection devices when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).

Site Response: Storm drain inlet protection will be provided in Federal Avenue during watermain extension work.

Existing inlet protection at warehouse loading dock area will be maintained. All other on-site inlets were removed during prior interim cleanup actions.

Element 8: Stabilize Channels and Outlets (2.1.8)

Provide stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes, and downstream reaches, will be installed at the outlets of all conveyance systems.

List and describe BMPs:

A. Design, construct and stabilize all on-site conveyance channels to prevent erosion from the following expected peak flows:
B. West of the Cascade Mountains Crest: Channels must handle the peak 10-minute flow rate from a Type 1A, 10-year, 24-hour frequency storm for the developed condition. Alternatively, the 10-year, 1-hour flow rate indicated by an approved continuous runoff model, increased by a factor of 1.6, may be used. The hydrologic analysis must use the existing land cover condition for predicting flow rates from tributary areas outside the project limits. For tributary areas on the project site, the analysis must use the temporary or permanent project land cover condition, whichever will produce the highest flow rates. If using the WWHM to predict flows, bare soil areas should be modeled as "landscaped area.”

Site Response: Outfall replacements will be stabilized with a riprap energy dissipator.

Element 9: Control Pollutants (2.1.9)

The following pollutants are anticipated to be present on-site:

Table 2 – Pollutants

Pollutant (and source, if applicable)
See Appenix G for a listing of pollutant parameters present in site soil.

List and describe BMPs:

A. Handle and dispose of all pollutants, including waste materials and demolition debris that occur on site in a manner that does not cause contamination of stormwater.
B. Provide cover, containment, and protection from vandalism for all chemicals, liquid products, petroleum products, and other materials that have the potential to pose a threat to human health or the environment. On-site fueling tanks must include secondary con-tainment. Secondary containment means placing tanks or containers within an imper-vious structure capable of containing 110% of the volume contained in the largest tank within the containment structure. Double-walled tanks do not require additional secondary containment.
C. Conduct maintenance, fueling, and repair of heavy equipment and vehicles using spill prevention and control measures. Clean contaminated surfaces immediately following any spill incident.
D. Discharge wheel wash or tire bath wastewater to a separate on-site treatment system that prevents discharge to surface water, or to the sanitary sewer, with local sewer district approval.
E. Apply fertilizers and pesticides in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Follow manufacturers' label requirements for application rates and procedures.
F. Use BMPs to prevent contamination of stormwater runoff by pH-modifying sources. The sources for this contamination include, but are not limited to: recycled concrete stockpiles, bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, waste streams generated from concrete grinding and sawing, exposed aggregate processes, dewatering concrete vaults, concrete pumping and mixer washout waters.
G. Adjust the pH of stormwater if necessary to prevent violations of water quality standards.
H. Assure that washout of concrete trucks is performed off site or in designated concrete washout areas only. Do not wash out concrete truck drums or concrete handling equipment onto the ground, or into storm drains, open ditches, streets, or streams. Washout of small concrete handling equipment may be disposed of in a formed area awaiting concrete where it will not contaminate surface or ground water. Do not dump excess concrete on site, except in designated concrete washout areas. Concrete spillage or

concrete discharge directly to ground water or surface waters of the State is prohibited. Do not wash out to formed areas awaiting infiltration BMPs.

I. Obtain written approval from Ecology before using chemical treatment other than CO2, dry ice, or food grade vinegar to adjust pH.

J. Uncontaminated water from water-only based shaft drilling for construction of building, road, and bridge foundations may be infiltrated provided the wastewater is managed in a way that prohibits discharge to surface waters. Prior to infiltration, water from water-only based shaft drilling that comes into contact with curing concrete must be neutralized until pH is in the range of 6.5 to 8.5 (su).

Site Response: A soil & groundwater management plan will be developed to properly handle and dispose of waste materials.

The project will utilize BMP C153 Material Delivery, Storage, and Containment to implement good housekeeping measures. Specific source control BMP's will include:

- Regular inspection of all vehicles, equipment and petroleum storage/dispensing areas to detect any leaks or spills, and to identify maintenance needs for spill prevention.
- Spill prevention measures such as drip pans will be used for maintenance and repair of vehicles and equipment.
- BMP C151 Concrete Handling Measures will be utilized as needed.
- BMP C106 Wheel Wash Implementation will be utilized as needed.
- Portable sanitation facilities will be regularly maintained.
- Solid waste other than soil will be stored in clearly marked containers.

Installation Schedules: The site depression and ponding/infiltration within the unpaved site is already in place, along with a perimeter soil berm. The berm will be extended as part of the first phase of work.

Inspection and Maintenance plan: If ever stormwater is found to be ponding up against the soil berms and flowing over, around, or permeating through the soil berms (most likely in the southwest and the northwest portions of the site, then pumps will be utilized to retain and control that stormwater. Stormwater will either be pumped back into lower depression areas of the site for infiltration or will be pumped to onsite tanks for temporary containment until it can be later infiltrated into site soil or hauled to a licensed facility offsite for proper treatment and disposal.

Responsible Staff: The site CESCL has lead responsibility to ensure that no stormwater is discharging from the site to surface water.

Will maintenance, fueling, and/or repair of heavy equipment and vehicles occur on-site?

The contractor has not yet been selected for the construction work, and this section of the SWPPP will need to be updated with any plans that the contractor has for maintenance, fueling, and/or repair of heavy equipment and vehicles to occur onsite. If yes, description of spill prevention and control measures that are to be in place while conducting maintenance, fueling, and repair of heavy equipment and vehicles must be added to this SWPPP.

If yes, the total volume of fuel on-site and capacity of impervious secondary containment for each fuel tank will also need to be provided.

List and describe BMPs:

A. Handle and dispose of all pollutants, including waste materials and demolition debris that occur on site in a manner that does not cause contamination of stormwater.
B. Provide cover, containment, and protection from vandalism for all chemicals, liquid products, petroleum products, and other materials that have the potential to pose a threat to human health or the environment. Minimize storage of hazardous materials on-site. Safety Data Sheets (SDS) should be supplied for all materials stored. Chemicals should be kept in their original labeled containers. On-site fueling tanks must include secondary containment. Secondary containment means placing tanks or containers within an impervious structure capable of containing 110% of the volume of the largest tank within the containment structure. Double-walled tanks do not require additional secondary containment.
C. Conduct maintenance, fueling, and repair of heavy equipment and vehicles using spill prevention and control measures. Clean contaminated surfaces immediately following any spill incident.

Site Response: A soil & groundwater management plan will be developed to properly handle and dispose of waste materials.
The project will utilize BMP C153 Material Delivery, Storage, and Containment to implement good housekeeping measures. Specific source control BMP's will include:

- Regular inspection of all vehicles, equipment and petroleum storage/dispensing areas to detect any leaks or spills, and to identify maintenance needs for spill prevention.
- Spill prevention measures such as drip pans will be used for maintenance and repair of vehicles and equipment.
- BMP C151 Concrete Handling Measures will be utilized as needed.
- BMP C106 Wheel Wash Implementation will be utilized as needed.
- Portable sanitation facilities will be regularly maintained.
- Solid waste other than soil will be stored in clearly marked containers.

Will wheel wash or tire bath system BMPs be used during construction?
Yes, as needed.

List and describe BMPs:

A. Discharge wheel wash or tire bath wastewater to a separate on-site treatment system that prevents discharge to surface water, such as closed-loop recirculation or upland land application, or to the sanitary sewer with local sewer district approval.

Wheel wash wastewater that can no longer be reused and requires disposal will be hauled offsite to a licensed facility for proper treatment and disposal, until authorization is attained for onsite disposal to the sanitary sewer. Once approval is obtained from the City for onsite disposal to the sanitary sewer system, that approval letter will be included under Correspondence in Appendix C.

Will pH-modifying sources be present on-site?

Yes

Table 3 – pH-Modifying Sources

	None
X	Bulk cement
	Cement kiln dust
	Fly ash
X	Other cementitious materials
X	New concrete washing or curing waters
X	Waste streams generated from concrete grinding and sawing
	Exposed aggregate processes
X	Dewatering concrete vaults and abandoned pipes
X	Concrete pumping and mixer washout waters
	Recycled concrete
	Other (i.e. calcium lignosulfate) [please describe]

List and describe BMPs:

A. Apply fertilizers and pesticides in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Follow manufacturers' label requirements for application rates and procedures.
B. Use BMPs to prevent contamination of stormwater runoff by pH-modifying sources. The sources for this contamination include, but are not limited to: recycled concrete stockpiles, bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, waste streams generated from concrete grinding and sawing, exposed aggregate processes, dewatering concrete vaults, concrete pumping and mixer washout waters.
C. Adjust the pH of stormwater if necessary to prevent violations of water quality standards.
D. Assure that washout of concrete trucks is performed off site or in designated concrete washout areas only. Do not wash out concrete truck drums or concrete handling equipment onto the ground, or into storm drains, open ditches, streets, or streams. Washout of small concrete handling equipment may be disposed of in a formed area awaiting concrete where it will not contaminate surface or ground water. Do not dump excess concrete on site, except in designated concrete washout areas. Concrete spillage or concrete discharge directly to ground water or surface waters of the State is prohibited. Do not wash out to formed areas awaiting infiltration BMPs.
E. Obtain written approval from Ecology before using chemical treatment other than CO2, dry ice, or food grade vinegar to adjust pH.
F. Uncontaminated water from water-only based shaft drilling for construction of building, road, and bridge foundations may be infiltrated provided the wastewater is managed in a

way that prohibits discharge to surface waters. Prior to infiltration, water from water-only based shaft drilling that comes into contact with curing concrete must be neutralized until pH is in the range of 6.5 to 8.5 (su).

Site Response: A soil & groundwater management plan will be developed to properly handle and dispose of waste materials.
The project will utilize BMP C153 Material Delivery, Storage, and Containment to implement good housekeeping measures. Specific source control BMP's will include:

- Regular inspection of all vehicles, equipment and petroleum storage/dispensing areas to detect any leaks or spills, and to identify maintenance needs for spill prevention.
- Spill prevention measures such as drip pans will be used for maintenance and repair of vehicles and equipment.
- BMP C151 Concrete Handling Measures will be utilized as needed.
- BMP C106 Wheel Wash Implementation will be utilized as needed.
- Portable sanitation facilities will be regularly maintained.
- Solid waste other than soil will be stored in clearly marked containers.

If stormwater may discharge from the site that is outside the pH range of 6.5 to 8.5 due to exposure to cement, carbon dioxide gas or dry ice will be used to reduce the pH to within that range. Approval from Ecology will be sought before any other type of pH adjustment chemical treatment.

Responsible Staff: The site CESCL will have lead responsibility

Concrete trucks must not be washed out onto the ground, or into storm drains, open ditches, streets, or streams. Excess concrete must not be dumped on-site, except in designated concrete washout areas with appropriate BMPs installed.

Element 10: Control Dewatering (2.1.10)

Excavations for utility installations that require dewatering will treat groundwater and discharge to City sewer in conformance with an approved discharge authorization. Upon Ecology permission, excavation dewatering may also be discharged on-site where it will be allowed to re-infiltrate into the ground.

Table 4 – Dewatering BMPs

X	Infiltration
X	Transport off-site in a vehicle (vacuum truck for legal disposal)
X	Ecology-approved on-site chemical treatment or other suitable treatment technologies
X	Sanitary or combined sewer discharge with local sewer district approval (last resort)
X	Use of sedimentation bag with discharge to ditch or swale (small volumes of localized dewatering)

List and describe BMPs:

A. a. Permittees must discharge foundation, vault, and trench dewatering water, which have characteristics similar to stormwater runoff at the site, in conjunction with BMPs to reduce sedimentation before discharge to a sediment trap or sediment pond.
B. b. Permittees may discharge clean, non-turbid dewatering water, such as well-point groundwater, to systems tributary to, or directly into surface waters of the State, as specified in Special Condition S9.D.8, provided the dewatering flow does not cause erosion or flooding of receiving waters. Do not route clean dewatering water through stormwater sediment ponds. Note that “surface waters of the State” may exist on a construction site as well as off site; for example, a creek running through a site.

Site Response: Excavations that require dewatering will treat groundwater and discharge to City sewer in conformance with an approved discharge authorization. Upon Ecology permission, excavation dewatering may also be discharged on-site where it will be allowed to re-infiltrate into the ground.

Element 11: Maintain BMPs (2.1.11)

All temporary and permanent Erosion and Sediment Control (ESC) BMPs shall be maintained and repaired as needed to ensure continued performance of their intended function.

Maintenance and repair shall be conducted in accordance with each particular BMP specification (see *Volume II of the SWMMWW*).

Visual monitoring of all BMPs installed at the site will be conducted at least once every calendar week and within 24 hours of any stormwater or non-stormwater discharge from the site (form in Appendix D). If the site becomes inactive and is temporarily stabilized, the inspection frequency may be reduced to once every calendar month.

All temporary ESC BMPs shall be removed within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed.

Trapped sediment shall be stabilized on-site or removed. Disturbed soil resulting from removal of either BMPs or vegetation shall be permanently stabilized.

Additionally, protection must be provided for all BMPs installed for the permanent control of stormwater from sediment and compaction. BMPs that are to remain in place following completion of construction shall be examined and restored to full operating condition. If sediment enters these BMPs during construction, the sediment shall be removed and the facility shall be returned to conditions specified in the construction documents.

TESC will include the following elements:

1. Maintain site's existing perimeter protection consisting of concrete block barrier and berm protection. Berm protection will be extended at site's south and north ends to provide a continuous barrier with no gaps.
2. Maintain infiltration of all on-site drainage and allow no surface water discharge from the site's exposed soils. Surface water discharge to the East Waterway will not commence until after the final top course of asphalt pavement is in place. Precipitation falling on the new asphalt pavement will be routed through the CESF treatment system prior to discharge to East Waterway. Precipitation falling on the site's exposed soils during construction will be infiltrated into the ground and will not result in a surface water discharge.
3. Supplement existing site perimeter protection as needed with temporary silt fence per City of Everett Standard Drawing 214.
4. Provide construction entrance per City of Everett Standard Drawing 201.
5. Provide wheel wash as necessary.
6. Excavations that require dewatering will treat groundwater and discharge to City sewer in conformance with an approved discharge authorization. Upon Ecology permission, excavation dewatering may also be discharged on-site where it will be allowed to re-infiltrate into the ground.
7. Dust control will be implemented per standard BMP's.
8. Cover protection of stockpiled materials will be implemented per standard BMP's.
9. Concrete handling BMPS's will be implemented.
10. Street sweeping will be implemented per standard BMP's.

Element 12: Manage the Project (2.1.12)

The project will be managed based on the following principles:

- Projects will be phased to the maximum extent practicable and seasonal work limitations will be taken into account.
- Inspection and monitoring:
  - Inspection, maintenance and repair of all BMPs will occur as needed to ensure performance of their intended function.
  - Site inspections and monitoring will be conducted in accordance with Special Condition S4 of the CSWGP. The current version of the CSWGP can be downloaded from the link listed in Appendix E. Sampling locations are indicated on the Site Map. Sampling station(s) are located in accordance with applicable requirements of the CSWGP.
- Maintain an updated SWPPP.
  - The SWPPP will be updated, maintained, and implemented in accordance with Special Conditions S3, S4, and S9 of the CSWGP.

As site work progresses the SWPPP will be modified routinely to reflect changing site conditions. The SWPPP will be reviewed monthly to ensure the content is current.

Table 5 – Management

X	Design the project to fit the existing topography, soils, and drainage patterns
X	Emphasize erosion control rather than sediment control
X	Minimize the extent and duration of the area exposed
X	Keep runoff velocities low
X	Retain sediment on-site
X	Thoroughly monitor site and maintain all ESC measures
X	Schedule major earthwork during the dry season
	Other (please describe)

Site Response: Erosion & sedimentation control BMPs for this project shall be managed on the following principles:

- Inspection, maintenance and repair of BMPs will occur, as needed, to ensure performance of their intended function.
- The SWPPP will be modified whenever there is a change in the design, construction, operation, or maintenance at the construction site that could have a significant effect on the discharge of pollutants to waters of the state.
- The SWPPP shall be modified if, during inspections, it is determined that the SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater. The SWPPP (including inspection form – Appendix D) shall be modified as necessary to include additional or modified BMPs to correct problems identified.

Element 13: Protect Low Impact Development (LID) BMPs (2.1.13)

Site Response: Not applicable—No LID BMPs will be constructed or impacted.

Pollution Prevention Team (3.0)

Table 7 – Team Information

Title	Name(s)	Phone Number
Certified Erosion and Sediment Control Lead (CESCL)	Contractor - TBD	[Insert Number]
Resident Engineer	Elise Gronewald, Port of Everett	425-388-0630
Emergency Ecology Contact		[Insert Number]
Emergency Permittee/ Owner Contact	Elise Gronewald, Port of Everett	425-388-0630
Non-Emergency Owner Contact	Elise Gronewald, Port of Everett	425-388-0630
Monitoring Personnel	Contractor - TBD	[Insert Number]
Ecology Regional Office	Northwest Regonal Office	425-649-7000

Monitoring and Sampling Requirements (4.0)

Monitoring includes visual inspection, sampling for water quality parameters of concern, and documentation of the inspection and sampling findings in a site log book. A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements
- Site inspections
- Stormwater sampling data

The site log book must be maintained on-site within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

Numeric effluent limits may be required for certain discharges to 303(d) listed waterbodies. See CSWGP Special Condition S8 and Section 5 of this template.

Complete the following paragraph for sites that discharge to impaired waterbodies for fine sediment, turbidity, phosphorus, or pH:

The receiving waterbody, Port Gardner Bay, East Waterway, is impaired for: sediment; parameter: sediment bioassay.

All stormwater and dewatering discharges from the site are subject to benchmarks of 8.5 su for pH and/or 25 NTU for turbidity. Any dewatering water measured with pH greater than 9.0 cannot be infiltrated onsite (regardless of treatment) and must be discharged to the sanitary sewer (if approved) or taken offsite for proper treatment and disposal (see section 4.2.2). If Ecology issues an Administrative Order that imposes specific monitoring requirements and/or an effluent limit (e.g., for TSS), then this SWPPP must be updated to reflect those added requirements and limitations.

Site Inspection (4.1)

Site inspections will be conducted at least once every calendar week and within 24 hours following any discharge from the site. An inspection form is provided in Appendix D. If the site is temporarily stabilized and inactive, the required frequency is reduced to once per calendar month.

Stormwater Quality Sampling (4.2)

As discussed in this SWPPP this site has demonstrated the ability to infiltrate all stormwater, and no stormwater discharge to surface water is expected during most of the construction period. The site topography and the site perimeter berms are indicated on the site maps (see Drawing C1.1 in Appendix A). There will be no need for stormwater quality sampling when there is no construction stormwater discharge to surface water. An exception to that statement will be when the new asphalt pavement is installed and the CESF treatment system is installed and operational. The discharge sampling point at that time will be the effluent of the CESF system.

A sampling plan for CESF system discharge of construction stormwater during the end of the construction period (see Drawing C4.1 in Appendix A for planned paved conditions and location of planned CESF stormwater treatment system), and for any other time when an unexpected construction stormwater discharge to surface water might occur, is provided below.

Turbidity Sampling (4.2.1)

CSWGP requirements include calibrated turbidity meter use to sample site construction stormwater discharges to surface water. Sampling will be conducted at all discharge points at least once per calendar week.

Method for sampling turbidity: by Standard Methods or field measurement.

Table 8 – Turbidity Sampling Method

X	Turbidity Meter/Turbidimeter (required for disturbances 5 acres or greater in size)
	Transparency Tube (option for disturbances less than 1 acre and up to 5 acres in size)

The benchmark for turbidity value is 25 nephelometric turbidity units (NTU).

If the discharge's turbidity is 26 to 249 NTU, the following steps will be conducted:

1. Review the SWPPP for compliance with Special Condition S9. Make appropriate revisions within 7 days of the date the discharge exceeded the benchmark.
2. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible. Address the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period.
3. Document BMP implementation and maintenance in the site log book.

If the turbidity exceeds 250 NTU at any time, the following steps will be conducted:

1. Telephone or submit an electronic report to the applicable Ecology Region's Environmental Report Tracking System (ERTS) within 24 hours. https://www.ecology.wa.gov/About-us/Get-involved/Report-an-environmental-issue
    - Northwest Region (King, Kitsap, Island, San Juan, Skagit, Snohomish, Whatcom): (425) 649-7000
2. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible. Address the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period
3. Document BMP implementation and maintenance in the site log book.
4. Continue to sample discharges daily until one of the following is true:
    - Turbidity is 25 NTU (or lower).
    - Compliance with the water quality limit for turbidity is achieved.

    - 1 - 5 NTU over background turbidity, if background is less than 50 NTU
    - 1% - 10% over background turbidity, if background is 50 NTU or greater
- The discharge stops or is eliminated.

pH Sampling (4.2.2)

pH monitoring is required for "Significant concrete work" (i.e. greater than 1000 cubic yards poured concrete or recycled concrete over the life of the project).The use of engineered soils (soil amendments including but not limited to Portland cement-treated base [CTB], cement kiln dust [CKD] or fly ash) also requires pH monitoring.

For significant concrete work, pH sampling will start the first day concrete is poured and continue until it is cured, typically three (3) weeks after the last pour.

For engineered soils and recycled concrete, pH sampling begins when engineered soils or recycled concrete are first exposed to precipitation and continues until the area is fully stabilized.

If the measured pH is between 8.5 and 9.0, the following measures will be taken:

1. Prevent high pH water from entering storm sewer systems or surface water.
2. Adjust or neutralize the high pH water to the range of 6.5 to 8.5 su using appropriate technology such as carbon dioxide (CO_2) sparging (liquid or dry ice).
3. Written approval will be obtained from Ecology prior to the use of chemical treatment other than CO_2 sparging or dry ice.

Monitoring for pH is required for dewatering water generated during excavation beneath the groundwater table. If the measured pH is greater than 9.0, the water generated cannot be treated and infiltrated onsite, rather it shall be discharged to the sanitary sewer under terms of a discharge authorization from the City of Everett or shall be removed from the site for off-site management at an appropriate offsite treatment and disposal facility. A copy of any sanitary sewer discharge authorization from City of Everett is to be kept in Appendix C of this SWPPP.

Method for sampling pH: by Standard Methods or field measurement.

Table 8 – pH Sampling Method

X	pH meter
X	pH test kit
X	Wide range pH indicator paper

Other Stormwater Quality Sampling (4.3)

In addition to turbidity and pH, the April 2021 Proposed Agreed Order Parameters Memorandum (Aspect Consulting 2021, included in Appendix G) recommended that the following parameters be included for monitoring in a CSWGP Agreed Order for the Port's planned project:

- Total metals arsenic, copper, lead, nickel, and zinc by U.S. Environmental Protection Agency (EPA) 200.8 and mercury by EPA 1631E
- Total polychlorinated biphenyls (PCBs) by EPA 608.3
- Carcinogenic polycyclic aromatic hydrocarbons (cPAHs) by EPA 625.1, that individually are:
    - Benzo(a)anthracene
    - Benzo(b)fluoranthene
    - Benzo(k)fluoranthene
    - Benzo(a)pyrene
    - Chrysene
    - Dibenzo(a-h)anthracene
    - Indeno(1,2,3-cd)pyrene.

Reporting and Record Keeping (6.0)

Record Keeping (6.1)

Site Log Book (6.1.1)

A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements
- Site inspections
- Sample logs

Records Retention (6.1.2)

Records will be retained during the life of the project and for a minimum of three (3) years following the termination of permit coverage in accordance with Special Condition S5.C of the CSWGP. The current version of the CSWGP can be downloaded from the link listed in Appendix E.

Permit documentation to be retained on-site:

- CSWGP
- Permit Coverage Letter
- SWPPP
- Site Log Book

Permit documentation will be provided within 14 days of receipt of a written request from Ecology. A copy of the SWPPP or access to the SWPPP will be provided to the public when requested in writing in accordance with Special Condition S5.G.2.b of the CSWGP.

Updating the SWPPP (6.1.3)

The SWPPP will be modified if:

- Found ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site.
- There is a change in design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the State.

The SWPPP will be modified within seven (7) days if inspection(s) or investigation(s) determine additional or modified BMPs are necessary for compliance. An updated timeline for BMP implementation will be prepared.

Reporting (6.2)

Discharge Monitoring Reports (6.2.1)

Cumulative soil disturbance is one (1) acre or larger; therefore, Discharge Monitoring Reports (DMRs) will be submitted to Ecology monthly. If there was no discharge during a given monitoring period the DMR will be submitted as required, reporting "No Discharge". The DMR due date is fifteen (15) days following the end of each calendar month.

DMRs will be reported online through Ecology's WQWebDMR System.

To sign up for WQWebDMR go to:
https://www.ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance/WQWebPortal-guidance

Notification of Noncompliance (6.2.2)

If any of the terms and conditions of the permit is not met, and the resulting noncompliance may cause a threat to human health or the environment, the following actions will be taken:

1. Ecology will be notified within 24-hours of the failure to comply by calling the applicable Regional office ERTS phone number (Regional office numbers listed below).
2. Immediate action will be taken to prevent the discharge/pollution or otherwise stop or correct the noncompliance. If applicable, sampling and analysis of any noncompliance will be repeated immediately and the results submitted to Ecology within five (5) days of becoming aware of the violation.
3. A detailed written report describing the noncompliance will be submitted to Ecology within five (5) days, unless requested earlier by Ecology.

Specific information to be included in the noncompliance report is found in Special Condition S5.F.3 of the CSWGP.

Anytime turbidity sampling indicates turbidity is 250 NTUs or greater, the Ecology Regional office will be notified by phone within 24 hours of analysis as required by Special Condition S5.A of the CSWGP. The current version of the CSWGP can be downloaded from the link listed in Appendix E.

- Northwest Region at (425) 649-7000 for Island, King, Kitsap, San Juan, Skagit, Snohomish, or Whatcom County

Include the following information:

1. Your name and / Phone number
2. Permit number
3. City / County of project
4. Sample results
5. Date / Time of call
6. Date / Time of sample
7. Project name

In accordance with Special Condition S4.D.5.b of the CSWGP, the Ecology Regional office will be notified if chemical treatment other than CO_2 sparging is planned for adjustment of high pH water.

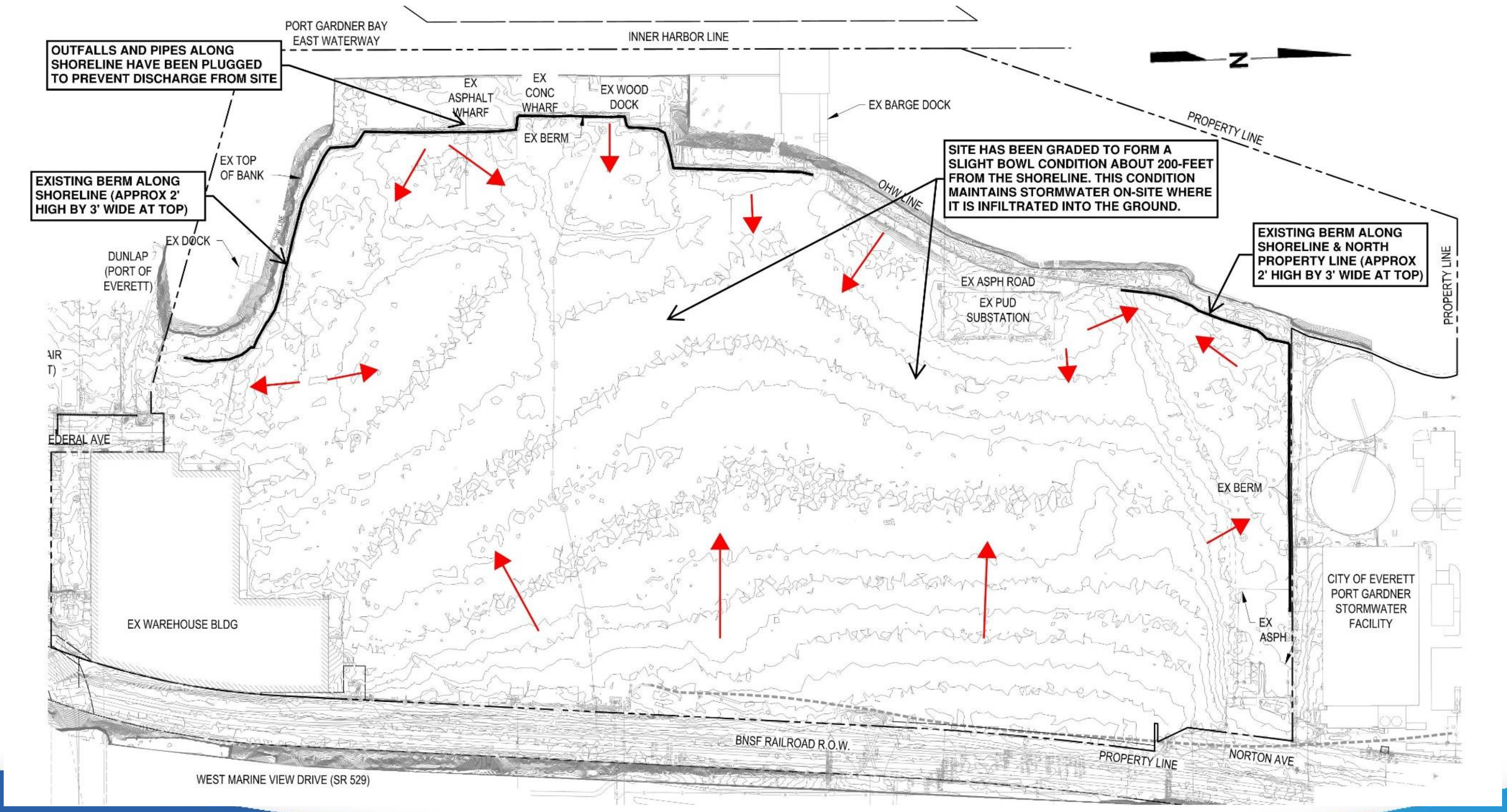
Appendix/Glossary

A. Site Maps
B. BMP Details
C. Correspondence
D. Site Inspection Form
E. Construction Stormwater General Permit (CSWGP)
F. 303(d) List Waterbodies / TMDL Waterbodies Information
G. Contaminated Site Information
H. Engineering Calculations

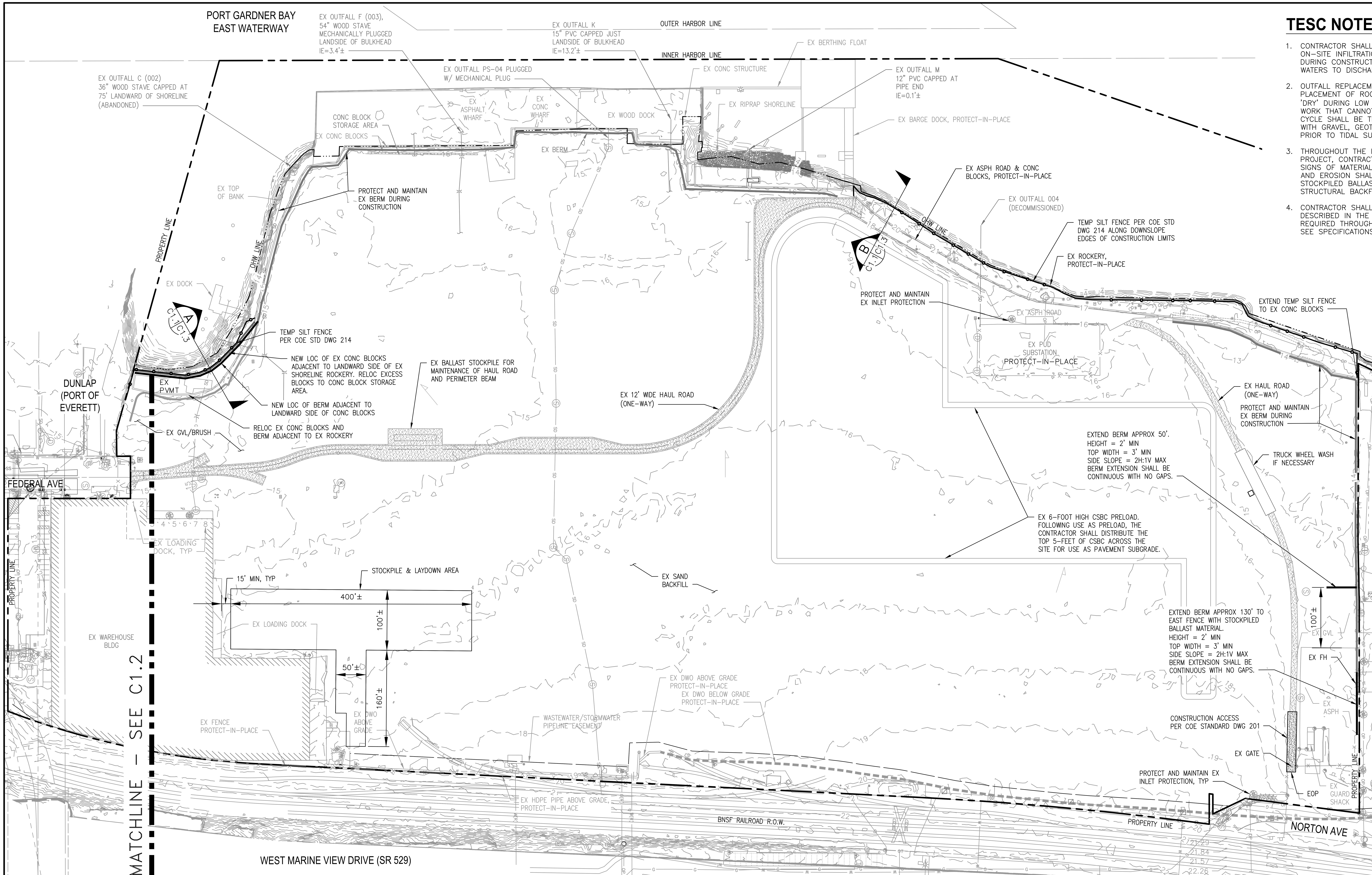
APPENDIX A

Site Maps

Existing Conditions Site Plan



kpff
Consulting Engineers



TESC NOTES

1. CONTRACTOR SHALL MANAGE AND MAINTAIN EXISTING ON-SITE INFILTRATION OF ALL ON-SITE STORMWATER DURING CONSTRUCTION AND SHALL NOT ALLOW SURFACE WATERS TO DISCHARGE FROM THE SITE.
2. OUTFALL REPLACEMENT WORK – ALL EXCAVATION AND PLACEMENT OF ROCK BELOW OHW WILL OCCUR IN THE "DRY" DURING LOW TIDE WITHIN A SINGLE TIDE CYCLE. WORK THAT CANNOT BE COMPLETED IN A SINGLE TIDE CYCLE SHALL BE TEMPORARILY COVERED AND STABILIZED WITH GRAVEL, GEOTEXTILE OR OTHER APPROVED METHODS PRIOR TO TIDAL SUBMERSION.
3. THROUGHOUT THE PROJECT DURATION AND AT END OF PROJECT, CONTRACTOR SHALL REVIEW PERIMETER BERM FOR SIGNS OF MATERIAL LOSS AND EROSION. MATERIAL LOSS AND EROSION SHALL BE REPAIRED WITH ON-SITE STOCKPILED BALLAST MATERIAL PROVIDED BY THE PORT OR STRUCTURAL BACKFILL IMPORTED BY CONTRACTOR.
4. CONTRACTOR SHALL FOLLOW ALL TESC MEASURES DESCRIBED IN THE SWPPP AND UPDATE THE SWPPP AS REQUIRED THROUGHOUT THE DURATION OF THE CONTRACT. SEE SPECIFICATIONS FOR FURTHER REQUIREMENS.

LEGEND

GROUND SLOPE DIRECTION

TEMP INLET PROTECTION PER COE STD DWG 210

EX TEMP INLET PROTECTION

TEMP SILT FENCE PER COE STD DWG 214

N

80' 0 80' 160'
40' 120'

SCALE: 1"=80'

CALL 48 HOURS BEFORE YOU DIG DIAL 811

VERT DATUM: NAVD 88
CONV TO MLLW = NAVD88+2.03
HORZ DATUM: NAD 83/91

IF SHEET IS LESS THAN 22x34 REDUCE SCALE ACCORDINGLY

FOR CITY REVIEW

Port of EVERETT
P.O. BOX 538
EVERETT, WA 98206
(425) 259-3164

kpff
1601 5th Avenue, Suite 1300
Seattle, Washington 98101
(206) 382-0600 Fax (206) 382-0500
PROJECT NO. 1600120

NO.	DATE	BY	REVISION
1	05/07/2021	NW	FOR CITY REVIEW

NO.	DATE	BY	REVISION

PROJECT ENGINEER: N. WATSON	SCALE: 1" = 80'
DESIGNED BY: J. BECKER	DATE: 05/07/2021
DRAWN BY: K. EDWARDS, D. YU	CHECKED BY: N. WATSON
APPROVED BY:	

PORT OF EVERETT

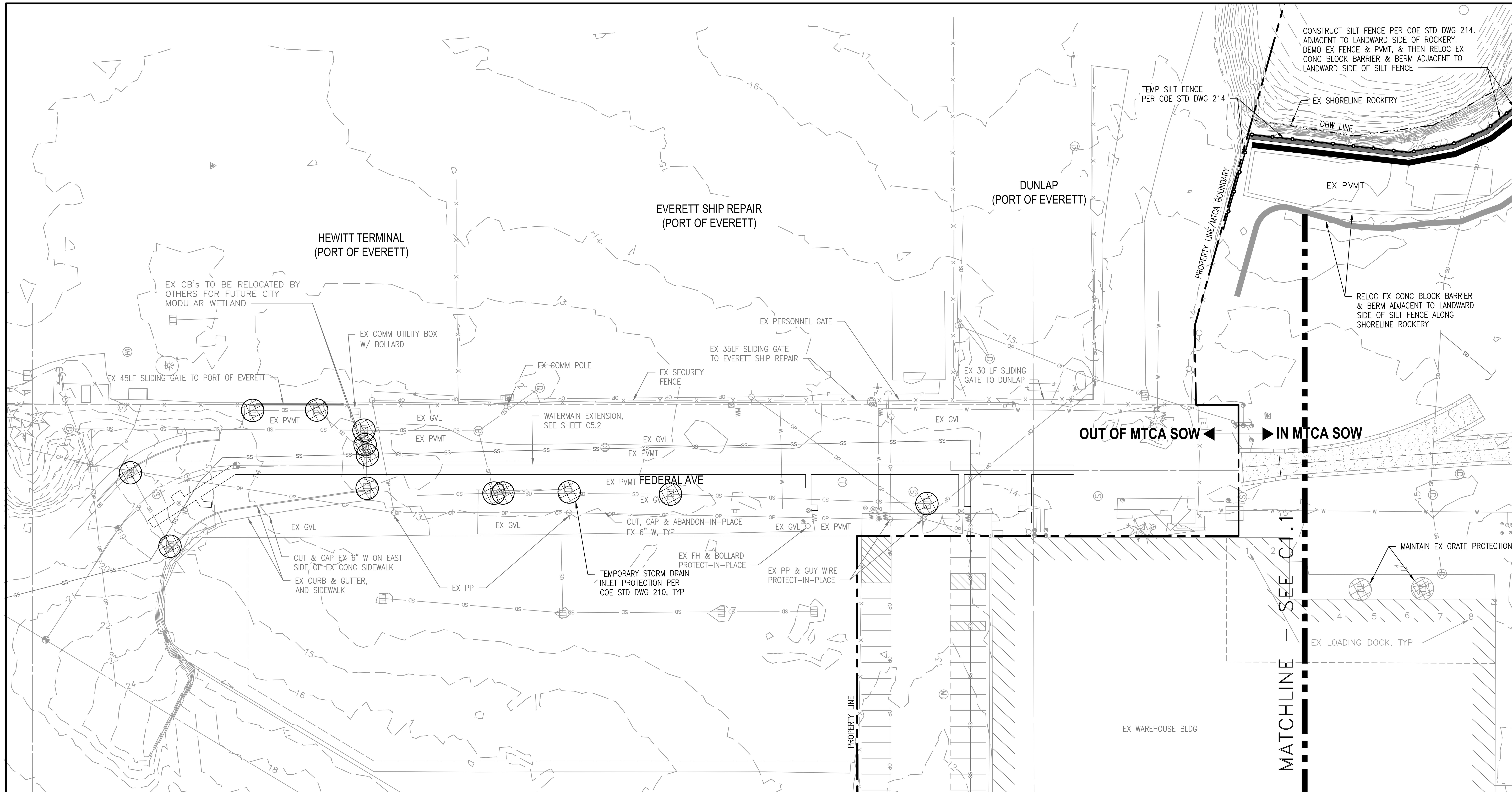
NORTON TERMINAL DEVELOPMENT & MTCA 3RD INTERIM ACTION TEMPORARY EROSION AND SEDIMENT CONTROL PLAN

DWG. NO. **C1.1**

CIP NO. 1-8-900-05

PROJECT NO. MT-NT-2021-02.2

SHEET NO. XX OF XX



TESC NOTES

1. CONTRACTOR SHALL INSTALL AND MAINTAIN TESC BMPS AS SHOWN DURING TRENCHING AND OTHER CONSTRUCTION ON FEDERAL AVENUE THAT DISTURB EXISTING PAVEMENT. SEE SPECIFICATIONS FOR FURTHER REQUIREMENTS.

LEGEND

- GROUND SLOPE DIRECTION
- TEMP INLET PROTECTION PER COE STD DWG 210
- EX TEMP INLET PROTECTION
- TEMP SILT FENCE PER CITY STD DWG 214

N

30' 0 30' 60'
15' 45'

SCALE: 1"=30'

CALL 48 HOURS BEFORE YOU DIG DIAL 811

VERT DATUM: NAVD 88
CONV TO MLLW = NAVD88+2.03
HORZ DATUM: NAD 83/91

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PROJECT NO. 1600120

NO.	DATE	BY	REVISION
1	05/07/2021	NW	FOR CITY REVIEW

NO.	DATE	BY	REVISION

PROJECT ENGINEER: N. WATSON	SCALE: 1" = 30'
DESIGNED BY: J. BECKER	DATE: 05/07/2021
DRAWN BY: K. EDWARDS, D. YU	CHECKED BY: N. WATSON
APPROVED BY:	

PORT OF EVERETT

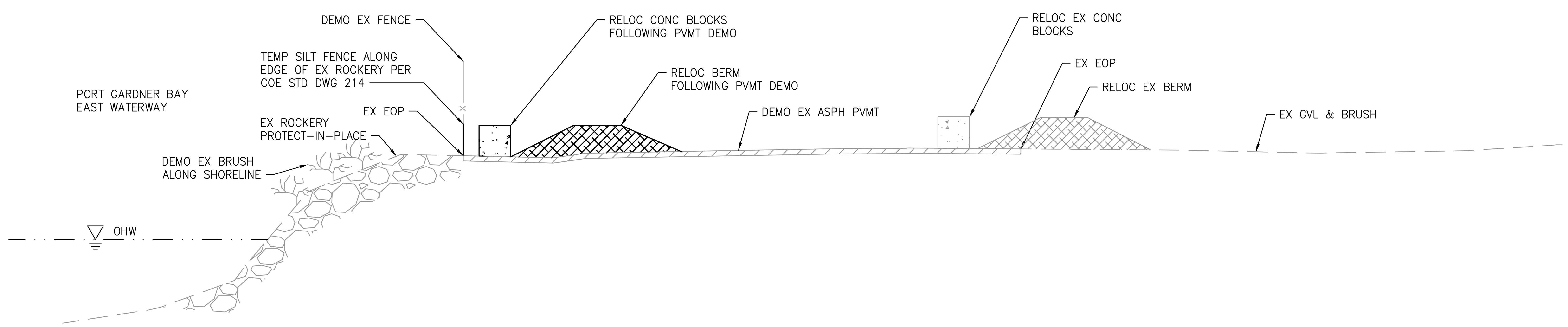
NORTON TERMINAL DEVELOPMENT & MTCA 3RD INTERIM ACTION TEMPORARY EROSION AND SEDIMENT CONTROL PLAN

DWG. NO. C1.□

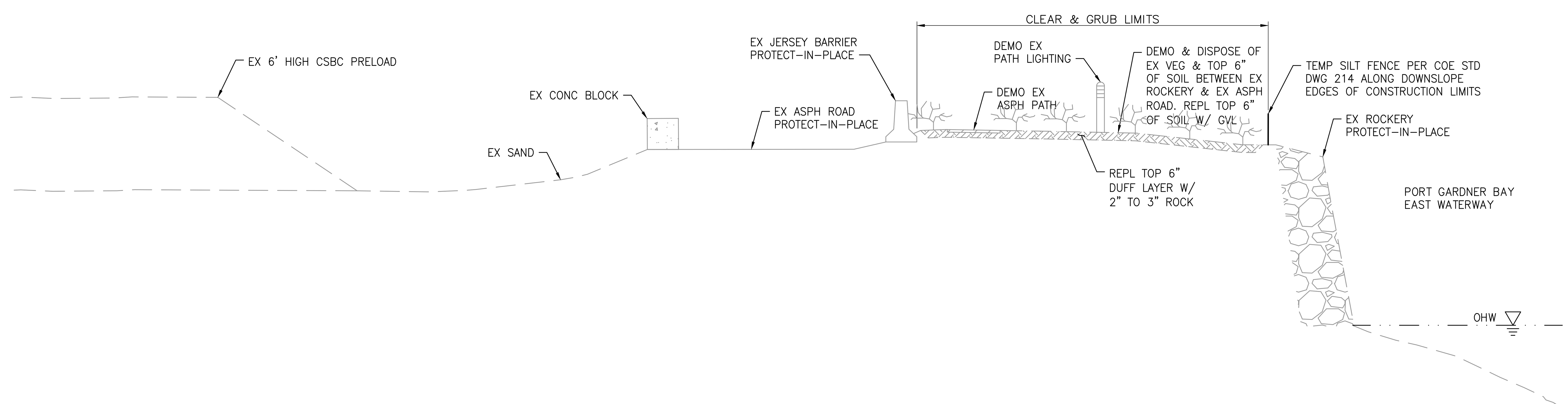
CIP NO. 1-8-900-05

PROJECT NO. MT-NT-2021-02.2

SHEET NO. XX OF XX



A SECTION
C1.1 C1.3 SCALE: 1" = 5' HORIZ, 1"=5' VERT



B SECTION
C1.1 C1.3 SCALE: 1" = 5' HORIZ, 1"=5' VERT

5' 0 5' 10'
2.5' 7.5'

CALL 48 HOURS
BEFORE YOU DIG
DIAL 811

VERT DATUM: NAVD 88
CONV TO MLLW = NAVD88+2.03
HORZ DATUM: NAD 83/91

IF SHEET IS LESS THAN 22x34
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NO.	DATE	BY	REVISION
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NO.	DATE	BY	REVISION

PROJECT ENGINEER: N. WATSON	SCALE: AS SHOWN
DESIGNED BY: J. BECKER	DATE: 05/07/2021
DRAWN BY: K. EDWARDS, D. YU	CHECKED BY: N. WATSON
APPROVED BY:	

PORT OF EVERETT

NORTON TERMINAL DEVELOPMENT
& MTCA 3RD INTERIM ACTION
TEMPORARY EROSION AND
SEDIMENT CONTROL SECTIONS

DWG. NO. C1.
CIP NO. 1-8-900-05
PROJECT NO. MT-NT-2021-02.2
SHEET NO. XX OF XX

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NO.	DATE	BY	REVISION

PROJECT ENGINEER: N. WATSON	SCALE: 1" = 80'
DESIGNED BY: J. BECKER	DATE: 05/07/2021
DRAWN BY: K. EDWARDS, D. YU	CHECKED BY: N. WATSON
APPROVED BY:	

PORT OF EVERETT

NORTON TERMINAL DEVELOPMENT & MTCA 3RD INTERIM ACTION STORMWATER OVERALL PLAN

DWG. NO. **C4.1**

CIP NO. 1-8-900-05

PROJECT NO. MT-NT-2021-02.2

SHEET NO. XX OF XX

FOR CITY REVIEW

APPENDIX B

BMP Detail

BMP C106: Wheel Wash

Purpose

Wheel washes reduce the amount of sediment transported onto paved roads by washing dirt from the wheels of motor vehicles prior to the motor vehicles leaving the construction site.

Conditions of Use

- Use a wheel wash when BMP C105: Stabilized Construction Access is not preventing sediment from being tracked off site.
- Wheel washing is generally an effective BMP when installed with careful attention to topography. For example, a wheel wash can be detrimental if installed at the top of a slope abutting a right-of-way where the water from the dripping truck can run unimpeded into the street.
- Pressure washing combined with an adequately sized and surfaced pad with direct drainage to a large 10-foot x 10-foot sump can be very effective.
- Wheel wash wastewater is not stormwater. It is commonly called process water, and must be discharged to a separate on-site treatment system that prevents discharge to waters of the State, or to the sanitary sewer with local sewer district approval.
- Wheel washes may use closed-loop recirculation systems to conserve water use.
- Wheel wash wastewater shall not include wastewater from concrete washout areas.
- When practical, the wheel wash should be placed in sequence with BMP C105: Stabilized Construction Access. Locate the wheel wash such that vehicles exiting the wheel wash will enter directly onto BMP C105: Stabilized Construction Access. In order to achieve this, BMP C105: Stabilized Construction Access may need to be extended beyond the standard installation to meet the exit of the wheel wash.

Design and Installation Specifications

Suggested details are shown in Figure II-3.2: Wheel Wash. The Local Permitting Authority may allow other designs. A minimum of 6 inches of asphalt treated base (ATB) over crushed base material or 8 inches over a good subgrade is recommended to pave the wheel wash.

Use a low clearance truck to test the wheel wash before paving. Either a belly dump or lowboy will work well to test clearance.

Keep the water level from 12 to 14 inches deep to avoid damage to truck hubs and filling the truck tongues with water.

Midpoint spray nozzles are only needed in extremely muddy conditions.

Wheel wash systems should be designed with a small grade change, 6- to 12-inches for a 10-foot-wide pond, to allow sediment to flow to the low side of pond to help prevent re-suspension of sediment. A drainpipe with a 2- to 3-foot riser should be installed on the low side of the pond to allow for easy cleaning and refilling. Polymers may be used to promote coagulation and flocculation in a closed-loop system. Polyacrylamide (PAM) added to the wheel wash water at a rate of 0.25 - 0.5 pounds per 1,000 gallons of water increases effectiveness and reduces cleanup time. If PAM is already being used for dust or erosion control and is being applied by a water truck, the same truck can be used to change the wash water.

Maintenance Standards

The wheel wash should start out each day with fresh water.

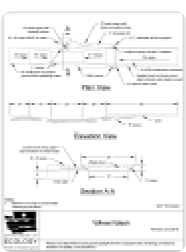
The wheel wash water should be changed a minimum of once per day. On large earthwork jobs where more than 10-20 trucks per hour are expected, the wheel wash water will need to be changed more often.

Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology’s website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

Figure II-3.2: Wheel Wash



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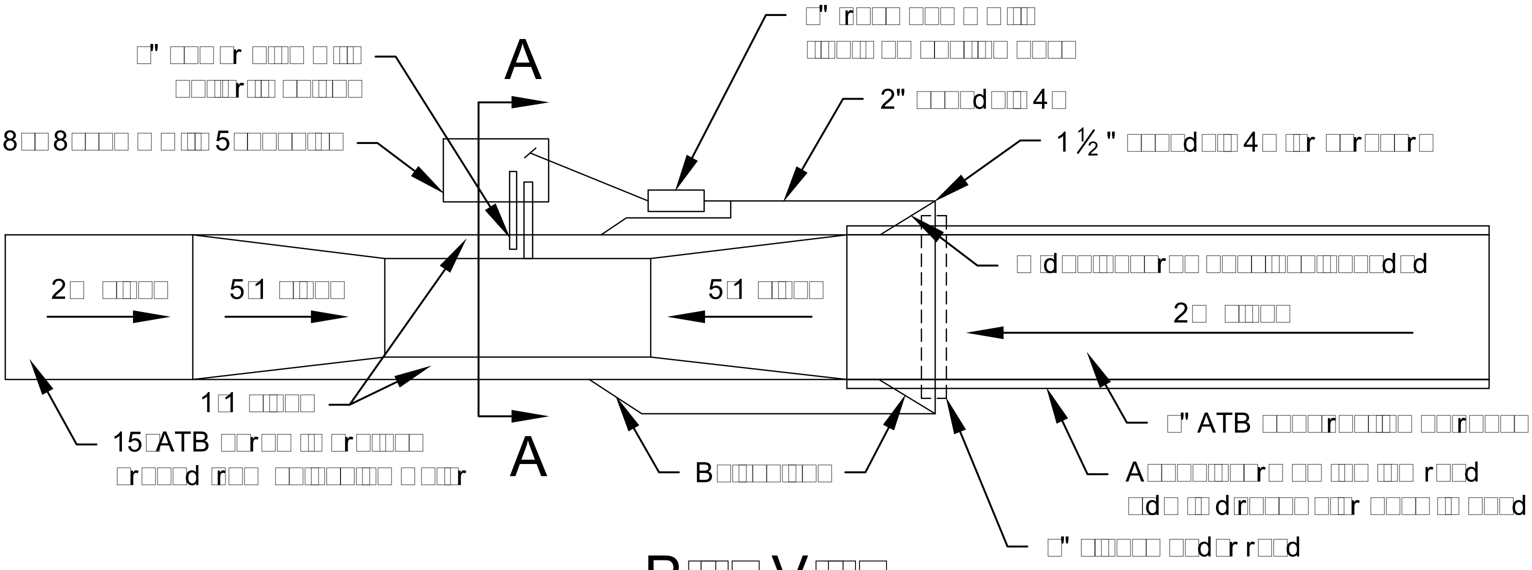
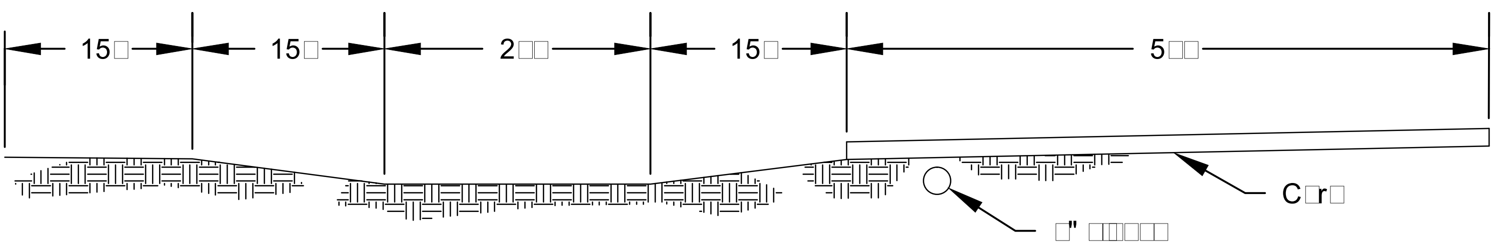
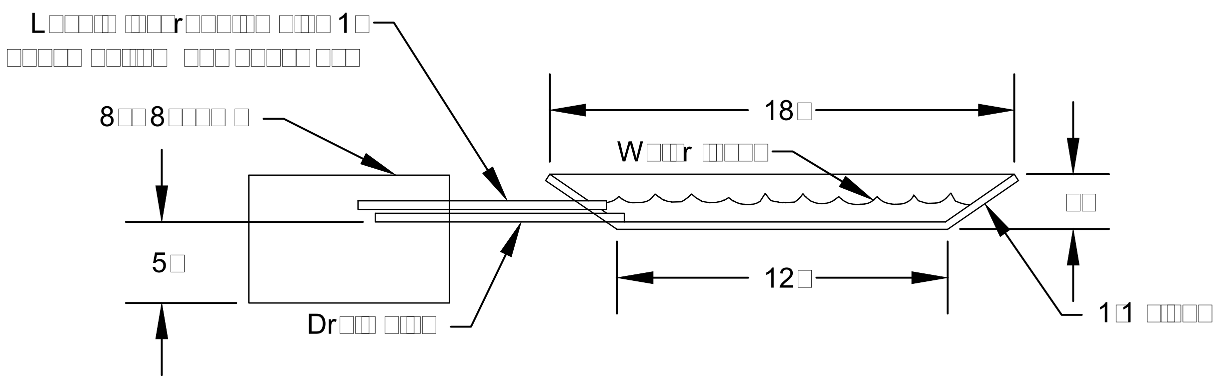
2019 Stormwater Management Manual for Western Washington (2019 SWMMWW)

Publication No.19-10-021







NOT TO SCALE

DEPARTMENT OF
ECOLOGY

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BMP C151: Concrete Handling

Purpose

Concrete work can generate process water and slurry that contain fine particles and high pH, both of which can violate water quality standards in the receiving water. Concrete spillage or concrete discharge to waters of the State is prohibited. Use this BMP to minimize and eliminate concrete, concrete process water, and concrete slurry from entering waters of the State.

Conditions of Use

Any time concrete is used, utilize these management practices. Concrete construction project components include, but are not limited to:

- Curbs
- Sidewalks
- Roads
- Bridges
- Foundations
- Floors
- Runways

Disposal options for concrete, in order of preference are:

1. Off-site disposal
2. Concrete wash-out areas (see BMP C154: Concrete Washout Area)
3. De minimus washout to formed areas awaiting concrete

Design and Installation Specifications

- Wash concrete truck drums at an approved off-site location or in designated concrete washout areas only. Do not wash out concrete trucks onto the ground (including formed areas awaiting concrete), or into storm drains, open ditches, streets, or streams. Refer to BMP C154: Concrete Washout Area for information on concrete washout areas.

  - Return unused concrete remaining in the truck and pump to the originating batch plant for recycling. Do not dump excess concrete on site, except in designated concrete washout areas as allowed in BMP C154: Concrete Washout Area.

- Wash small concrete handling equipment (e.g. hand tools, screeds, shovels, rakes, floats, trowels, and wheelbarrows) into designated concrete washout areas or into formed areas awaiting concrete pour.
- At no time shall concrete be washed off into the footprint of an area where an infiltration feature will be installed.
- Wash equipment difficult to move, such as concrete paving machines, in areas that do not directly drain to natural or constructed stormwater conveyance or potential infiltration areas.
- Do not allow washwater from areas, such as concrete aggregate driveways, to drain directly (without detention or treatment) to natural or constructed stormwater conveyances.
- Contain washwater and leftover product in a lined container when no designated concrete washout areas (or formed areas, allowed as described above) are available. Dispose of contained concrete and concrete washwater (process water) properly.
- Always use forms or solid barriers for concrete pours, such as pilings, within 15-feet of surface waters.
- Refer to BMP C252: Treating and Disposing of High pH Water for pH adjustment requirements.
- Refer to the Construction Stormwater General Permit (CSWGP) for pH monitoring requirements if the project involves one of the following activities:
  - Significant concrete work (as defined in the CSWGP).
  - The use of soils amended with (but not limited to) Portland cement-treated base, cement kiln dust or fly ash.
  - Discharging stormwater to segments of water bodies on the 303(d) list (Category 5) for high pH.

Maintenance Standards

Check containers for holes in the liner daily during concrete pours and repair the same day.

Washington State Department of Ecology
2019 Stormwater Management Manual for Western Washington (2019 SWMMWW)
Publication No.19-10-021

BMP C153: Material Delivery, Storage, and Containment

Purpose

Prevent, reduce, or eliminate the discharge of pollutants to the stormwater system or watercourses from material delivery and storage. Minimize the storage of hazardous materials on-site, store materials in a designated area, and install secondary containment.

Conditions of Use

Use at construction sites with delivery and storage of the following materials:

- Petroleum products such as fuel, oil and grease
- Soil stabilizers and binders (e.g., Polyacrylamide)
- Fertilizers, pesticides and herbicides
- Detergents
- Asphalt and concrete compounds
- Hazardous chemicals such as acids, lime, adhesives, paints, solvents, and curing compounds
- Any other material that may be detrimental if released to the environment

Design and Installation Specifications

- The temporary storage area should be located away from vehicular traffic, near the construction entrance(s), and away from waterways or storm drains.
- Safety Data Sheets (SDS) should be supplied for all materials stored. Chemicals should be kept in their original labeled containers.
- Hazardous material storage on-site should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- During the wet weather season (Oct 1 – April 30), consider storing materials in a covered area.
- Materials should be stored in secondary containments, such as an earthen dike, horse trough, or even a children's wading pool for non-reactive materials such as detergents, oil, grease, and paints. Small amounts of material may be secondarily contained in "bus boy" trays or concrete mixing trays.

- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and, when possible, within secondary containment.
- If drums must be kept uncovered, store them at a slight angle to reduce ponding of rainwater on the lids to reduce corrosion. Domed plastic covers are inexpensive and snap to the top of drums, preventing water from collecting.
- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be stored in approved containers and drums and shall not be overfilled. Containers and drums shall be stored in temporary secondary containment facilities.
- Temporary secondary containment facilities shall provide for a spill containment volume able to contain 10% of the total enclosed container volume of all containers, or 110% of the capacity of the largest container within its boundary, whichever is greater.
- Secondary containment facilities shall be impervious to the materials stored therein for a minimum contact time of 72 hours.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- During the wet weather season (Oct 1 – April 30), each secondary containment facility shall be covered during non-working days, prior to and during rain events.
- Keep material storage areas clean, organized and equipped with an ample supply of appropriate spill clean-up material (spill kit).
- The spill kit should include, at a minimum:
    - 1-Water Resistant Nylon Bag
    - 3-Oil Absorbent Socks 3”x 4’
    - 2-Oil Absorbent Socks 3”x 10’
    - 12-Oil Absorbent Pads 17”x19”
    - 1-Pair Splash Resistant Goggles
    - 3-Pair Nitrile Gloves
    - 10-Disposable Bags with Ties
    - Instructions

Maintenance Standards

- Secondary containment facilities shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into drums. These liquids shall be handled as hazardous waste unless testing determines them to be non-hazardous.

- Re-stock spill kit materials as needed.

Washington State Department of Ecology

2019 Stormwater Management Manual for Western Washington (2019 SWMMWW)

Publication No.19-10-021

APPENDIX C

Correspondence (Ecology, City of Everett)

APPENDIX D

Site Inspection Form

Port of Everett - Construction Stormwater Site Inspection Form

Project Name **Norton Terminal Development** Permit # **WAR______** Inspection Date ________ Time ________

Name of Certified Erosion Sediment Control Lead (CESCL)
Print Name: ______________________________

Approximate rainfall amount since the last inspection (in inches): ______________________________

Approximate rainfall amount in the last 24 hours (in inches): ______________________________

Current Weather Clear ☐ Cloudy ☐ Mist ☐ Rain ☐ Wind ☐ Fog ☐

A. Type of inspection: Weekly ☐ Post Storm Event ☐ Other ☐

B. Phase of Active Construction (*check all that apply*):

Pre Construction/installation of erosion/sediment controls	☐	Clearing/Demo/Grading	☐	Infrastructure/storm/roads	☐
Concrete pours	☐	Vertical Construction/buildings	☐	Utilities	☐
Offsite improvements	☐	Site temporary stabilized	☐	Final stabilization	☐

C. Questions:

1. Were all areas of construction and discharge points inspected? Yes ___ No ___
2. Did you observe the presence of suspended sediment, turbidity, discoloration, or oil sheen Yes ___ No ___
3. Was a water quality sample taken during inspection? (*refer to permit conditions S4 & S5*) Yes ___ No ___
4. Was there a turbid discharge 250 NTU or greater, or Transparency 6 cm or less?* Yes ___ No ___
5. If yes to #4 was it reported to Ecology? Yes ___ No ___
6. Is pH sampling required? pH range required is 6.5 to 8.5. Yes ___ No ___

If answering yes to a discharge, describe the event. Include when, where, and why it happened; what action was taken, and when.

____

____

____

____

*If answering yes to # 4 record NTU/Transparency with continual sampling daily until turbidity is 25 NTU or less/ transparency is 33 cm or greater.

Sampling Results: Date: ______________________________

Parameter	Method (circle one)	Result			Other/Note
		NTU	cm	pH	
Turbidity	tube, meter, laboratory				
pH	Paper, kit, meter				

Port of Everett - Construction Stormwater Site Inspection Form

D. Check the observed status of all items. Provide "Action Required "details and dates.

Element #	Inspection	BMPs Inspected			BMP needs maintenance	BMP failed	Action required (describe in section F)
		yes	no	n/a			
1 Clearing Limits	Before beginning land disturbing activities are all clearing limits established with Construction area perimeter fencing, ecology blocks, and earthen berms?						
2 Construction Access	Construction access stabilized with quarry spalls to prevent sediment from being tracked onto roads?						
	Sediment tracked onto the road way fully cleaned at the end of the day or more frequent as necessary?						
3 Control Flow Rates	Unpaved areas still effectively infiltrating all onsite stormwater to prevent any discharge to surface water?						
4 Sediment Controls	Stabilized construction access still adequate to prevent sediment from being tracked onto roads and wheel wash still not needed?						
	All perimeter sediment controls (ecology block barrier and berms) installed, and maintained in accordance with the Stormwater Pollution Prevention Plan (SWPPP).						
5 Stabilize Soils	Have exposed un-worked soils been stabilized with effective BMP to prevent erosion and sediment deposition?						
	Are stabilized stockpiles located away from drain inlet, waterways, and drainage channels?						
	Have soils been stabilized at the end of the shift, before a holiday or weekend if needed based on the weather forecast?						

Port of Everett - Construction Stormwater Site Inspection Form

Element #	Inspection	BMPs Inspected			BMP needs maintenance	BMP failed	Action required (describe in section F)
		yes	no	n/a			
6 – Protect Slopes	Not applicable						
7 Drain Inlets	Storm drain inlet protection provided in Federal Avenue during watermain extension work?						
	Inlet protection at warehouse loading dock area maintained?						
	New storm trench drain rim 9” above gravel during construction?						
8 – Stabilize Outlets	Outfall replacements stabilized with a riprap energy dissipator?						
9 Control Pollutants	Waste materials/demolition debris handled & disposed of to prevent stormwater contamination?						
	Cover and 110% secondary containment volume provided for all chemicals, liquid & petroleum products, and other material?						
	Contaminated surfaces cleaned immediately after a spill incident?						
	All stormwater contained by berms and infiltrated onsite?						
	Any dewatering water pH 8.5-9.0 adjusted to 6.5-8.5 w/ CO_2, or if >9.0 discharged to sanitary sewer or hauled offsite for treatment?						
	If wheel wash, wastewater is handled and disposed of properly?						
10 Control Dewatering	Concrete washout in designated areas. No washout or excess concrete on the ground.						
	Dewatering has been done to an approved source and in compliance with the SWPPP.						
	Were there any clean non turbid dewatering discharges?						
11 Maintain BMP	Are all temporary and permanent erosion and sediment control BMPs maintained to perform as intended?						

Port of Everett - Construction Stormwater Site Inspection Form

Element #	Inspection	BMPs Inspected			BMP needs maintenance	BMP failed	Action required (describe in section F)
		yes	no	n/a			
12 Manage the Project	Has the project been phased to the maximum degree practicable?						
	Has regular inspection, monitoring and maintenance been performed as required by the permit?						
	Has the SWPPP been updated, implemented and records maintained?						
13 Protect LID	Not applicable.						

E. Check all areas that have been inspected. ✔

All in place BMPs ☐ All disturbed soils ☐ All concrete wash out area ☐ All material storage areas ☐
All discharge locations ☐ All equipment storage areas ☐ All construction entrances/exits ☐

F. Elements checked "Action Required" (section D) describe corrective action to be taken. List the element number; be specific on location and work needed. Document, initial, and date when the corrective action has been completed and inspected.

Element #	Description and Location	Action Required	Completion Date	Initials

Attach additional page if needed

Sign the following certification:

"I certify that this report is true, accurate, and complete, to the best of my knowledge and belief"

Inspected by: (print) ____________________ (Signature) ________________________ Date: ______________

Title/Qualification of Inspector: ____

APPENDIX E

Construction Stormwater General Permit (CSWGP)

Download latest copy of CSWGP from:

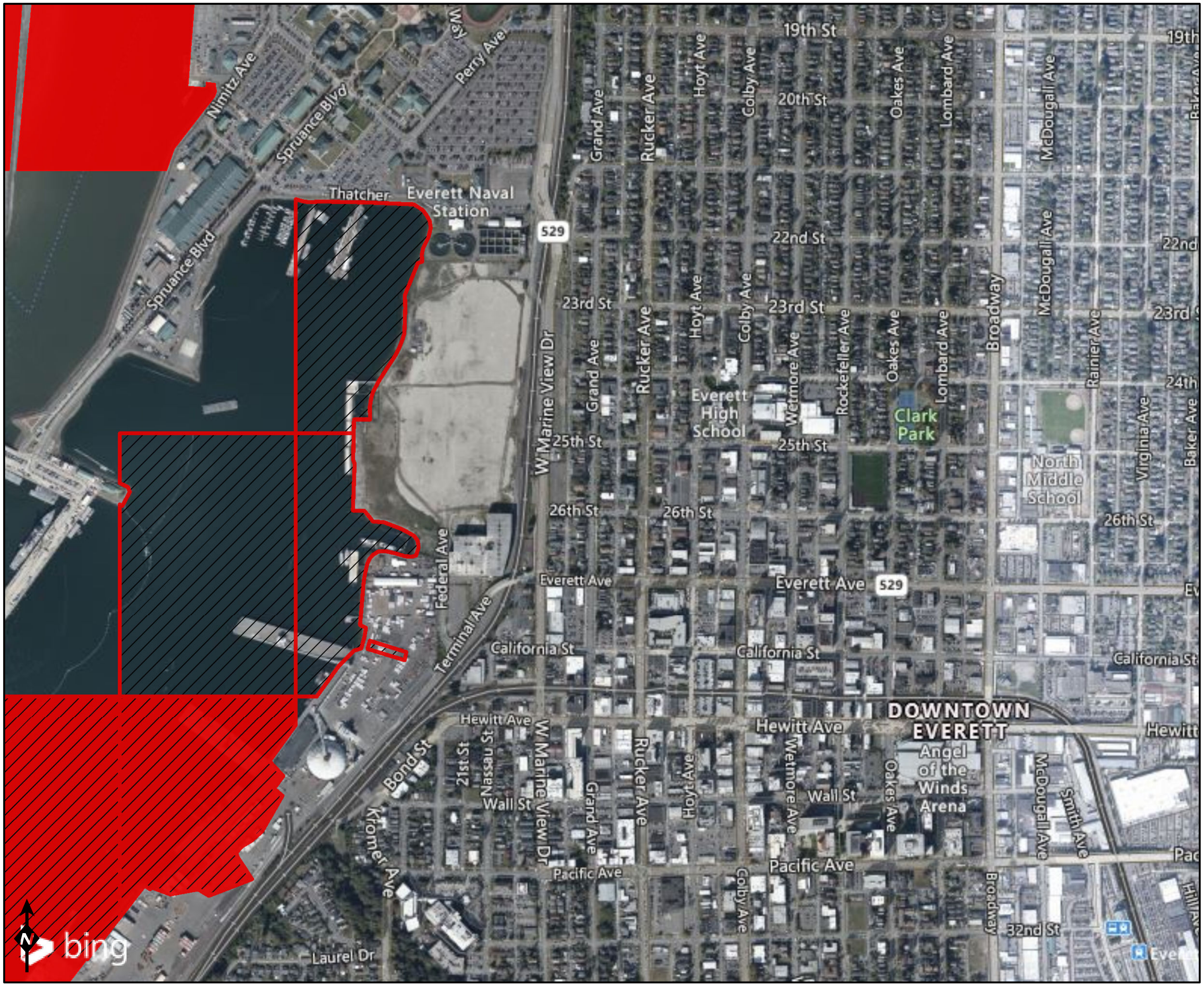
https://www.ecology.wa.gov/Regulations-Permits/Permits-certifications/Stormwater-general-permits/Construction-stormwater-permit

APPENDIX F

303(d) List Waterbodies / TMDL Waterbodies Information

May 17, 2021

Port Gardner, East Waterway, Everett, WA



Assessed Water/Sediment

Water

- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Sediment

- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Miles
0 0.125 0.25 0.5

DEPARTMENT OF ECOLOGY State of Washington

Listing ID: 504391

Main Listing Information

Listing ID: 504391 **Waterbody Name:** PORT GARDNER AND INNER EVERETT HARBOR **Medium:** Sediment **Parameter:** Sediment Bioassay **WQI Project:**
None
Designated Use: None **Collection Date:** 10/6/2008

Current Category:
5

View Category History

Assessment Unit

Assessment Unit ID: 47122J2I1_SW **County:** Snohomish **WRIA:** 7 - Snohomish

Basis Statement

Data from the Department of Ecology's Environmental Information Management (EIM) system samples
H=PortGardner_08*A1-10*A1-10-S*10/6/2008
M=NONE
L=NONE
indicate a total of 2 points for 1 samples collected on or before October 6, 2008 exceeds the Sediment Management Standards CSL bioassay criterion. This grid is in an area being investigated for sediment contamination, therefore it is assessed as Category 5. Statute: MTCA. This grid is in an area commonly known as Everett East Waterway. Site to be further investigated.

Remarks

2010: Comment #1009 - old bioassay data; new bioassay data available. Data submitted Apr2010.

Data Sources

No Source Records

Map Link

Map Link

Back To Results

Submit questions or comments about this specific Listing:

***Your Name:**

Your Email:

***Comment/Question:**

Submit

If you wish to comment about something unrelated to this listing, please Contact Us.

APPENDIX G

Contaminated Site Information

April 21, 2021

Erik Gerking, Director of Environmental Programs
Port of Everett
1205 Craftsman Way, #200
Everett, Washington 98201

Re: **Recommended Parameters for Administrative Order in Conjunction with Construction Stormwater General Permit Coverage**
Third Interim Action, Kimberly-Clark Worldwide Site Upland Area, Port of Everett
Project No. 210178

Dear Erik:

Aspect Consulting LLC (Aspect) is submitting this letter presenting the chemical compounds that we propose as appropriate parameters for an Administrative Order (AO) in conjunction with coverage under the Construction Stormwater General Permit (CSWGP) to be obtained for Port of Everett's (Port) Third Interim Action under the state Model Toxics Control Act (MTCA) for the Kimberly-Clark Worldwide Site Upland Area (Site). Monitoring for these parameters under the AO is intended to document that the construction activities are not creating a water quality impact to surface waters of the state.

Contamination at the Site upland has been thoroughly investigated under close supervision of Department of Ecology Toxics Cleanup Program (TCP) staff since 2012, including collection of thousands of soil samples, groundwater monitoring at more than 130 monitoring wells, and sampling sediment porewater and seeps along the intertidal shoreline. Figure 1 depicts locations for the hundreds of explorations completed for soil and/or groundwater sampling at the Site.[1] In addition, a pair of MTCA interim actions (2013–2014 and 2020) accomplished substantial cleanup of the Site—specifically removing soil contamination that posed the greatest risk to groundwater quality. Finally, approximately 250,000 tons of demolition debris (crushed concrete predominantly) that created high-pH groundwater was fully removed from the Site in 2020. Following the removal actions, widespread, low-level contamination in soil and groundwater remains across much of the Site. The Port's Third Interim Action will construct a low-permeability pavement section across a portion of the Site that will accelerate recovery of the residual groundwater contamination.

In short, the Site upland has been intensively studied, remedial actions have been carried out to remove grossly contaminated materials, and the remaining contaminants of concern (aka indicator hazardous substances under MTCA) are well defined.

Groundwater at the Site is not considered to be a drinking water source; rather, the highest beneficial use of the groundwater is discharge to marine surface waters of the adjacent East

[1] The explorations shown do not reflect completion of the 2020 interim action. Locations of the 2020 interim actions, including samples collected to verify removal of soil contamination are presented in *Report for Second Interim Action, Kimberly-Clark Worldwide Site Upland Area, Everett, Washington, March 3, 2021, available on Ecology's webpage for the Site at: https://apps.ecology.wa.gov/gsp/CleanupSiteDocuments.aspx?csid=2569.*

Waterway. Accordingly, the MTCA preliminary groundwater cleanup levels for the Site are the most stringent marine surface water quality standards applicable to the Site. This includes standards from Chapter 173-201A Washington Administrative Code (WAC), Clean Water Act Section 304(a), and the federal water quality criteria under 40 Code of Federal Regulations (CFR) 131.45. The Site preliminary cleanup levels (PCLs) for soil and groundwater are presented in Tables 1 and 2, respectively. PCLs were established for all parameters that were detected at the Site; many of those parameters did not have an exceedance of the PCL; thus, Indicator Levels are not necessary for all parameters with PCLs. The principal focus for the MTCA cleanup of the Site uplands, including selection of cleanup levels for both soil and groundwater, is to ensure the uplands are not an ongoing source of contaminants to the East Waterway.

Therefore, we propose that the MTCA contaminants of concern (indicator hazardous substances) determined through the years of investigation and cleanup are likewise appropriate Site-specific parameters for inclusion in the AO for the purpose of protecting surface water quality during the Port's Third Interim Action construction activities that will involve limited handling of the upland soil and groundwater. Tables 3 and 4 respectively present statistical summaries of groundwater data and soil data representative of current conditions following the interim actions and debris removal projects[2], including the exceedance frequency[3] for each compound. The compounds are sorted based on exceedance frequency, from high to low, in the tables.

Accordingly, we recommend that the following parameters, which have an exceedance frequency greater than 5 percent in either soil or groundwater at the Site, be included for monitoring in a CSWGP AO for the Port's planned project (highlighted in Tables 3 and 4):

- pH and turbidity by Standard Methods or field measurement
- Total metals arsenic, copper, lead, nickel, and zinc by U.S. Environmental Protection Agency (EPA) 200.8 and mercury by EPA 1631E
- Total polychlorinated biphenyls (PCBs) by EPA 608.3
- Carcinogenic polycyclic aromatic hydrocarbons (cPAHs)[4] by EPA 625.1, that individually are:
    - Benzo(a)anthracene
    - Benzo(b)fluoranthene
    - Benzo(k)fluoranthene

[2] Some groundwater results in Table 4 were collected from wells within areas excavated during the second interim action in 2020, so are no longer representative of current conditions in those areas.
[3] Equal to the number of samples exceeding the PCL divided by the total number of samples.
[4] The MTCA process establishes a PCL for the Total Toxic Equivalent Concentration (Quotient) of Benzo(a)pyrene (Total cPAHs TEQ) by applying toxicity equivalency factors to and then summing the individual cPAH concentrations. Consistent with standard practice of the Water Quality Program, we recommend establishing Indicator Levels for the individual cPAHs that comprise Total cPAHs TEQ.

- Benzo(a)pyrene
- Chrysene
- Dibenzo(a-h)anthracene
- Indeno(1,2,3-cd)pyrene

Note that PCBs emerged as an indicator hazardous substance for the Site during the 2017 groundwater monitoring, when elevated concentrations were detected in two monitoring wells. Those two locations, hundreds of feet from the shoreline, were subsequently remediated during the 2020 interim action.

As noted in Table 4, hydrogen sulfide and un-ionized ammonia are also contaminants of concern in nearshore groundwater within some areas of the Site. However, both compounds persist only in geochemically reducing (anaerobic) conditions and, upon contact with oxygen, are readily oxidized into nontoxic forms of sulfur and nitrogen, respectively, within minutes. As such, they will not be present at concentrations of concern in stormwater runoff and are not appropriate for inclusion in an AO.

We are available to discuss this further at your convenience.

Limitations

Work for this project was performed for the Port of Everett (Client), and this letter was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This letter does not represent a legal opinion. No other warranty, expressed or implied, is made.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Sincerely,

Aspect consulting, LLC

Steve Germiat, LHG
Principal Hydrogeologist
sgermiat@aspectconsulting.com

Owen Reese, PE
Principal Water Resources Engineer
oreese@aspectconsulting.com

Attachments: Table 1 – Groundwater Preliminary Cleanup Levels
Table 2 – Soil Preliminary Cleanup Levels
Table 3 – Statistical Summary of Groundwater Quality Data Representing Current Site Conditions
Table 4 – Statistical Summary of Soil Quality Data Representing Current Site Conditions
Figure 1 – Explorations Locations Prior to 2020 Interim Action

V:\210178 Port of Everett MIE Stormwater\Deliverables\Indicator Compounds and Levels Letter\Proposed AO Parameters Memo_2021.04.21.docx

TABLES

Table 1. Groundwater Preliminary Cleanup Levels

Project No. 210178, K-C Worldwide Site Upland Area, Everett, Washington

	APPLICABLE GROUNDWATER CRITERIA											
	Marine Surface Water Criteria for Establishing Method B Surface Water Cleanup Levels[a]											
	Aquatic Protection		Human Health Protection									
	Surface Water ARAR - Aquatic Life - Ch. 173-201A WAC	Surface Water ARAR - Aquatic Life - National Recommended WQ Criteria (CWA 304a)	Surface Water ARAR - Human Health - National Recommended WQ Criteria (CWA 304a)	Surface Water ARAR - Human Health - Ch. 173-201A WAC	Surface Water ARAR - Human Health - 40 CFR 131.45 (CWA 303c)	Surface Water, Method B Human Health, Most Restrictive, Standard Formula	Surface Water, Method B Human Health, Most Restrictive, Adjusted for ARARs[b]	Surface Water Screening Level for Marine Protection	Potable Groundwater Screening Level[c]	Groundwater Screening Level Protective of Vapor Intrusion for Industrial Use (Method C)[a]	Applicable Practical Quantitation Level (PQL)[d]	Groundwater Preliminary Cleanup Level and Basis
ANALYTE (BY GROUP)	*(ma-wac)*	*(ma-cwa 304a)*	*(hh-cwa 304a)*	*(hh-wac)*	*(hh-cwa 303c)*	*(sw-b)*	*(hh)*	*(marine)*	*(pot)*	*(vi-c)*	*(pql)*	
Total Petroleum Hydrocarbons												
Gasoline Range Hydrocarbons in ug/L									1000		100	1000 *(pot)*
Diesel Range Hydrocarbons in ug/L									500		50	500 *(pot)*
Oil Range Hydrocarbons in ug/L									500		250	500 *(pot)*
TPH (D+O) in ug/L									500		250	500 *(pot)*
Metals												
Antimony in ug/L			640	180	90	1000	90	90 *(hh)*			0.05	90 *(marine)*
Arsenic in ug/L	36	36	0.14	10	0.14	0.098	0.14	5 *footnote e*			0.5	5 *(marine)*
Barium in ug/L									2000		0.5	2000 *(pot)*
Cadmium in ug/L	9.3	7.9				41	41	7.9 *(ma-cwa 304a)*			0.02	7.9 *(marine)*
Chromium (Total) in ug/L						240000	240000	240000 *(hh)*			0.2	240000 *(marine)*
Copper in ug/L	3.1	3.1				2900	2900	3.1 *(ma-wac)*			0.1	3.1 *(marine)*
Lead in ug/L	8.1	8.1						8.1 *(ma-wac)*			0.02	8.1 *(marine)*
Mercury in ug/L	0.025	0.94						0.025 *(ma-wac)*		1.9	0.0005	0.025 *(marine)*
Nickel in ug/L	8.2	8.2	4600	190	100	1100	100	8.2 *(ma-wac)*			0.2	8.2 *(marine)*
Selenium in ug/L	71	71	4200	480	200	2700	200	71 *(ma-wac)*			1	71 *(marine)*
Silver in ug/L	1.9	1.9				26000	26000	1.9 *(ma-wac)*			0.02	1.9 *(marine)*
Thallium in ug/L			0.47	0.27	6.3	0.22	0.22	0.22 *(hh)*			0.02	0.22 *(marine)*
Zinc in ug/L	81	81	26000	2900	1000	17000	1000	81 *(ma-wac)*			0.5	81 *(marine)*
Conventionals												
Formaldehyde in ug/L								1600 *footnote f*			100	1600 *(marine)*
Un-Ionized Ammonia in mg/L	0.035							0.035 *(ma-wac)*			0.01	0.035 *(marine)*
Free (Hydrogen) Sulfide in mg/L		0.002						0.002 *(ma-cwa 304a)*			0.001	0.002 *(marine)*
pH in standard units	7.0 to 8.5	6.5 to 8.5						6.5 to 8.5 *(ma-wac)*				6.5 to 8.5 *(marine)*
Volatile Organic Compounds												
1,1-Dichloroethene in ug/L			20000	4100	4000	23000	4000	4000 *(hh)*		280	0.5	280 *(vi-c)*
1,2,4-Trimethylbenzene in ug/L									80	62	1	62 *(vi-c)*
1,3,5-Trimethylbenzene in ug/L									80	62	1	62 *(vi-c)*
1,4-Dichlorobenzene in ug/L			900	580	200	21	200	200 *(hh)*		49	0.05	49 *(vi-c)*
2-Butanone in ug/L									4800	3,800,000	10	4800 *(pot)*
2-Chlorotoluene in ug/L									160		1	160 *(pot)*
4-Chlorotoluene in ug/L											1	
Acetone in ug/L									7200		10	7200 *(pot)*
Benzene in ug/L			16	1.6	1.6	23	1.6	1.6 *(hh)*		24	0.35	1.6 *(marine)*
cis-1,2-Dichloroethene (DCE) in ug/L									16		0.5	16 *(pot)*
Ethylbenzene in ug/L			130	270	31	6800	31	31 *(hh)*		6100	0.5	31 *(marine)*
Isopropylbenzene in ug/L									800	1600	2	800 *(pot)*
m,p-Xylenes in ug/L									1000	680	0.5	680 *(vi-c)*
Methylene chloride in ug/L			1000	250	100	3600	100	100 *(hh)*		11000	2	100 *(marine)*
n-Propylbenzene in ug/L									800		1	800 *(pot)*
o-Xylene in ug/L									1600	960	0.5	960 *(vi-c)*
p-Isopropyltoluene in ug/L									800	1600	1	800 *(pot)*
sec-Butylbenzene in ug/L									800		1	800 *(pot)*
Styrene in ug/L									100	18000	0.5	100 *(pot)*
tert-Butylbenzene in ug/L									800		1	800 *(pot)*

Table 1. Groundwater Preliminary Cleanup Levels

Project No. 210178, K-C Worldwide Site Upland Area, Everett, Washington

	APPLICABLE GROUNDWATER CRITERIA											
	Marine Surface Water Criteria for Establishing Method B Surface Water Cleanup Levels[a]											
	Aquatic Protection		Human Health Protection									
ANALYTE (BY GROUP)	Surface Water ARAR - Aquatic Life - Ch. 173-201A WAC (ma-wac)	Surface Water ARAR - Aquatic Life - National Recommended WQ Criteria (CWA 304a) (ma-cwa 304a)	Surface Water ARAR - Human Health - National Recommended WQ Criteria (CWA 304a) (hh-cwa 304a)	Surface Water ARAR - Human Health - Ch. 173-201A WAC (hh-wac)	Surface Water ARAR - Human Health - 40 CFR 131.45 (CWA 303c) (hh-cwa 303c)	Surface Water, Method B Human Health, Most Restrictive, Standard Formula (sw-b)	Surface Water, Method B Human Health, Most Restrictive, Adjusted for ARARs[b] (hh)	Surface Water Screening Level for Marine Protection (marine)	Potable Groundwater Screening Level[c] (pot)	Groundwater Screening Level Protective of Vapor Intrusion for Industrial Use (Method C)[a] (vi-c)	Applicable Practical Quantitation Level (PQL)[d] (pql)	Groundwater Preliminary Cleanup Level and Basis
Toluene in ug/L			520	410	130	19000	130	130 (hh)		34000	0.5	130 (marine)
Vinyl chloride in ug/L			1.6	0.26		3.7	0.26	0.26 (hh)		3.5	0.2	0.26 (marine)
Xylenes, total									1000	680	3	680 (vi-c)
Polycyclic Aromatic Hydrocarbons (PAHs)												
Acenaphthene in ug/L			90	110	30	640	30	30 (hh)			0.012	30 (marine)
Acenaphthylene in ug/L			90	110	30	640	30	30 (hh)			0.012	30 (marine)
Anthracene in ug/L			400	4600	100	26000	100	100 (hh)			0.012	100 (marine)
Benzo(g,h,i)perylene in ug/L			30	460	8	2600	8	8 (hh)			0.012	8 (marine)
Fluoranthene in ug/L			20	16	6	90	6	6 (hh)			0.012	6 (marine)
Fluorene in ug/L			70	610	10	3500	10	10 (hh)			0.012	10 (marine)
Phenanthrene in ug/L			400	4600	100	26000	100	100 (hh)			0.012	100 (marine)
Pyrene in ug/L			30	460	8	2600	8	8 (hh)			0.012	8 (marine)
1-Methylnaphthalene in ug/L									1.5		0.05	1.5 (pot)
2-Methylnaphthalene in ug/L									32		0.05	32 (pot)
Naphthalene in ug/L						4700	4700	4700 (hh)		89	0.012	89 (vi-c)
Benz(a)anthracene in ug/L											0.01	
Benzo(a)pyrene in ug/L											0.01	
Benzo(b)fluoranthene in ug/L											0.01	
Benzo(k)fluoranthene in ug/L											0.01	
Chrysene in ug/L											0.01	
Dibenzo(a,h)anthracene in ug/L											0.01	
Indeno(1,2,3-cd)pyrene in ug/L											0.01	
Total cPAHs TEQ in ug/L			0.00013	0.0021	0.000016	0.22	0.000016	0.000016 (hh)			0.015	0.015 (pql)
Other Semivolatile Organics												
2,4,6-Trichlorophenol in ug/L			2.8	0.28	0.28	3.9	0.28	0.28 (hh)			0.5	0.5 (pql)
2,4-Dimethylphenol in ug/L			3000	97	97	550	97	97 (hh)			0.5	97 (marine)
3 & 4 Methylphenol									400		1	400 (pot)
Benzoic acid in ug/L									64000		2.5	64000 (pot)
Benzyl alcohol in ug/L									800		0.5	800 (pot)
Benzyl butyl phthalate in ug/L			0.1	0.58	0.013	8.2	0.013	0.013 (hh)			0.5	0.5 (pql)
Bis(2-ethylhexyl) phthalate in ug/L			0.37	0.25	0.046	3.6	0.046	0.046 (hh)			0.8	0.8 (pql)
Carbazole in ug/L											0.5	
Dibenzofuran in ug/L									16		0.05	16 (pot)
Diethyl phthalate in ug/L			600	5000	200	28000	200	200 (hh)			0.5	200 (marine)
Dimethyl phthalate in ug/L			2000	130000	600		600	600 (hh)			0.5	600 (marine)
Di-n-butyl phthalate in ug/L			30	510	8	2900	8	8 (hh)			0.5	8 (marine)
Pentachlorophenol in ug/L	7.9	7.9	0.04	0.1	0.002	1.5	0.002	0.002 (hh)			0.5	0.5 (pql)
Phenol in ug/L			300000	200000	70000	560000	70000	70000 (hh)			0.5	70000 (marine)

Table 1. Groundwater Preliminary Cleanup Levels

Project No. 210178, K-C Worldwide Site Upland Area, Everett, Washington

ANALYTE (BY GROUP)	APPLICABLE GROUNDWATER CRITERIA												
	Marine Surface Water Criteria for Establishing Method B Surface Water Cleanup Levels[a]												
	Aquatic Protection		Human Health Protection										
	Surface Water ARAR - Aquatic Life - Ch. 173-201A WAC	Surface Water ARAR - Aquatic Life - National Recommended WQ Criteria (CWA 304a)	Surface Water ARAR - Human Health - National Recommended WQ Criteria (CWA 304a)	Surface Water ARAR - Human Health - Ch. 173-201A WAC	Surface Water ARAR - Human Health - 40 CFR 131.45 (CWA 303c)	Surface Water, Method B Human Health, Most Restrictive, Standard Formula	Surface Water, Method B Human Health, Most Restrictive, Adjusted for ARARs[b]	Surface Water Screening Level for Marine Protection		Potable Groundwater Screening Level[c]	Groundwater Screening Level Protective of Vapor Intrusion for Industrial Use (Method C)[a]	Applicable Practical Quantitation Level (PQL)[d]	Groundwater Preliminary Cleanup Level and Basis
	(ma-wac)	*(ma-cwa 304a)*	*(hh-cwa 304a)*	*(hh-wac)*	*(hh-cwa 303c)*	*(sw-b)*	*(hh)*	*(marine)*		*(pot)*	*(vi-c)*	*(pql)*	
Polychlorinated Biphenyls (PCBs)													
Total PCBs in ug/L (Sum of Aroclors)	0.03	0.03	6.4E-05	1.7E-04	7.0E-06	1.0E-04	7.0E-06	7.0E-06	*(hh)*			0.05	0.05 *(pql)*
Total PCBs in ug/L (Sum of Congeners)	0.03	0.03	6.4E-05	1.7E-04	7.0E-06	1.0E-04	7.0E-06	7.0E-06	*(hh)*			0.0091	0.0091 *(pql)*
Dioxins/Furans													
Total 2,3,7,8 TCDD (TEQ) in ug/L			5.1E-09	6.4E-08	1.4E-08	1.0E-08	5.10E-09	5.1E-09	*(hh)*			6.3E-05	6.3E-05 *(pql)*

Notes:

Preliminary cleanup levels are presented for compounds that were detected in either soil or groundwater during collection of data used in the RI (2012-present).

ug/L - micrograms per liter

a Criteria values taken from Ecology's online CLARC database (updated July 2015).

b Surface water Method B human health levels established using the standard Method B formula in MTCA were compared to state and federal human-health-based ARARs. The most stringent ARAR that is sufficiently protective under MTCA (i.e., less than a risk of 10^{-5} and a hazard quotient of 1) is selected as the screening level for human health protection (*hh*). If there are multiple contaminants, then the cumulative risk and HI must not exceed a risk of 10-5 or a hazard index of 1.

c Upland Area groundwater is not a practicable source of potable groundwater, but, for the purposes of the RI, potable groundwater screening levels are applied for those compounds without a marine surface water screening level,.

d Analytical method reporting limits. PQLs for total cPAH (TEQ) and total TCDD (TEQ) are adjusted for TEFs.

e Based on background groundwater concentrations in Washington state (WAC 173-340-900, Table 720-1).

f Formaldehyde value based on protection of aquatic life (Anchor Environmental, 2008). Value is coincidentally equal to potable water screening level.

Table 2. Soil Preliminary Cleanup Levels

Project No. 210178, K-C Worldwide Site Upland Area, Everett, Washington

ANALYTE (BY GROUP)	Groundwater Preliminary Cleanup Level (ug/L) (see Table 1)	APPLICABLE SOIL CRITERIA: Soil Protective of Groundwater: Calculated Values: Unsaturated Soil Concentration Protective of Leachability to Groundwater for Industrial Land Use (mg/kg)[b] *(gwl-u)*	Saturated Soil Concentration Protective of Leachability to Groundwater for Industrial Land Use (mg/kg)[c] *(gwl-s)*	Groundwater Exceedances Confirmed Empirically for Analyte?[d] (Y = yes; blank = no)	Soil, Method A, Industrial Land Use, Table Value (mg/kg)[e] *(mA)*	Soil Protective of Human Direct Contact[f]: Soil, Method C, Most-Restrictive Standard Formula Value, Direct Contact, Industrial Land Use (mg/kg)[a] *(mC)*	Natural Background Concentration (mg/kg)[g] *(back)*	Practical Quantitation Level (PQL) (mg/kg)[h] *(pql)*	Soil Preliminary Cleanup Level (mg/kg) and Basis: Unsaturated Soil		Saturated Soil	
Total Petroleum Hydrocarbons [k]												
Gasoline Range Hydrocarbons	1000			Y	100			5	100	*(mA)*	100	*(mA)*
Diesel Range Hydrocarbons	500			Y	2000			25	2000	*(mA)*	2000	*(mA)*
Oil Range Hydrocarbons	500			Y	2000			100	2000	*(mA)*	2000	*(mA)*
TPH (D+O)	500			Y	2000			100	2000	*(mA)*	2000	*(mA)*
Metals												
Antimony	90	81	4.1			1400		1	1400	*(mC)*	1400	*(mC)*
Arsenic	5	2.9	0.15	Y		88	20	1	20	*(back)*	20	*(back)*
Barium	2000	1600	83			700000		1	700000	*(mC)*	700000	*(mC)*
Cadmium	7.9	1.1	0.055			3500	1	1	3500	*(mC)*	3500	*(mC)*
Chromium (Total)	240000	4800000	240000			5.3E+06	48	1	5300000	*(mC)*	5300000	*(mC)*
Copper	3.1	1.4	0.069	Y		140000	36	1	36	*(back)*	36	*(back)*
Lead	8.1	1600	81	Y	1000		24	1	1000	*(mA)*	81	*(gwl-s)*
Mercury	0.025	0.026	0.0013	Y		1050	0.07	0.1	0.1	*(pql)*	0.1	*(pql)*
Nickel	8.2	11	0.54	Y		70000	48	1	48	*(back)*	48	*(back)*
Selenium	71	7.4	0.38			18000		1	18000	*(mC)*	18000	*(mC)*
Silver	1.9	0.32	0.016			18000		1	18000	*(mC)*	18000	*(mC)*
Thallium	0.22	0.31	0.016			35		1	35	*(mC)*	35	*(mC)*
Zinc	81	100	5	Y		1100000	85	1	100	*(gwl-u)*	85	*(back)*
Volatile Organic Compounds												
1,1-Dichloroethene	280			Y		180000		0.05	180000	*(mC)*	180000	*(mC)*
1,2,4-Trimethylbenzene	62					35000		0.05	35000	*(mC)*	35000	*(mC)*
1,3,5-Trimethylbenzene	62					35000		0.05	35000	*(mC)*	35000	*(mC)*
2-Butanone	4800					2100000		0.5	2100000	*(mC)*	2100000	*(mC)*
2-Chlorotoluene	160					70000		0.05	70000	*(mC)*	70000	*(mC)*
4-Chlorotoluene								0.05				
Acetone	7200					3200000		0.05	3200000	*(mC)*	3200000	*(mC)*
Benzene	1.6					2400		0.05	2400	*(mC)*	2400	*(mC)*
cis-1,2-Dichloroethene (DCE)	16					7000		0.05	7000	*(mC)*	7000	*(mC)*
Ethylbenzene	31					350000		0.05	350000	*(mC)*	350000	*(mC)*
Isopropylbenzene	800					350000		0.05	350000	*(mC)*	350000	*(mC)*
m,p-Xylenes	680			Y		700000		0.1	700000	*(mC)*	700000	*(mC)*
Methylene chloride	100					21000		0.05	21000	*(mC)*	21000	*(mC)*
n-Propylbenzene	800					350000		0.05	350000	*(mC)*	350000	*(mC)*
o-Xylene	960			Y		700000		0.05	700000	*(mC)*	700000	*(mC)*
p-Isopropyltoluene	800					350000		0.05	350000	*(mC)*	350000	*(mC)*
sec-Butylbenzene	800					350000		0.05	350000	*(mC)*	350000	*(mC)*
Styrene	100					700000		0.05	700000	*(mC)*	700000	*(mC)*
tert-Butylbenzene	800					350000		0.05	350000	*(mC)*	350000	*(mC)*
Toluene	130					280000		0.05	280000	*(mC)*	280000	*(mC)*

Table 2. Soil Preliminary Cleanup Levels

Project No. 210178, K-C Worldwide Site Upland Area, Everett, Washington

		APPLICABLE SOIL CRITERIA								
		Soil Protective of Groundwater				**Soil Protective of Human Direct Contact**[f]			**Soil Preliminary Cleanup Level (mg/kg) and Basis**	
		Calculated Values								
ANALYTE (BY GROUP)	**Groundwater Preliminary Cleanup Level (ug/L) (see Table 1)**	**Unsaturated Soil Concentration Protective of Leachability to Groundwater for Industrial Land Use (mg/kg)**[b] *(gwl-u)*	**Saturated Soil Concentration Protective of Leachability to Groundwater for Industrial Land Use (mg/kg)**[c] *(gwl-s)*	**Groundwater Exceedances Confirmed Empirically for Analyte?**[d] **(Y = yes; blank = no)**	**Soil, Method A, Industrial Land Use, Table Value (mg/kg)**[e] *(mA)*	**Soil, Method C, Most-Restrictive Standard Formula Value, Direct Contact, Industrial Land Use (mg/kg)**[a] *(mC)*	**Natural Background Concentration (mg/kg)**[g] *(back)*	**Practical Quantitation Level (PQL) (mg/kg)**[h] *(pql)*	**Unsaturated Soil**	**Saturated Soil**
Vinyl chloride	0.26			Y		88		0.05	88 *(mC)*	88 *(mC)*
Xylenes (total)	680			Y		700000		0.05	700000 *(mC)*	700000 *(mC)*
Polycyclic Aromatic Hydrocarbons (PAHs)										
Acenaphthene	30			Y		210000		0.03	210000 *(mC)*	210000 *(mC)*
Acenaphthylene	30					210000		0.03	210000 *(mC)*	210000 *(mC)*
Anthracene	100					1100000		0.03	1100000 *(mC)*	1100000 *(mC)*
Benzo(g,h,i)perylene	8					110000		0.03	110000 *(mC)*	110000 *(mC)*
Fluoranthene	6					140000		0.03	140000 *(mC)*	140000 *(mC)*
Fluorene	10					140000		0.03	140000 *(mC)*	140000 *(mC)*
Phenanthrene	100					1100000		0.03	1100000 *(mC)*	1100000 *(mC)*
Pyrene	8					110000		0.03	110000 *(mC)*	110000 *(mC)*
1-Methylnaphthalene	1.5					4500		0.03	4500 *(mC)*	4500 *(mC)*
2-Methylnaphthalene	32			Y		14000		0.03	14000 *(mC)*	14000 *(mC)*
Naphthalene	89			Y		70000		0.03	70000 *(mC)*	70000 *(mC)*
Benz(a)anthracene								0.01		
Benzo(a)pyrene								0.01		
Benzo(b)fluoranthene								0.01		
Benzo(k)fluoranthene								0.01		
Chrysene								0.01		
Dibenzo(a,h)anthracene								0.01		
Indeno(1,2,3-cd)pyrene								0.01		
Total cPAHs TEQ	0.015			Y		131		0.015	131 *(mC)*	131 *(mC)*
Other Semivolatile Organics										
1,4-Dichlorobenzene	49					24000		0.03	24000 *(mC)*	24000 *(mC)*
2,4-Dimethylphenol	97					70000		0.3	70000 *(mC)*	70000 *(mC)*
3 & 4 Methylphenol	400					175000		0.18	175000 *(mC)*	175000 *(mC)*
Benzoic acid	64000					14000000		3	14000000 *(mC)*	14000000 *(mC)*
Benzyl alcohol	800					350000		0.03	350000 *(mC)*	350000 *(mC)*
Benzyl butyl phthalate	0.5					69000		0.03	69000 *(mC)*	69000 *(mC)*
Bis(2-ethylhexyl) phthalate	0.8					9400		0.3	9400 *(mC)*	9400 *(mC)*
Carbazole								0.06		
Dibenzofuran	16			Y		3500		0.03	3500 *(mC)*	3500 *(mC)*
Diethyl phthalate	200					2800000		0.03	2800000 *(mC)*	2800000 *(mC)*
Dimethyl phthalate	600							0.03		
Di-n-butyl phthalate	8					350000		0.03	350000 *(mC)*	350000 *(mC)*
Pentachlorophenol	0.5			Y		330		0.3	330 *(mC)*	330 *(mC)*
Phenol	70000					1100000		0.3	1100000 *(mC)*	1100000 *(mC)*

Table 2. Soil Preliminary Cleanup Levels

Project No. 210178, K-C Worldwide Site Upland Area, Everett, Washington

		APPLICABLE SOIL CRITERIA							Soil Preliminary Cleanup Level (mg/kg) and Basis	
		Soil Protective of Groundwater				Soil Protective of Human Direct Contact[f]				
		Calculated Values								
ANALYTE (BY GROUP)	Groundwater Preliminary Cleanup Level (ug/L) (see Table 1)	Unsaturated Soil Concentration Protective of Leachability to Groundwater for Industrial Land Use (mg/kg)[b] *(gwl-u)*	Saturated Soil Concentration Protective of Leachability to Groundwater for Industrial Land Use (mg/kg)[c] *(gwl-s)*	Groundwater Exceedances Confirmed Empirically for Analyte?[d] (Y = yes; blank = no)	Soil, Method A, Industrial Land Use, Table Value (mg/kg)[e] *(mA)*	Soil, Method C, Most-Restrictive Standard Formula Value, Direct Contact, Industrial Land Use (mg/kg)[a] *(mC)*	Natural Background Concentration (mg/kg)[g] *(back)*	Practical Quantitation Level (PQL) (mg/kg)[h] *(pql)*	Unsaturated Soil	Saturated Soil
Polychlorinated Biphenyls (PCBs)										
Total PCBs	0.05	2.4	1.2	Y	10	66		0.10	2.4 *(gwl-u)*	1.2 *(gwl-s)*
Dioxins/Furans										
Total 2,3,7,8 TCDD (TEQ)[j]	6.3E-05					1.7E-03	5.2E-06	5.0E-06	1.7E-03 *(mC)*	1.7E-03 *(mC)*

Notes:

Preliminary cleanup levels are presented for compounds that were detected in either soil or groundwater during collection of data used in the RI (2012-present).

a Values obtained from Ecology's CLARC database, July 2015 update.

b Calculated values from three-phase model, per MTCA Equation 747-1, with groundwater value (Cw) as most stringent land-use-specific groundwater cleanup level, site-specific f_{oc} = 0.0078, and MTCA-default dilution factor = 20. WAC 173-340-747 provides multiple additional means to evaluate soil concentrations protective of groundwater.

c Calculated values from three-phase model, per MTCA Equation 747-1, with groundwater value (Cw) as most stringent land-use-specific groundwater cleanup level, site-specific f_{oc} = 0.0078, and MTCA-default dilution factor = 1. WAC 173-340-747 provides multiple additional means to evaluate soil concentrations protective of groundwater.

d If the existing empirical groundwater data demonstrate no groundwater exceedances for a compound, the soil-leachability-to-groundwater pathway is considered incomplete for that compound, and the calculated soil-protective-of-groundwater criteria are not included for establishing that compound's preliminary soil screening levels.

e Because Upland Area groundwater is not a practicable source of drinking water, many Method A soil cleanup levels are not applicable. Method A soil cleanup levels are used for TPH, lead, and arsenic (natural background).

f Direct contact soil cleanup levels are applicable for soils to 15-foot depth.

g Natural background values for metals from Natural Background Soil Metals Concentrations in Washington State (Ecology, 1994), except arsenic which is from MTCA (WAC 173-340-900, Table 720-1). Natural background value for dioxins/furans from Natural Background for Dioxins/Furans in Washington Soils—Technical Memorandum #8 (Ecology, 2010).

h Analytical method reporting limits. PQLs for total cPAH (TEQ) and total TCDD (TEQ) are adjusted for TEFs.

i Total PCBs is the summation of detected aroclors.

j K_{oc} and Hcc values for 2,3,7,8-TCDD are from EPA Regional Screening Level table, and are in the Oak Ridge National Lab Risk Assessment database.

k Area-specific (and petroleum product-specific) Method C soil TPH PCLs developed for selected areas using VPH/EPH data in acordance with WAC 173-340-745(5), as described in the text and Appendix B, are not presented here.

Table 3. Statistical Summary of Groundwater Quality Data Representing Current Site Conditions

Project No. 210178, K-C Worldwide Site Upland Area, Everett, Washington

							(PCLs) (all exposure pathways)			
Group	Analyte	Number of Samples	Number of Detections	Detection Frequency	Max Detected Concentration	Units	Groundwater PCL	Number of Locations with Exceedances	Number of Samples with Exceedances	Exceedance Frequency
Conventionals	Hydrogen Sulfide	8	8	100%	0.97	mg/L	0.002	6	6	75.0%
PCBAro	Total PCBs (Sum of Aroclors)	3	2	67%	0.084	ug/L	0.04	1	2	66.7%
PCBCong	Total PCBs (sum of congeners)	8	8	100%	0.434	ug/L	0.0091	3	3	37.5%
Metals	Copper	308	293	95%	269	ug/L	3.1	50	112	36.4%
Metals	Arsenic	194	182	94%	202	ug/L	5	32	56	28.9%
Metals	Nickel	155	155	100%	308	ug/L	8.2	23	41	26.5%
Conventionals	Un-ionized Ammonia (as N)	82	82	100%	10.7	mg/L	0.035	10	18	22.0%
Metals	Mercury	241	192	80%	4.24	ug/L	0.025	21	45	18.7%
cPAHs	Total cPAHs TEQ	362	82	23%	0.404	ug/L	0.015	20	40	11.0%
Metals	Lead	199	162	81%	121	ug/L	8.1	7	11	5.5%
Metals	Zinc	173	168	97%	356	ug/L	81	3	9	5.2%
VOCs	Vinyl chloride	83	6	7%	0.96	ug/L	0.26	4	4	4.8%
Other SVOCs	Pentachlorophenol	83	3	4%	7.3	ug/L	0.5	2	3	3.6%
TPHs	TPH (D+O Range)	328	100	30%	2500	ug/L	500	4	10	3.0%
Other SVOCs	Dibenzofuran	83	9	11%	62	ug/L	16	1	2	2.4%
VOCs	1,1-Dichloroethene	83	3	4%	5.9	ug/L	3.2	1	2	2.4%
TPHs	Diesel Range Hydrocarbons	328	99	30%	990	ug/L	500	3	6	1.8%
ncPAHs	Naphthalene	377	155	41%	210	ug/L	89	4	6	1.6%
ncPAHs	2-Methylnaphthalene	83	7	8%	37	ug/L	32	1	1	1.2%
Other SVOCs	2,4,6-Trichlorophenol	83	1	1%	0.56	ug/L	0.5	1	1	1.2%
Other SVOCs	Bis(2-ethylhexyl) phthalate	83	1	1%	0.96	ug/L	0.8	1	1	1.2%
TPHs	Oil Range Hydrocarbons	328	4	1%	2200	ug/L	500	1	3	0.9%
TPHs	Gasoline Range Hydrocarbons	207	34	16%	1100	ug/L	1000	1	1	0.5%
Metals	Antimony	54	16	30%	29.6	ug/L	180	0	0	0.0%
Metals	Beryllium	54	5	9%	0.018	ug/L	270	0	0	0.0%
Metals	Cadmium	56	19	34%	0.776	ug/L	8.8	0	0	0.0%
Metals	Chromium (Total)	56	43	77%	110	ug/L	240000	0	0	0.0%
Metals	Selenium	56	19	34%	25.6	ug/L	71	0	0	0.0%
Metals	Silver	56	11	20%	0.031	ug/L	1.9	0	0	0.0%
Metals	Thallium	54	2	4%	0.026	ug/L	0.22	0	0	0.0%
Conventionals	Formaldehyde	2	0	0%	NA	ug/L	1600	0	0	0.0%
ncPAHs	Acenaphthene	362	253	70%	58	ug/L	90	0	0	0.0%
ncPAHs	Acenaphthylene	362	47	13%	0.73	ug/L	90	0	0	0.0%
ncPAHs	Anthracene	362	149	41%	6.4	ug/L	400	0	0	0.0%
ncPAHs	Benzo(g,h,i)perylene	362	14	4%	0.14	ug/L	30	0	0	0.0%
ncPAHs	Fluoranthene	362	184	51%	6.4	ug/L	16	0	0	0.0%
ncPAHs	Fluorene	362	203	56%	35	ug/L	70	0	0	0.0%
ncPAHs	Phenanthrene	362	168	46%	41	ug/L	400	0	0	0.0%
ncPAHs	Pyrene	362	191	53%	4.2	ug/L	30	0	0	0.0%
ncPAHs	1-Methylnaphthalene	9	3	33%	1.1	ug/L	1.5	0	0	0.0%
cPAHs	Benz(a)anthracene	362	64	18%	0.55	ug/L	-	0	0	0.0%
cPAHs	Benzo(a)pyrene	362	35	10%	0.28	ug/L	-	0	0	0.0%
cPAHs	Benzo(b)fluoranthene	361	40	11%	0.3	ug/L	-	0	0	0.0%
cPAHs	Benzo(k)fluoranthene	362	20	6%	0.13	ug/L	-	0	0	0.0%
cPAHs	Chrysene	362	77	21%	0.53	ug/L	-	0	0	0.0%
cPAHs	Dibenzo(a,h)anthracene	362	3	1%	0.047	ug/L	-	0	0	0.0%
cPAHs	Indeno(1,2,3-cd)pyrene	362	17	5%	0.16	ug/L	-	0	0	0.0%
Other SVOCs	1,4-Dioxane	2	0	0%	NA	ug/L	10	0	0	0.0%
Other SVOCs	2,4,5-Trichlorophenol	83	0	0%	NA	ug/L	3600	0	0	0.0%
Other SVOCs	2,4-Dichlorophenol	83	0	0%	NA	ug/L	190	0	0	0.0%
Other SVOCs	2,4-Dimethylphenol	83	4	5%	23	ug/L	97	0	0	0.0%
Other SVOCs	2,4-Dinitrophenol	83	0	0%	NA	ug/L	3500	0	0	0.0%
Other SVOCs	2,4-Dinitrotoluene	83	0	0%	NA	ug/L	3.4	0	0	0.0%
Other SVOCs	2,6-Dinitrotoluene	83	0	0%	NA	ug/L	0.25	0	0	0.0%
Other SVOCs	2-Chloronaphthalene	83	0	0%	NA	ug/L	1000	0	0	0.0%
Other SVOCs	2-Chlorophenol	83	0	0%	NA	ug/L	100	0	0	0.0%
Other SVOCs	2-Methylphenol	83	0	0%	NA	ug/L	400	0	0	0.0%
Other SVOCs	2-Nitroaniline	83	0	0%	NA	ug/L	160	0	0	0.0%
Other SVOCs	2-Nitrophenol	83	0	0%	NA	ug/L	-	0	0	0.0%
Other SVOCs	3 & 4 Methylphenol	83	5	6%	68	ug/L	400	0	0	0.0%
Other SVOCs	3-Nitroaniline	83	0	0%	NA	ug/L	-	0	0	0.0%
Other SVOCs	4,6-Dinitro-2-methylphenol	83	0	0%	NA	ug/L	-	0	0	0.0%
Other SVOCs	4-Bromophenyl phenyl ether	83	0	0%	NA	ug/L	-	0	0	0.0%
Other SVOCs	4-Chloro-3-methylphenol	83	0	0%	NA	ug/L	-	0	0	0.0%
Other SVOCs	4-Chloroaniline	83	0	0%	NA	ug/L	3	0	0	0.0%
Other SVOCs	4-Chlorophenyl phenyl ether	83	0	0%	NA	ug/L	-	0	0	0.0%
Other SVOCs	4-Nitroaniline	83	0	0%	NA	ug/L	-	0	0	0.0%
Other SVOCs	4-Nitrophenol	83	0	0%	NA	ug/L	-	0	0	0.0%
Other SVOCs	Benzoic acid	80	4	5%	37	ug/L	64000	0	0	0.0%
Other SVOCs	Benzyl alcohol	83	0	0%	NA	ug/L	800	0	0	0.0%
Other SVOCs	Benzyl butyl phthalate	83	0	0%	NA	ug/L	0.5	0	0	0.0%
Other SVOCs	Bis(2-chloro-1-methylethyl) ether	83	0	0%	NA	ug/L	37	0	0	0.0%
Other SVOCs	Bis(2-chloroethoxy)methane	83	0	0%	NA	ug/L	-	0	0	0.0%
Other SVOCs	Bis(2-chloroethyl) ether	83	0	0%	NA	ug/L	0.53	0	0	0.0%
Other SVOCs	Carbazole	83	4	5%	2.3	ug/L	-	0	0	0.0%
Other SVOCs	Diethyl phthalate	83	1	1%	4.1	ug/L	600	0	0	0.0%
Other SVOCs	Dimethyl phthalate	83	0	0%	NA	ug/L	2000	0	0	0.0%
Other SVOCs	Di-n-butyl phthalate	83	1	1%	1	ug/L	30	0	0	0.0%
Other SVOCs	Di-n-octyl phthalate	83	0	0%	NA	ug/L	160	0	0	0.0%
Other SVOCs	Hexachlorobenzene	83	0	0%	NA	ug/L	0.05	0	0	0.0%
Other SVOCs	Hexachlorobutadiene	120	0	0%	NA	ug/L	8.1	0	0	0.0%
Other SVOCs	Hexachlorocyclopentadiene	83	0	0%	NA	ug/L	0.48	0	0	0.0%

Table 3. Statistical Summary of Groundwater Quality Data Representing Current Site Conditions

Project No. 210178, K-C Worldwide Site Upland Area, Everett, Washington

							(PCLs) (all exposure pathways)			
Group	Analyte	Number of Samples	Number of Detections	Detection Frequency	Max Detected Concentration	Units	Groundwater PCL	Number of Locations with Exceedances	Number of Samples with Exceedances	Exceedance Frequency
Other SVOCs	Hexachloroethane	83	0	0%	NA	ug/L	3.3	0	0	0.0%
Other SVOCs	Isophorone	83	0	0%	NA	ug/L	600	0	0	0.0%
Other SVOCs	Nitrobenzene	83	0	0%	NA	ug/L	690	0	0	0.0%
Other SVOCs	N-Nitroso-di-n-propylamine	83	0	0%	NA	ug/L	0.51	0	0	0.0%
Other SVOCs	N-Nitrosodiphenylamine	83	0	0%	NA	ug/L	6	0	0	0.0%
Other SVOCs	Phenol	83	9	11%	77	ug/L	200000	0	0	0.0%
VOCs	Benzene	192	3	2%	0.92	ug/L	1.6	0	0	0.0%
VOCs	Ethylbenzene	192	8	4%	2.6	ug/L	130	0	0	0.0%
VOCs	Toluene	192	4	2%	6.9	ug/L	410	0	0	0.0%
VOCs	m,p-Xylenes	83	2	2%	2.9	ug/L	680	0	0	0.0%
VOCs	o-Xylene	83	3	4%	9.8	ug/L	960	0	0	0.0%
VOCs	Xylenes (total)	180	9	5%	13	ug/L	680	0	0	0.0%
VOCs	1,1,1,2-Tetrachloroethane	83	0	0%	NA	ug/L	1.7	0	0	0.0%
VOCs	1,1,1-Trichloroethane	83	0	0%	NA	ug/L	12000	0	0	0.0%
VOCs	1,1,2,2-Tetrachloroethane	83	0	0%	NA	ug/L	4	0	0	0.0%
VOCs	1,1,2-Trichloroethane	83	0	0%	NA	ug/L	10	0	0	0.0%
VOCs	1,1-Dichloroethane	83	0	0%	NA	ug/L	7.7	0	0	0.0%
VOCs	1,1-Dichloropropene	83	0	0%	NA	ug/L	-	0	0	0.0%
VOCs	1,2,3-Trichlorobenzene	83	0	0%	NA	ug/L	-	0	0	0.0%
VOCs	1,2,3-Trichloropropane	83	0	0%	NA	ug/L	0.5	0	0	0.0%
VOCs	1,2,4-Trichlorobenzene	120	0	0%	NA	ug/L	2	0	0	0.0%
VOCs	1,2,4-Trimethylbenzene	83	2	2%	4.9	ug/L	61	0	0	0.0%
VOCs	1,2-Dibromo-3-chloropropane	83	0	0%	NA	ug/L	2	0	0	0.0%
VOCs	1,2-Dibromoethane (EDB)	83	0	0%	NA	ug/L	0.05	0	0	0.0%
VOCs	1,2-Dichlorobenzene	120	0	0%	NA	ug/L	1300	0	0	0.0%
VOCs	1,2-Dichloroethane (EDC)	83	0	0%	NA	ug/L	37	0	0	0.0%
VOCs	1,2-Dichloropropane	83	0	0%	NA	ug/L	15	0	0	0.0%
VOCs	1,3,5-Trimethylbenzene	83	1	1%	2.2	ug/L	80	0	0	0.0%
VOCs	1,3-Dichlorobenzene	120	0	0%	NA	ug/L	960	0	0	0.0%
VOCs	1,3-Dichloropropane	83	0	0%	NA	ug/L	-	0	0	0.0%
VOCs	1,4-Dichlorobenzene	120	0	0%	NA	ug/L	21	0	0	0.0%
VOCs	2,2-Dichloropropane	83	0	0%	NA	ug/L	-	0	0	0.0%
VOCs	2-Butanone	83	2	2%	12	ug/L	4800	0	0	0.0%
VOCs	2-Chlorotoluene	83	0	0%	NA	ug/L	160	0	0	0.0%
VOCs	2-Hexanone	83	0	0%	NA	ug/L	-	0	0	0.0%
VOCs	4-Chlorotoluene	83	0	0%	NA	ug/L	-	0	0	0.0%
VOCs	4-Methyl-2-pentanone	83	0	0%	NA	ug/L	640	0	0	0.0%
VOCs	Acetone	83	4	5%	110	ug/L	7200	0	0	0.0%
VOCs	Bromobenzene	83	0	0%	NA	ug/L	-	0	0	0.0%
VOCs	Bromodichloromethane	83	0	0%	NA	ug/L	17	0	0	0.0%
VOCs	Bromoform	83	0	0%	NA	ug/L	140	0	0	0.0%
VOCs	Bromomethane	83	0	0%	NA	ug/L	28	0	0	0.0%
VOCs	Carbon tetrachloride	83	0	0%	NA	ug/L	1.6	0	0	0.0%
VOCs	Chlorobenzene	83	0	0%	NA	ug/L	640	0	0	0.0%
VOCs	Chloroethane	83	0	0%	NA	ug/L	40000	0	0	0.0%
VOCs	Chloroform	83	0	0%	NA	ug/L	12	0	0	0.0%
VOCs	Chloromethane	83	0	0%	NA	ug/L	340	0	0	0.0%
VOCs	cis-1,2-Dichloroethene (DCE)	83	0	0%	NA	ug/L	16	0	0	0.0%
VOCs	cis-1,3-Dichloropropene	83	0	0%	NA	ug/L	-	0	0	0.0%
VOCs	Dibromochloromethane	83	0	0%	NA	ug/L	13	0	0	0.0%
VOCs	Dibromomethane	83	0	0%	NA	ug/L	80	0	0	0.0%
VOCs	Dichlorodifluoromethane	83	0	0%	NA	ug/L	12	0	0	0.0%
VOCs	Isopropylbenzene	83	1	1%	1.2	ug/L	800	0	0	0.0%
VOCs	Methyl tert-butyl ether (MTBE)	83	0	0%	NA	ug/L	24.3	0	0	0.0%
VOCs	Methylene chloride	83	0	0%	NA	ug/L	250	0	0	0.0%
VOCs	n-Hexane	8	0	0%	NA	ug/L	-	0	0	0.0%
VOCs	n-Propylbenzene	83	2	2%	1.5	ug/L	800	0	0	0.0%
VOCs	p-Isopropyltoluene	83	4	5%	200	ug/L	800	0	0	0.0%
VOCs	sec-Butylbenzene	83	1	1%	2.2	ug/L	800	0	0	0.0%
VOCs	Styrene	83	1	1%	2	ug/L	100	0	0	0.0%
VOCs	tert-Butylbenzene	83	0	0%	NA	ug/L	800	0	0	0.0%
VOCs	Tetrachloroethene (PCE)	83	0	0%	NA	ug/L	3.3	0	0	0.0%
VOCs	trans-1,2-Dichloroethene	83	0	0%	NA	ug/L	250	0	0	0.0%
VOCs	trans-1,3-Dichloropropene	83	0	0%	NA	ug/L	-	0	0	0.0%
VOCs	Trichloroethene (TCE)	83	0	0%	NA	ug/L	8.4	0	0	0.0%
VOCs	Trichlorofluoromethane	83	0	0%	NA	ug/L	260	0	0	0.0%
VOCs	Vinyl acetate	2	0	0%	NA	ug/L	8000	0	0	0.0%

Notes

Yellow-highlighted constituents have frequency of exceedance of PCL greater than 5%.

PCL: Preliminary cleanup level addressing all applicable exposure pathways.

Table 4. Statistical Summary of Soil Quality Data Representing Current Site Conditions

Project No. 210178, K-C Worldwide Site Upland Area, Everett, Washington

								(PCLs) (all exposure pathways)				
Group	Analyte	Number of Sample Locations	Number of Samples	Number of Detections	Detection Frequency	Max Detected Concentration	Units	Unsaturated Soil PCL	Saturated Soil PCL	Number of Locations with Exceedances	Number of Samples with Exceedances	Exceedance Frequency
Metals	Mercury	591	807	132	16%	3.8	mg/kg	0.1	0.1	118	126	15.6%
Metals	Copper	557	778	795	102%	173	mg/kg	36	36	85	96	12.3%
Metals	Zinc	505	713	746	105%	973	mg/kg	100	85	64	82	11.5%
cPAHs	Total cPAHs TEQ	817	1057	442	42%	7.77	mg/kg	3.2	0.16	48	52	4.9%
TPHs	TPH (D+O Range)	775	1046	136	13%	29000	mg/kg	2000	2000	31	33	3.2%
TPHs	Gasoline Range Hydrocarbons	347	471	55	12%	4000	mg/kg	100	100	14	14	3.0%
Metals	Lead	455	671	692	103%	924	mg/kg	1000	81	13	15	2.2%
Metals	Arsenic	442	651	627	96%	43	mg/kg	20	20	11	12	1.8%
PCBs	Total PCBs (Sum of Aroclors)	289	367	58	16%	24	mg/kg	2.4	0.12	4	4	1.1%
ncPAHs	2-Methylnaphthalene	140	233	37	16%	1.5	mg/kg	13	0.63	2	2	0.9%
Metals	Nickel	427	616	645	105%	135	mg/kg	48	48	5	5	0.8%
ncPAHs	Naphthalene	813	1077	275	26%	79	mg/kg	17	0.86	8	8	0.7%
VOCs	Xylenes (total)	290	374	7	2%	7.1	mg/kg	28	1.4	2	2	0.5%
Metals	Antimony	185	241	46	19%	9.42	mg/kg	1400	1400	0	0	0.0%
Metals	Barium	4	8	8	100%	68.6	mg/kg	700000	700000	0	0	0.0%
Metals	Beryllium	114	170	0	0%	NA	mg/kg	7000	7000	0	0	0.0%
Metals	Cadmium	341	417	3	1%	2.41	mg/kg	3500	3500	0	0	0.0%
Metals	Chromium (Total)	137	197	231	117%	75.8	mg/kg	5300000	5300000	0	0	0.0%
Metals	Selenium	125	185	0	0%	NA	mg/kg	18000	18000	0	0	0.0%
Metals	Silver	125	185	0	0%	NA	mg/kg	18000	18000	0	0	0.0%
Metals	Thallium	114	170	0	0%	NA	mg/kg	35	35	0	0	0.0%
Conventionals	Formaldehyde	34	34	24	71%	12	mg/kg	700000	700000	0	0	0.0%
ncPAHs	Acenaphthene	804	1045	244	23%	72	mg/kg	210000	210000	0	0	0.0%
ncPAHs	Acenaphthylene	804	1044	55	5%	0.33	mg/kg	-	-	0	0	0.0%
ncPAHs	Anthracene	804	1045	219	21%	25	mg/kg	1100000	1100000	0	0	0.0%
ncPAHs	Benzo(g,h,i)perylene	804	1044	332	32%	4.3	mg/kg	-	-	0	0	0.0%
ncPAHs	Fluoranthene	804	1045	486	47%	74	mg/kg	140000	140000	0	0	0.0%
ncPAHs	Fluorene	804	1045	209	20%	79	mg/kg	140000	140000	0	0	0.0%
ncPAHs	Phenanthrene	804	1045	440	42%	210	mg/kg	-	-	0	0	0.0%
ncPAHs	Pyrene	804	1045	541	52%	45	mg/kg	110000	110000	0	0	0.0%
ncPAHs	1-Methylnaphthalene	17	37	10	27%	2.6	mg/kg	4500	4500	0	0	0.0%
cPAHs	Benz(a)anthracene	817	1057	378	36%	9.3	mg/kg	-	-	0	0	0.0%
cPAHs	Benzo(a)pyrene	817	1057	367	35%	6.3	mg/kg	-	-	0	0	0.0%
cPAHs	Benzo(b)fluoranthene	817	1057	412	39%	3.2	mg/kg	-	-	0	0	0.0%
cPAHs	Benzo(k)fluoranthene	817	1057	217	21%	1.4	mg/kg	-	-	0	0	0.0%
cPAHs	Chrysene	817	1057	424	40%	12	mg/kg	-	-	0	0	0.0%
cPAHs	Dibenzo(a,h)anthracene	817	1057	110	10%	0.98	mg/kg	-	-	0	0	0.0%
cPAHs	Indeno(1,2,3-cd)pyrene	817	1057	312	30%	1.5	mg/kg	-	-	0	0	0.0%
Other SVOCs	1,4-Dioxane	45	45	0	0%	NA	mg/kg	1312.5	1312.5	0	0	0.0%
Other SVOCs	2,4,5-Trichlorophenol	133	218	0	0%	NA	mg/kg	350000	350000	0	0	0.0%
Other SVOCs	2,4,6-Trichlorophenol	133	218	0	0%	NA	mg/kg	3500	3500	0	0	0.0%
Other SVOCs	2,4-Dichlorophenol	133	219	0	0%	NA	mg/kg	11000	11000	0	0	0.0%
Other SVOCs	2,4-Dimethylphenol	133	219	1	0%	0.16	mg/kg	70000	70000	0	0	0.0%
Other SVOCs	2,4-Dinitrophenol	133	219	0	0%	NA	mg/kg	7000	7000	0	0	0.0%
Other SVOCs	2-Chloronaphthalene	133	218	0	0%	NA	mg/kg	280000	280000	0	0	0.0%
Other SVOCs	2-Chlorophenol	133	219	0	0%	NA	mg/kg	18000	18000	0	0	0.0%
Other SVOCs	2-Methylphenol	133	219	0	0%	NA	mg/kg	180000	180000	0	0	0.0%
Other SVOCs	2-Nitroaniline	133	218	0	0%	NA	mg/kg	35000	35000	0	0	0.0%
Other SVOCs	2-Nitrophenol	133	219	0	0%	NA	mg/kg	-	-	0	0	0.0%
Other SVOCs	3 & 4 Methylphenol	133	219	1	0%	1.3	mg/kg	175000	175000	0	0	0.0%
Other SVOCs	3-Nitroaniline	133	218	0	0%	NA	mg/kg	-	-	0	0	0.0%
Other SVOCs	4,6-Dinitro-2-methylphenol	133	219	0	0%	NA	mg/kg	-	-	0	0	0.0%
Other SVOCs	4-Bromophenyl phenyl ether	133	219	0	0%	NA	mg/kg	-	-	0	0	0.0%
Other SVOCs	4-Chloro-3-methylphenol	133	219	0	0%	NA	mg/kg	-	-	0	0	0.0%
Other SVOCs	4-Chloroaniline	133	219	0	0%	NA	mg/kg	660	660	0	0	0.0%
Other SVOCs	4-Chlorophenyl phenyl ether	133	219	0	0%	NA	mg/kg	-	-	0	0	0.0%
Other SVOCs	4-Nitroaniline	133	219	0	0%	NA	mg/kg	-	-	0	0	0.0%
Other SVOCs	4-Nitrophenol	133	219	0	0%	NA	mg/kg	-	-	0	0	0.0%
Other SVOCs	Benzoic acid	133	218	0	0%	NA	mg/kg	14000000	14000000	0	0	0.0%
Other SVOCs	Benzyl alcohol	133	219	1	0%	0.69	mg/kg	350000	350000	0	0	0.0%
Other SVOCs	Benzyl butyl phthalate	133	219	1	0%	0.065	mg/kg	69000	69000	0	0	0.0%
Other SVOCs	Bis(2-chloro-1-methylethyl) ether	133	219	0	0%	NA	mg/kg	1900	1900	0	0	0.0%
Other SVOCs	Bis(2-chloroethoxy)methane	133	219	0	0%	NA	mg/kg	-	-	0	0	0.0%
Other SVOCs	Bis(2-chloroethyl) ether	133	219	0	0%	NA	mg/kg	120	120	0	0	0.0%
Other SVOCs	Bis(2-ethylhexyl) phthalate	133	218	2	1%	1	mg/kg	9400	9400	0	0	0.0%
Other SVOCs	Carbazole	133	219	4	2%	0.29	mg/kg	-	-	0	0	0.0%
Other SVOCs	Dibenzofuran	133	219	30	14%	1.6	mg/kg	3500	3500	0	0	0.0%
Other SVOCs	Diethyl phthalate	133	219	0	0%	NA	mg/kg	2800000	2800000	0	0	0.0%
Other SVOCs	Dimethyl phthalate	133	218	2	1%	0.1	mg/kg	-	-	0	0	0.0%
Other SVOCs	Di-n-butyl phthalate	133	219	2	1%	1.2	mg/kg	350000	350000	0	0	0.0%
Other SVOCs	Di-n-octyl phthalate	133	218	0	0%	NA	mg/kg	35000	35000	0	0	0.0%
Other SVOCs	Hexachlorobenzene	133	219	0	0%	NA	mg/kg	82	82	0	0	0.0%
Other SVOCs	Hexachlorobutadiene	324	461	0	0%	NA	mg/kg	1700	1700	0	0	0.0%
Other SVOCs	Hexachlorocyclopentadiene	133	218	0	0%	NA	mg/kg	21000	21000	0	0	0.0%
Other SVOCs	Hexachloroethane	133	219	0	0%	NA	mg/kg	2500	2500	0	0	0.0%
Other SVOCs	Isophorone	133	219	0	0%	NA	mg/kg	140000	140000	0	0	0.0%
Other SVOCs	Nitrobenzene	133	219	0	0%	NA	mg/kg	7000	7000	0	0	0.0%
Other SVOCs	N-Nitroso-di-n-propylamine	133	219	0	0%	NA	mg/kg	19	19	0	0	0.0%
Other SVOCs	N-Nitrosodiphenylamine	133	219	0	0%	NA	mg/kg	27000	27000	0	0	0.0%
Other SVOCs	Pentachlorophenol	133	219	0	0%	NA	mg/kg	0.3	0.3	0	0	0.0%
Other SVOCs	Phenol	133	219	1	0%	0.34	mg/kg	1100000	1100000	0	0	0.0%
Other SVOCs	2,4-Dinitrotoluene	133	219	0	0%	NA	mg/kg	420	420	0	0	0.0%
Other SVOCs	2,6-Dinitrotoluene	133	218	0	0%	NA	mg/kg	88	88	0	0	0.0%
VOCs	Benzene	316	421	1	0%	0.036	mg/kg	2400	2400	0	0	0.0%

Table 4. Statistical Summary of Soil Quality Data Representing Current Site Conditions

Project No. 210178, K-C Worldwide Site Upland Area, Everett, Washington

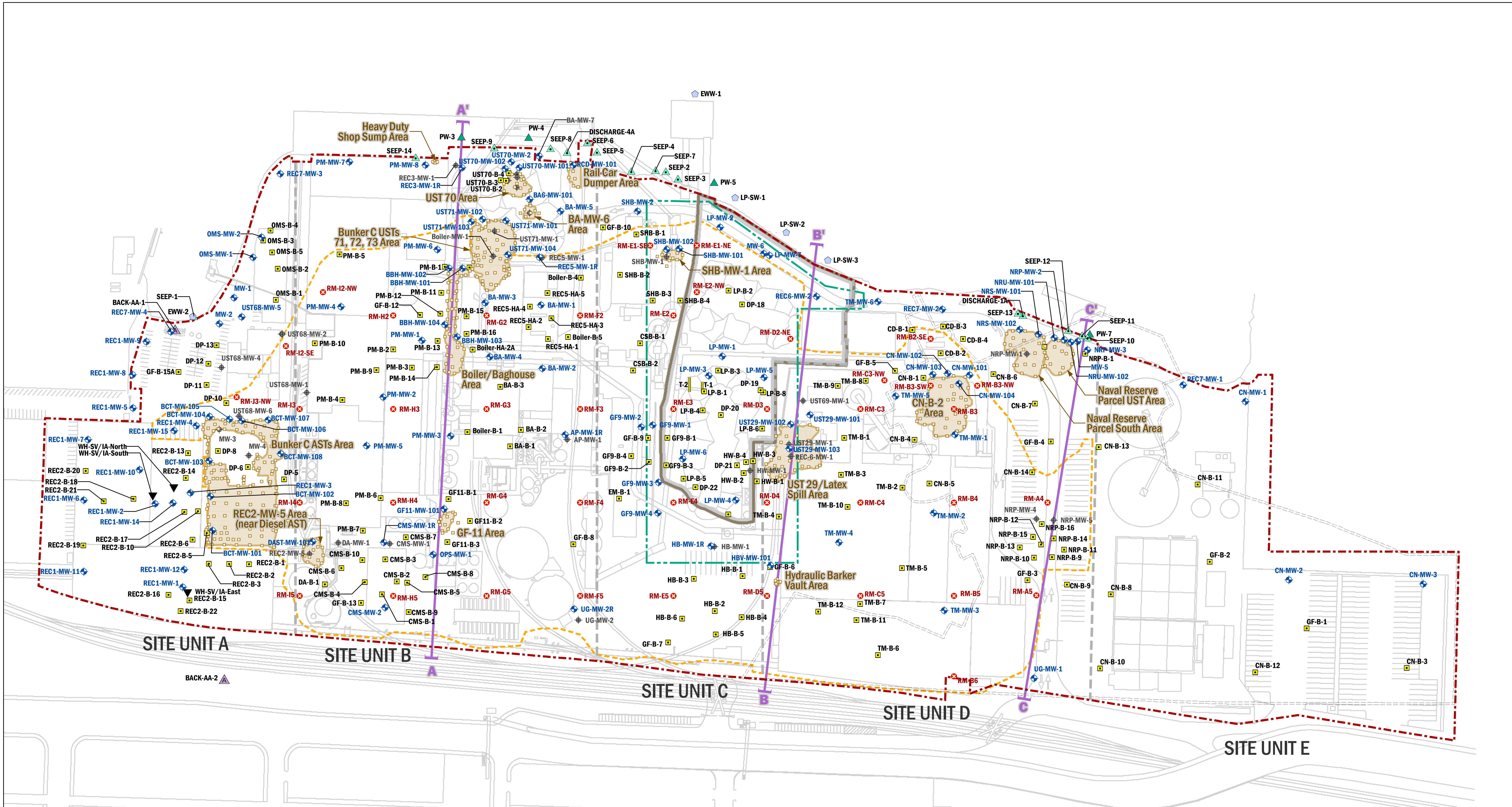
								(PCLs) (all exposure pathways)				
Group	Analyte	Number of Sample Locations	Number of Samples	Number of Detections	Detection Frequency	Max Detected Concentration	Units	Unsaturated Soil PCL	Saturated Soil PCL	Number of Locations with Exceedances	Number of Samples with Exceedances	Exceedance Frequency
VOCs	Ethylbenzene	316	421	7	2%	1.44	mg/kg	350000	350000	0	0	0.0%
VOCs	Toluene	316	421	2	0%	0.666	mg/kg	280000	280000	0	0	0.0%
VOCs	m,p-Xylenes	300	395	9	2%	2.78	mg/kg	-	-	0	0	0.0%
VOCs	o-Xylene	300	395	8	2%	4.32	mg/kg	-	-	0	0	0.0%
VOCs	1,1,1,2-Tetrachloroethane	298	393	0	0%	NA	mg/kg	5000	5000	0	0	0.0%
VOCs	1,1,1-Trichloroethane	298	393	0	0%	NA	mg/kg	7000000	7000000	0	0	0.0%
VOCs	1,1,2,2-Tetrachloroethane	298	393	0	0%	NA	mg/kg	660	660	0	0	0.0%
VOCs	1,1,2-Trichloroethane	298	393	0	0%	NA	mg/kg	2300	2300	0	0	0.0%
VOCs	1,1-Dichloroethane	298	393	0	0%	NA	mg/kg	23000	23000	0	0	0.0%
VOCs	1,1-Dichloroethene	298	393	0	0%	NA	mg/kg	180000	180000	0	0	0.0%
VOCs	1,1-Dichloropropene	298	393	0	0%	NA	mg/kg	-	-	0	0	0.0%
VOCs	1,2,3-Trichlorobenzene	298	393	0	0%	NA	mg/kg	-	-	0	0	0.0%
VOCs	1,2,3-Trichloropropane	298	393	0	0%	NA	mg/kg	4.4	4.4	0	0	0.0%
VOCs	1,2,4-Trichlorobenzene	324	461	0	0%	NA	mg/kg	4500	4500	0	0	0.0%
VOCs	1,2,4-Trimethylbenzene	298	393	5	1%	0.089	mg/kg	-	-	0	0	0.0%
VOCs	1,2-Dibromo-3-chloropropane	298	393	0	0%	NA	mg/kg	160	160	0	0	0.0%
VOCs	1,2-Dibromoethane (EDB)	298	393	0	0%	NA	mg/kg	66	66	0	0	0.0%
VOCs	1,2-Dichlorobenzene	324	461	0	0%	NA	mg/kg	320000	320000	0	0	0.0%
VOCs	1,2-Dichloroethane (EDC)	298	393	0	0%	NA	mg/kg	1400	1400	0	0	0.0%
VOCs	1,2-Dichloropropane	298	393	0	0%	NA	mg/kg	3600	3600	0	0	0.0%
VOCs	1,3,5-Trimethylbenzene	298	393	3	1%	0.087	mg/kg	35000	35000	0	0	0.0%
VOCs	1,3-Dichlorobenzene	324	461	0	0%	NA	mg/kg	-	-	0	0	0.0%
VOCs	1,3-Dichloropropane	298	393	0	0%	NA	mg/kg	-	-	0	0	0.0%
VOCs	1,4-Dichlorobenzene	324	461	2	0%	0.039	mg/kg	24000	24000	0	0	0.0%
VOCs	2,2-Dichloropropane	298	393	0	0%	NA	mg/kg	-	-	0	0	0.0%
VOCs	2-Butanone	298	393	0	0%	NA	mg/kg	2100000	2100000	0	0	0.0%
VOCs	2-Chlorotoluene	298	393	2	1%	7.6	mg/kg	70000	70000	0	0	0.0%
VOCs	2-Hexanone	298	393	0	0%	NA	mg/kg	-	-	0	0	0.0%
VOCs	4-Chlorotoluene	298	393	1	0%	0.11	mg/kg	-	-	0	0	0.0%
VOCs	4-Methyl-2-pentanone	298	393	0	0%	NA	mg/kg	280000	280000	0	0	0.0%
VOCs	Acetone	298	393	8	2%	1.5	mg/kg	3200000	3200000	0	0	0.0%
VOCs	Bromobenzene	298	393	0	0%	NA	mg/kg	-	-	0	0	0.0%
VOCs	Bromodichloromethane	298	393	0	0%	NA	mg/kg	2100	2100	0	0	0.0%
VOCs	Bromoform	298	393	0	0%	NA	mg/kg	17000	17000	0	0	0.0%
VOCs	Bromomethane	298	393	0	0%	NA	mg/kg	4900	4900	0	0	0.0%
VOCs	Carbon tetrachloride	297	392	0	0%	NA	mg/kg	1900	1900	0	0	0.0%
VOCs	Chlorobenzene	298	393	0	0%	NA	mg/kg	70000	70000	0	0	0.0%
VOCs	Chloroethane	298	393	0	0%	NA	mg/kg	-	-	0	0	0.0%
VOCs	Chloroform	298	393	0	0%	NA	mg/kg	4200	4200	0	0	0.0%
VOCs	Chloromethane	298	393	0	0%	NA	mg/kg	-	-	0	0	0.0%
VOCs	cis-1,2-Dichloroethene (DCE)	298	393	0	0%	NA	mg/kg	7000	7000	0	0	0.0%
VOCs	cis-1,3-Dichloropropene	298	393	0	0%	NA	mg/kg	-	-	0	0	0.0%
VOCs	Dibromochloromethane	298	393	0	0%	NA	mg/kg	1600	1600	0	0	0.0%
VOCs	Dibromomethane	298	393	0	0%	NA	mg/kg	35000	35000	0	0	0.0%
VOCs	Dichlorodifluoromethane	297	390	0	0%	NA	mg/kg	700000	700000	0	0	0.0%
VOCs	Isopropylbenzene	298	393	6	2%	0.48	mg/kg	350000	350000	0	0	0.0%
VOCs	Methyl tert-butyl ether (MTBE)	299	394	0	0%	NA	mg/kg	73000	73000	0	0	0.0%
VOCs	Methylene chloride	298	393	2	1%	1.1	mg/kg	21000	21000	0	0	0.0%
VOCs	n-Hexane	10	21	0	0%	NA	mg/kg	-	-	0	0	0.0%
VOCs	n-Propylbenzene	298	393	6	2%	1.7	mg/kg	350000	350000	0	0	0.0%
VOCs	p-Isopropyltoluene	298	393	7	2%	1.5	mg/kg	-	-	0	0	0.0%
VOCs	sec-Butylbenzene	298	393	7	2%	1.9	mg/kg	350000	350000	0	0	0.0%
VOCs	Styrene	298	393	0	0%	NA	mg/kg	700000	700000	0	0	0.0%
VOCs	tert-Butylbenzene	298	393	1	0%	0.055	mg/kg	350000	350000	0	0	0.0%
VOCs	Tetrachloroethene (PCE)	298	393	0	0%	NA	mg/kg	21000	21000	0	0	0.0%
VOCs	trans-1,2-Dichloroethene	298	393	0	0%	NA	mg/kg	70000	70000	0	0	0.0%
VOCs	trans-1,3-Dichloropropene	298	393	0	0%	NA	mg/kg	-	-	0	0	0.0%
VOCs	Trichloroethene (TCE)	298	393	0	0%	NA	mg/kg	1800	1800	0	0	0.0%
VOCs	Trichlorofluoromethane	298	393	0	0%	NA	mg/kg	1100000	1100000	0	0	0.0%
VOCs	Vinyl acetate	45	45	0	0%	NA	mg/kg	3500000	3500000	0	0	0.0%
VOCs	Vinyl chloride	298	393	0	0%	NA	mg/kg	88	88	0	0	0.0%
Dioxins/Furans	Total 2,3,7,8 TCDD [TEQ]	25	30	30	100%	0.0000433	mg/kg	0.0017	0.0017	0	0	0.0%

Notes

Yellow-highlighted constituents have frequency of exceedance of PCL greater than 5%.

PCL: Preliminary cleanup level addressing all applicable exposure pathways.

FIGURE



Monitoring Well	Surface Water Sample	Trench	Interim Action Excavation Extent
Soil Boring	Recycled Material Sample	Boundary of Log Pond Geophysical Survey	Crushed Material Boundary
IA Excavation Confirmation Sample	Ambient Air	Cross Section Location	Site Unit Divider
Intertidal Porewater	Warehouse Indoor Air	Footprint of Former Clark-Nickerson Lumber Mill	Upland Area Boundary
Intertidal Seep	Decommissioned Monitoring Well	Former Log Pond	Historical Site Feature

0 200 400
Feet

Explorations reflect conditions prior to the 2nd Interim Action in 2020.

Exploration Locations Prior to 2020 Interim Action

RI/FS
K-C Worldwide Site Upland Area
Everett, Washington

Aspect CONSULTING

FEB-2018	BY: SJG / RAP	FIGURE NO. 1	
PROJECT NO. 110207	REVISED BY: - - -		

GIS Path: T:\projects_8\KimberlyClark\Env_Support_110207\Delivered\RIFS\2-04 Explorations and Cross Section Locations.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 2/19/2018 || User: rppin || Print Date: 2/19/2018

APPENDIX H

Engineering Calculations

(Not Applicable)

ATTACHMENT 6

Health and Safety Plan

LANDAU ASSOCIATES

Work Location Personnel Protection and Safety Evaluation Form

Attach Pertinent Documents/Data
Fill in Blanks <u>As Appropriate</u>

Project Number:	121049.020.024	Reviewed by:	Christine Kimmel
Prepared by:	Jeff Menken	Date:	June 7, 2021
Date:	June 2, 2021		

A. Work Location Description

1. Project Name:	KPFF/Port of Everett MIE Environmental and AO Support
2. Location:	Everett, WA
3. Anticipated Activities	Site grading, cap construction, utility installation, outfall reconstruction, soil and groundwater management, fill soil sampling and security fencing. Potential test pit excavation and groundwater sampling.
4. Size:	68 acres
5. Surrounding Population:	Commercial and industrial
6. Buildings/Homes/Industry:	Existing PUD substation at west edge of site, warehouse to the south.
7. Topography:	Flat, upland elevations less than 20 feet sloping toward shoreline at west.
8. Anticipated Weather:	Work will extend from Fall 2021 and continue through late 2022. Temperature ranges expected between 30- and 80-degrees F with high likelihood of precipitation during non-summer months.
9. Unusual Features:	Docks and waterfront
10. Site History:	Former saw milling and pulp and paper manufacturing since the late 1800s. Bulk petroleum storage operations were also on the Site. Manufacturing ceased in 2012 but releases of hazardous substances related to both operations confirmed. Ecology listed the Site under MTCA and assigned it Cleanup Site ID No. 2569. Two interim cleanups performed previously to remove contaminated soil and groundwater as well as eliminate stormwater pathways to the waterway.

B. Hazard Description

1. **Background Review:** ☒ Complete ☐ Partial
   If partial, why?

2. **Hazardous Level:** ☐ B ☐ C ☒ D ☐ Unknown

Justification: Hard hat, safety glasses, steel toed boots, long sleeves, long pants, nitrile gloves. Heavy equipment will be in operation. Some dispersed areas of soils still exceed preliminary cleanup levels.

3. Types of Hazards: (Attach additional sheets as necessary)

A. ☒ Chemical ☒ Inhalation ☐ Explosive
☒ Biological ☒ Ingestion ☐ O_2 Def. ☒ Skin Contact

Describe: Limited areas of total petroleum hydrocarbons (TPH), carcinogenic polycyclic aromatic hydrocarbons (cPAHs), arsenic, lead, mercury, nickel, zinc, and xylenes with preliminary cleanup level exceedances in soils and groundwater. There have also been reported exceedances of polychlorinated biphenyls (PCBs), select volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) in groundwater. Site activities will be conducted during the national COVID-19 pandemic and guidelines from biological exposures shall be maintained.

B. ☒ Physical ☒ Cold Stress ☒ Noise ☐ Heat Stress ☐ Other

Describe: Slips, trips, and falls as well as noise and physical hazards associated with proximity to heavy equipment operations.

C. ☐ Radiation

Describe: NA

4. Nature of Hazards:

☒ Air Describe: Potential for VOCs to be released from contaminated soils during dirt moving.

☒ Soil Describe: Potential for contact with or ingestion of contaminated soils or dust.

☒ Surface Water Describe: Potential for contact with or ingestion of contaminated water/runoff.

☒ Groundwater Describe: Potential for contact with or ingestion of contaminated water.

☒ Other Describe: Standard physical slip, trip, fall hazards as well as hazards presented by vicinity heavy equipment activities.

5. Chemical Contaminants of Concern ☐ N/A

Contaminant	PEL	IDLH	Source/Quantity Characteristics	Route of Exposure	Symptoms of Acute Exposure	Instruments Used to Monitor Contaminant
Petroleum products	100 ppm	400 ppm	Gasoline range TPH max = 4,000 mg/kg soil and 1100 µg/l GW, max diesel range = 18,000 mg/kg in soil and 990 µg/l GW, and max oil/residual range = 19,000 mg/kg soil and 2,200 µg/l GW.	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritated eyes, skin; mucous membrane; dermatitis; headache; lassitude; blurred vision; dizziness; slurred speech; confusion; convulsions; chemical pneumonitis (aspiration liquid); possible liver, kidney damage (potential occupational carcinogen)	Olfactory, visual observation, and PID meter
Arsenic	0.01 mg/m^3 TWA	5 mg/m^3	Max concentration detected in soils = 43 mg/m^3. Max concentration in GW = 202 µg/l	Eye contact, skin contact, ingestion, or inhalation. May be absorbed through the skin.	Inhalation can cause irritation of the nose and throat. Exposure can cause weakness, poor appetite, nausea, vomiting, headache, and death. (known carcinogen)	Visual observation. If disturbance of dry, dusty surfaces cannot be avoided, wear a Minimum ½ Mask AP/HEPA;
PCBs	0.5 mg/m^3 TWA (skin)	0.5 mg/m^3	Max concentration detected in soils = 43 mg/m3. Max concentration in GW = 0.084 µg/l (aroclors) and 0.434 µg/l (congeners)	Eye contact, skin contact, ingestion, or inhalation.	irritation of the nose and lungs, skin irritations and eye problems. (Probable carcinogen).	Visual observation. If disturbance of dry, dusty surfaces cannot be avoided, wear a Minimum ½ Mask AP/HEPA;
Mercury	0.1 mg/m^3 TWA	10 mg/m^3	Max concentration detected in soils = 3.8 mg/kg. Max concentration in GW = 4.24 µg/l	Eye contact, skin contact, ingestion, or inhalation.	Inhalation can cause irritation of the nose, throat, and lungs, coughing, shortness of breath, nausea, or vomiting.	Visual observation. If disturbance of dry, dusty surfaces cannot be avoided, wear a Minimum ½ Mask AP/HEPA;

Nickel	1.0 mg/m^3 TWA	10 mg/m^3	Max concentration detected in soils = 135 mg/kg. Max concentration in GW = 308 µg/l	Eye contact, skin contact, or inhalation.	Irritation of the skin, eyes, nose, throat, or lungs	Visual observation. If disturbance of dry, dusty surfaces cannot be avoided, wear a Minimum ½ Mask AP/HEPA;
Xylenes	100 ppm	900 ppm	Max concentration detected in soils = 7.1 mg/m3. Max concentration in GW = 13 µg/l	Eye contact, skin contact, inhalation, or ingestion.	skin, and mucous membrane irritation. They can cause narcosis at high levels. Xylenes can cause liver and kidney damage	PID meter
Naphthalene	10 ppm	250 ppm	Maximum soil concentration detected = 79 mg/m3. Maximum GW concentration = 210 µg/l	inhalation, skin absorption, ingestion, skin and/or eye contact	Eye irritation, dermatitis, headache, confusion, excitement, malaise, nausea, vomiting, abdominal pain, jaundice.	PID meter
Vinyl chloride	1.0 ppm	NA (5.0 ppm STEL)	Not detected in soil. Max concentration in GW = 0.96 µg/l	Eye contact, skin contact, ingestion, or inhalation.	Irritation of the skin, eyes, nose, throat, or lungs. Headache, nausea, vomiting, fatigue. (Known carcinogen and mutagen).	PID meter and detector tubes
pH	NA	NA	GW pH up to 11.8 in some upland areas	Eye contact, skin contact, ingestion	Contact with water with pH greater than 8.5 may cause skin irritation. Ingestion of high pH water may cause nausea.	pH meter if in contact with groundwater.

Notes:

6. Physical Hazards of Concern ☐ N/A

Hazard	Description	Location	Procedures Used to Monitor Hazard
Vehicles and heavy equipment used at the site	At all times	All areas of the site	Remain alert of surroundings; wear brightly colored safety vest. Stand clear of equipment and avoid pinch points. Make eye contact with operator prior to advancing. Verify working backup alarms on equipment. Properly ground drill equipment in the C-29 and Former Fuel Farm areas.
Weather stress	Exposure to hot or cold temperatures, wind, and/or rain	All areas of the site	Have drinking water accessible; wear appropriate clothing (light for heat, warm for cold); wear sunscreen protection; avoid caffeine; take short breaks as needed.
Slips, trips, and falls	Uneven terrain, drilling equipment, and active manufacturing facility	All areas of the site	Visual observations of terrain and hazards. Keep work area clear of debris and remove tripping hazards. Flag or mark hazards that cannot be removed.
Overhead and underground utilities	Damage to utilities through drilling and excavations	In work area	Client to provide utility maps and both public and private utility locating service will be used. Air-knife to be conducted to identify shallow subsurface utilities. No raised towers within 20 feet of overhead power lines.
Travel to and from site	Operating motor vehicle in traffic on highways and rural roads	Route to and from site from Landau Associates office	Operate motor vehicle while well rested and physically able to drive safely. Conduct pre-trip vehicle inspection, all vehicles to be maintained and in good working order. Obey all traffic laws including no cell phone use while driving. Secure all cargo properly to avoid shifting. Allow sufficient time for travel to site at safe speeds. Engage emergency brake when parking vehicles. Establish a planned route prior to departure.

7. Work Location Instrument Readings ☐ N/A

Location:	
Percent O_2:	Percent LEL:
Radioactivity:	PID:
FID:	Other:
Other:	Other:
Other:	Other:

Location:	
Percent O_2:	Percent LEL:
Radioactivity:	PID:
FID:	Other:
Other:	Other:
Other:	Other:

Location:	
Percent O_2:	Percent LEL:
Radioactivity:	PID:
FID:	Other:
Other:	Other:
Other:	Other:

Location:	
Percent O_2:	Percent LEL:
Radioactivity:	PID:
FID:	Other:
Other:	Other:
Other:	Other:

8. Hazards Expected in Preparation for Work Assignment ☐ N/A

<u>Describe:</u>

C. Personal Protective Equipment

1. Level of Protection

☐ A ☐ B ☐ C ☒ D

Location/Activity: All

☐ A ☐ B ☒ C ☐ D

Location/Activity: Upgrade to Level C PPE if monitoring indicates exceedances of level

2. Protective Equipment (specify probable quantity required)

Respirator ☐ N/A

☐ SCBA, Airline
☐ Full-Face Respirator
☒ Half-Face Respirator (Cart. organic vapor) (Only if upgrade to Level C)
☐ Escape mask
☐ None
☒ Other: COVID-19 face masks
☐ Other:

Clothing ☐ N/A

☐ Fully Encapsulating Suit
☐ Chemically Resistant Splash Suit
☐ Apron, Specify:
☒ Tyvek Coverall (only if upgrade to Level C)
☐ Saranex Coverall
☐ Coverall, Specify
☐ Other:

Head & Eye ☐ N/A

☒ Hard Hat
☒ Goggles
☐ Face Shield
☒ Safety Eyeglasses
☐ Other:

Hand Protection ☐ N/A

☐ Undergloves; Type:
☒ Gloves; Type: Nitrile
☐ Overgloves; Type:
☐ None
☐ Other:

Foot Protection ☐ N/A

☒ Neoprene Safety Boots with Steel Toe/Shank (as needed)
☐ Disposable Overboots
☐ Other:

3. Monitoring Equipment ☐ N/A

☐ CGI
☐ O2 Meter
☐ Rad Survey
☒ Detector Tubes (optional)
Type:

☒ PID
☐ FID
☐ Other

D. Decontamination

Personal Decontamination ☒ Required ☐ Not Required

If required, describe: Avoid hand-to-mouth contact, no eating or drinking in the exclusion zone. Wash hands and face prior to breaks and after work. Change out PPE frequently, place disposable PPE in plastic bags for municipal waste disposal.

Equipment Decontamination ☒ Required ☐ Not Required

If required, describe: Decontamination of non-dedicated sampling equipment with Alconox or Liquinox/tap water solution followed by tap water rinse and de-ionized water rinse.

Construction equipment to be decontaminated by either dry brush methods or a high-pressure steam cleaner (based on planned construction activities in specified areas of the site)

E. Activities Covered Under This Plan

Task No.	Description	Preliminary Schedule
1	Sampling of fill soils	2021-2022
2	Oversight of construction activities	2021-2022

F. Subcontractor’s Health and Safety Program Evaluation

☒ **N/A**

Name and Address of Subcontractor:

Evaluation Criteria

Item	Adequate	Inadequate	Comments
Medical Surveillance Program	☐	☐	
Personal Protective Equipment Availability	☐	☐	
Onsite Monitoring Equipment Availability	☐	☐	
Safe Working Procedures Specification	☐	☐	
Training Protocols	☐	☐	
Ancillary Support Procedures (if any)	☐	☐	
Emergency Procedures	☐	☐	
Evacuation Procedures Contingency Plan	☐	☐	
Decontamination Procedures Equipment	☐	☐	
Decontamination Procedures Personnel	☐	☐	

General Health and Safety Program Evaluation: ☐ Adequate ☐ Inadequate

Additional Comments:

Evaluation Conducted by: Date:

Emergency Facilities and Numbers

Hospital: Providence Regional Medical Center

Directions: Head south on Federal Ave toward Pigeon Creek Trail for 0.1 mile, turn left onto Terminal Ave. and continue onto Everett Ave. after 0.2 miles. Turn left onto Colby Ave. and follow Colby Ave. for 1.3 miles. Turn right onto 13th St.
Telephone: 425-261-2000

Emergency Transportation Systems (Fire, Police, Ambulance) -- 911

Emergency Routes – Map (Attachment C)

Emergency Contacts:

Name	Offsite	Onsite
Nathan Watson- KPFF	206.382.0600	206.484.1303
Elise Gronewald- POE	425.388.0630	425.922.8032
Dylan Frazer- LAI	425.329.0293	509.240.2018

In the event of an emergency, do the following:

1. Call for help as soon as possible. Call 911. Give the following information:
   - WHERE the emergency is – use cross streets or landmarks
   - PHONE NUMBER you are calling from
   - WHAT HAPPENED – type of injury
   - WHAT is being done for the victim(s)
   - YOU HANG UP LAST – let the person you called hang up first.
2. If the victim can be moved, paramedics will transport to the hospital. If the injury or exposure is not life-threatening, decontaminate the individual first. If decontamination is not feasible, wrap the individual in a blanket or sheet of plastic prior to transport.

Health and Safety Plan
Approval/Sign Off Form

I have read, understood, and agreed with the information set forth in this Health and Safety Plan (and attachments) and discussed in the Personnel Health and Safety briefing.

Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Site Safety Coordinator	Signature	Date
	Christine Kimmel	June 7, 2021
LAI Health and Safety Manager	Signature	Date
Project Manager	Signature	Date

Personnel Health and Safety Briefing Conducted by:

Name	Signature	Date

Attachment A
Action Levels for Respiratory Protection

Monitoring Parameter	Reading	Level of Protection
VOCs (PID)	PID reading >1 ppm in breathing zone for more than 1 minute	Establish 25-ft-diameter exclusion zone around work area and upgrade to Level C-half face respirator with organic vapor/HEPA cartridge. Collect VC detection tubes readings.

VC	VC reading 0.1 to 1 ppm	Establish 25 ft diameter exclusion zone around work area and upgrade to Level C-half face respirator with organic vapor/HEPA cartridge.
VC	VC reading > 1 ppm	Evacuate area and move upwind. Establish 50 ft diameter exclusion zone around work area. Notify onsite contact and LAI Health and Safety Manager. Do not return to area of detection until VC < 1 ppm.
VOCs (PID)	PID reading > 25 ppm **instantaneous** reading	Evacuate area and move upwind. Establish 50 ft diameter exclusion zone around work area. Notify onsite contact and LAI Health and Safety Manager. Do not return to area of detection until VOCs < 25 ppm.
Contaminated Particulate	Visible Dust	Stop work and control dust with water, resume work. If dust persists, upgrade to Level C-half-faced respirator with organic vapor/HEPA combination cartridges.

Attachment B
COVID Protective Guidance

COVID-19 Field Guidance and Best Practices

The COVID-19 pandemic continues to be rapidly evolving, and Landau Associates, Inc. (LAI) continues to work diligently to provide services using protective guidance from global and regional health authorities to help protect the health and safety of our employees, the public, and our clients. This technical memorandum has been prepared to provide guidance on managing the risks associated with COVID-19 for employees that perform or manage field work.

Symptoms

People infected with COVID-19 may have little to no symptoms and in some cases, symptoms (when they appear) can take up to 14 days to present after exposure to COVID-19. Symptoms can include the following: fever, cough, and difficulty breathing.

Worksite Considerations

Employees working on project sites or in client settings will work to maintain LAI's company standards and will work transparently with the client to coordinate work approaches. Such topics include, but are not limited to:

- Site Access
- Social Distancing and Working in Isolation
- Fitness for Duty
- Emergency Responses.

Site Access

Prior to mobilization to the project site, the field lead will contact the client to verify that LAI has access to the site and to determine if any new clearance or site procedures are present related to COVID-19 outbreak.

In addition to reaching out to our clients, LAI will contact vendors and subcontractors to evaluate their capacity to meet project milestones. We will work closely with the vendors and subcontractors to minimize impacts on project timing.

Social Distancing and Working in Isolation

Heath and governing agencies are requiring social distancing as a method to flatten the contagion curve of the virus. Washington and Oregon states both have a "Stay at Home" or "Shelter in Place" ruling, which are currently in effect. All nonessential businesses have been temporarily shut down to enforce the social distancing requirements. Additionally, large gatherings in crowded places have also been temporarily stopped. LAI employees Experts recommend staying a minimum of 6 feet away from others.

LAI employees are asked to follow the direction of regional government and health agencies regarding social distancing or other measures by maintaining a minimum of 6 feet separation between people. If LAI employees need to be within 50 feet of others, a face mask/shield will be worn. Field employees are asked to practice social distancing by driving separate vehicles to a project site and work independently (as much as the task will allow) by not sharing tools and/or equipment. If reasonably practicable, conduct toolbox meetings outside, practice social distancing, and keep group sizes small.

LAI's field services are typically operated independent of project site operations, and we require very little to no assistance. Our field services are also typically conducted by working in isolation by placing safety cones and/or barriers around the work area to minimize interaction with the public.

Where possible, adjust work planning to maximize social distancing between workers, teams, and site personnel.

If a meeting must take place in-person onsite, meet outdoors whenever possible. If indoors or under shelter, the meeting location must be large enough to permit 6 feet of separation between attendees; surfaces will be wiped down prior to convening the meeting; hand sanitizer and wipes must be available to all participants; invitees will be asked not to attend if they are not feeling well; person-to-person contact must be avoided (shaking hands, etc.); and all attendees are reminded to cover any coughs or sneezes using the crook of their arm.

Fitness for Duty

As part of the fitness-for-duty checks, LAI's field employees are asked to confirm they are in good health and are symptom free. They must verify that they:

- Do not have any of the following symptoms: fever (no matter how mild), new onset or an exacerbation of chronic cough, or difficulty breathing; and
- Have not travelled outside their home country within the last 14 days; and
- Have not had close contact with a confirmed or probable COVID-19 case or a person who has been outside your home country in the last 14 days.

The following personal hygiene and wellness practices are recommended to prevent or control the transmission of viruses:

- Wash your hands with soap and water for at least 20 seconds after using toilet facilities, before and after eating, after handling potentially contaminated or infectious materials, after removing hand protection and other personal protective equipment (PPE), and after sneezing, coughing, or touching your face. When soap and water is not available, use an alcohol-based hand sanitizer.
- Avoid touching your eyes, nose, and mouth with unwashed hands.

- Cover your mouth and nose when coughing or sneezing with a tissue or the crook of your elbow. Throw the used tissue in the trash and wash your hands.
- Maintain vehicles through regular cleaning and disinfecting of surfaces.
- Do not share tools or equipment (e.g., cell phones, shovels, etc.) between employees without disinfecting them first.
- Avoid handling common-use items such as pens and clipboards; equip each worker with their own. If it is necessary to have common-use items, include them in the cleaning and disinfecting cycle outlined below.
- Get adequate rest, eat a healthy and balanced diet, and stay hydrated.

If an LAI employee experiences signs or symptoms of illness, they are advised to distance themselves from others and notify their supervisor. Supervisors and managers will work with the Corporate Health and Safety Manager and the Human Resources Director to help manage the response.

Cleaning and Disinfecting

COVID-19 can survive on different surfaces but can be killed by most cleaners and disinfectants. To prevent transmission of COVID-19 while cleaning, good hygiene measures and consistent use of appropriate PPE is recommended. Cleaning refers to the removal of germs, dirt, and impurities from surfaces. Cleaning does not kill germs; but by removing them, it lowers their numbers and the risk of spreading infection. Disinfecting refers to using chemicals to kill germs on surfaces. This process does not necessarily clean dirty surfaces or remove germs, but by killing germs on a surface after cleaning, it can further lower the risk of spreading infection.

All LAI offices are routinely cleaned and disinfection practices have been installed. Employees are asked to practice routine cleaning of frequently touched surfaces (e.g., vehicle door handles, interior of vehicle such as steering wheel and control panel, equipment controls, handles, stair railings, toilet facility doors, etc.) with household cleaners and disinfectants that are appropriate for the surface, following label instructions.

It is important to keep vehicles clean. Each vehicle has an ample supply of clean tissues and hand sanitizer, as well as cleaning supplies and disinfectants. Employees are asked to clean vehicles after each use and wear appropriate PPE when cleaning.

Drinking Water

A reasonable supply of potable drinking water is to be kept readily accessible at the project site for the use of workers. Drinking water is to be supplied from a piping system, individual servings, or from a clean, covered container with a drain faucet or pump. Workers will be given a sanitary means of drinking the drinking water and must not be required to share a common drinking container. If using water coolers to provide drinking water, wear clean gloves to operate the spigot and verify that a clean source of disposable cups is available. Verify that the cooler is cleaned and sanitized on a regular basis. If using bottled water sources, employees should take measures such as labeling bottles to avoid drinking out of someone else's bottle.

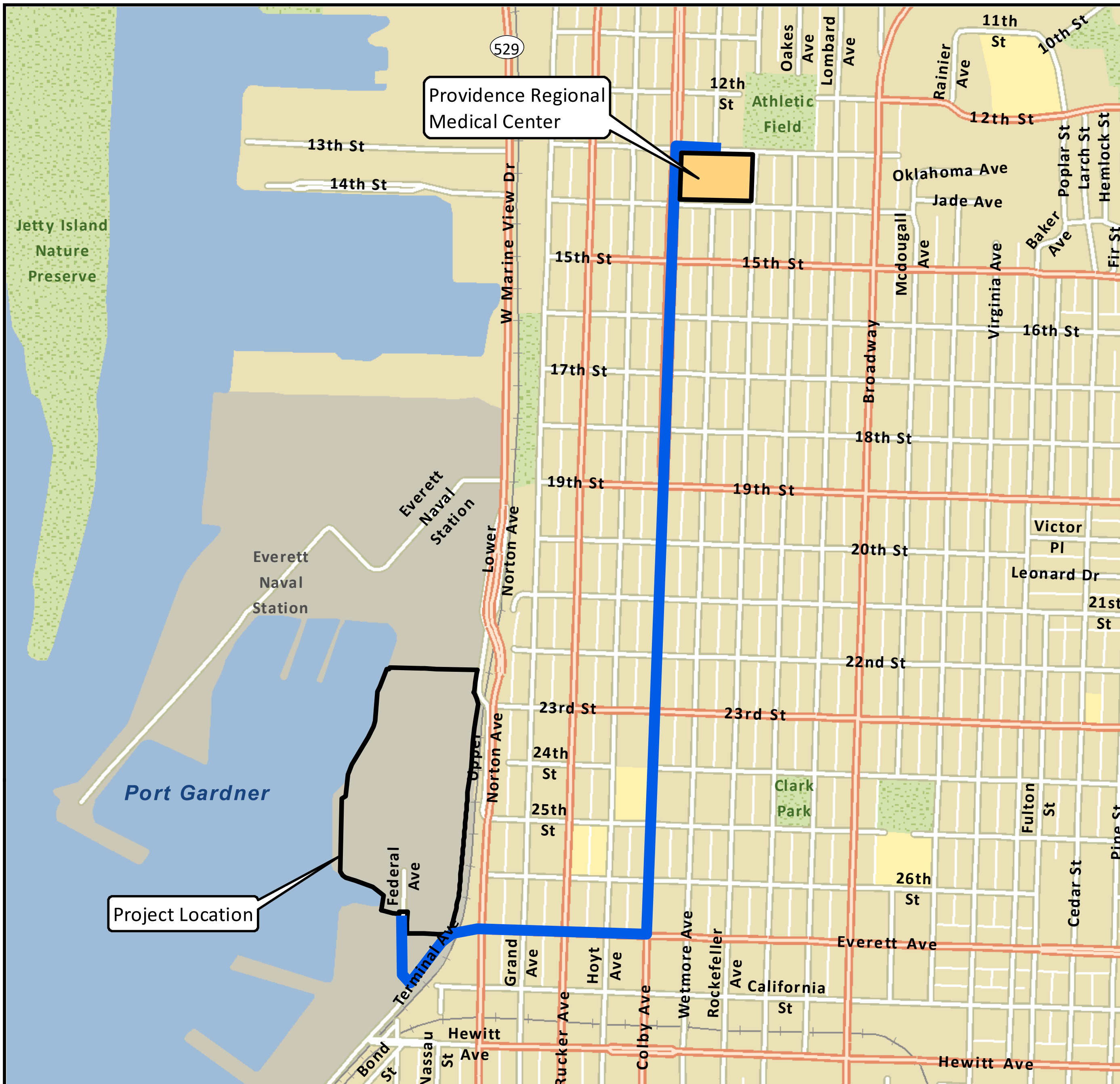
Personal Protective Equipment

LAI shall review the site-specific health and safety plans and requirements for PPE prior to mobilization to the site. Required PPE shall be donned prior to leaving the vehicle at the site.

LAI has PPE available for employees consisting of disposable nitrile gloves, soap, and disinfectant solutions. Additionally, each employee routinely conducting field services has been trained and fit with a personnel respirator with high-efficiency particulate air (HEPA) filter cartridges. The personnel respirators are rated above an N95 mask for protection against airborne particles and chemicals. Respirators will be worn in confined spaces and while working inside facility buildings.

If field services are being conducted in the open air, employees will be encouraged to wear either face masks/shields or N95 masks. Masks/shields are easily acceptable and provide a semipermeable barrier to ward against sneezes and airborne spray from the person wearing the shield to others. The supply of N95 masks is limited on a global nature; however, LAI will continue to seek the purchase of N95 masks as they become available.

Gloves shall be worn to match the type of work to be conducted and may consist of, but not be limited to: nitrile gloves, cotton gloves, or leather gloves.



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Miles

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Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Driving Directions from Project Location

Start: 2600 Federal Ave

1. Head south on Federal Ave toward Pigeon Creek Trail
2. Turn left onto Terminal Ave
3. Continue onto Everett Ave
4. Turn left onto Colby Ave
5. Turn right onto 13th Street
6. Destination is on the right

End: Providence Regional Medical Center

G:\Projects\121\049\020\024\F01HospitalRouteMap.mxd 6/4/2021

Data Source: Esri 2012; Google Maps

LANDAU ASSOCIATES

KPFF/Port of Everett MIE Environmental and AO Support	**Hospital Route Map**	Attachment C

ATTACHMENT 7

Archaeological Resource Assessment

ARCHAEOLOGICAL RESOURCES ASSESSMENT FOR THE KIMBERLY-CLARK WORLDWIDE SITE UPLAND AREA, EVERETT, SNOHOMISH COUNTY, WASHINGTON

REDACTED FOR GENERAL DISTRIBUTION

March 25, 2013

Report Number 24976

SWCA/NORTHWEST ARCHAEOLOGICAL ASSOCIATES
SEATTLE, WASHINGTON

ARCHAEOLOGICAL RESOURCES ASSESSMENT FOR THE KIMBERLY-CLARK WORLDWIDE SITE UPLAND AREA, EVERETT, SNOHOMISH COUNTY, WASHINGTON

Report Prepared for
Steve Germiat
Aspect Consulting LLC
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Seattle, WA 98104

By
Brandy Rinck, Sharon Boswell, and Johonna Shea

March 25, 2013

Report Number 24976

REDACTED FOR GENERAL DISTRIBUTION

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ABSTRACT

The Kimberly-Clark Worldwide (K-C WW) upland area was developed for historical pulp and paper manufacturing and the area is contaminated as a result of the industrial operations. The existing pulp and paper mill will be demolished to prepare the upland area for cleanup and eventual land use change. The Department of Ecology and K-C WW, Inc. have executed an Agreed Order to complete studies related to future cleanup as well as opportunistic interim action cleanup activities during demolition of the mill. As required by the Interim Action Plan, which is Exhibit C to the Agreed Order, SWCA Environmental Consultants has assessed the probability for encountering archaeological deposits or objects during cleanup of the contaminated K-C WW upland area, concentrating on 11 areas called out in opportunistic cleanup plans. This assessment includes background information on the setting of the project area, expectations for buried cultural resources based on previous investigations in the vicinity, and a GIS-based probability map showing areas with low, medium, and high potential to harbor significant archaeological materials in the entire K-C WW Upland project area. Areas with high probability for buried cultural resources will be addressed during future project construction and a monitoring and discovery plan will be developed for use during opportunistic cleanup.

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Cover: Overview of Port Gardner waterfront, looking north from approximately Hewitt Ave, showing the project area. Photograph by R. King and D.W. Baskerville, taken March 1, 1892. Everett Public Library, King and Baskerville Collection, Image 0065.

LIST OF FIGURES

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INTRODUCTION

The Department of Ecology (Ecology) and Kimberly-Clark Worldwide (K-C WW), Inc. have executed an Agreed Order to complete studies for future cleanup as well as interim cleanup activities within the K-C WW Upland Area on the Everett waterfront at 2600 Federal Avenue. The most recent mill on the property has since closed and the mill structures will be demolished in preparation for land use change. The area was contaminated by past industrial operations with petroleum, heavy metals, and volatile organic compounds that warrant remediation opportunistically during mill demolition. K-C WW has contracted with Aspect Consulting LLC (Aspect) to plan the mill cleanup efforts and Aspect retained SWCA Environmental Consultants (SWCA) to assess the probability for encountering archaeological deposits or objects during the interim action cleanups. This assessment includes background information on the natural and cultural setting of the project area, expectations for buried cultural resources based on previous archaeological and geotechnical investigations in the K-C WW upland area vicinity, and a probability map showing areas with low, medium, and high potential to contain significant archaeological materials.

Project Location and Description

The project is in Section 19 of Township 29 North, Range 5 East, Willamette Meridian (Figure 1). The K-C WW property includes about 56 acres of uplands and 12 acres of adjacent tidelands. The west property boundary is adjacent to the East Waterway in Port Gardner Bay of Possession Sound and the east property boundary is at the BNSF Railroad right-of-way. The north project boundary is at the foot of 21st Street and the south project boundary is at the foot of Everett Avenue.

In December 2012, an Agreed Order was signed by Ecology and K-C WW, Inc. in order to complete this project. The Agreed Order requires a Remedial Investigation and Feasibility Study (RI/FS) and a Cleanup Action Plan (CAP) prior to the start of final cleanup of the K-C WW Upland Area. The Agreed Order allows for opportunistic cleanup of contamination, called interim action, during mill demolition that will occur while the RI/FS is underway. The Agreed Order only covers the upland portion of the property, so no cleanup activities are currently planned for the 12 acres of tidelands on K-C WW's property. The tidelands will be addressed under a separate future Agreed Order. K-C WW, Inc. is now conducting the studies needed to draft the Cleanup Action Plan and would like to complete opportunistic cleanup interim actions while the studies are carried out, since the mill structures are being demolished (Figure 2). At the time of this assessment, 11 specific areas are identified where opportunistic cleanup will occur, including the Naval Reserve Parcel UST area (1), Xylene UST 29/Latex Spill (2), Rail Car Dumper Hydraulic System Building (3), Diesel UST 70 (4), Bunker C USTs71/72/73 (5), Boiler/Baghouse Area (6), Heavy Duty Shop sump (7), GF 11 (8), Diesel AST Area (9), Bunker C ASTa (10), Bunker C ASTb (11) (Figure 3). Additional areas may be identified for opportunistic cleanup as demolition proceeds.

Most of the contamination to be cleaned up is within historical fill, but some cleanup excavations will penetrate into underlying naturally deposited sediment. Because all the contaminated areas to be targeted during interim action are not currently known, excavation quantities and dimensions cannot yet be estimated. No vegetation removal or in-water work, including dredging, drilling, dumping, filling, mining, bulk-heading, pile driving, or piling removal will occur during the opportunistic interim action cleanup efforts.

Regulatory Context

The project is subject to the Washington State Environmental Policy Act (SEPA) that requires the project proponent to identify any places or objects listed on, or eligible for national, state, or local preservation

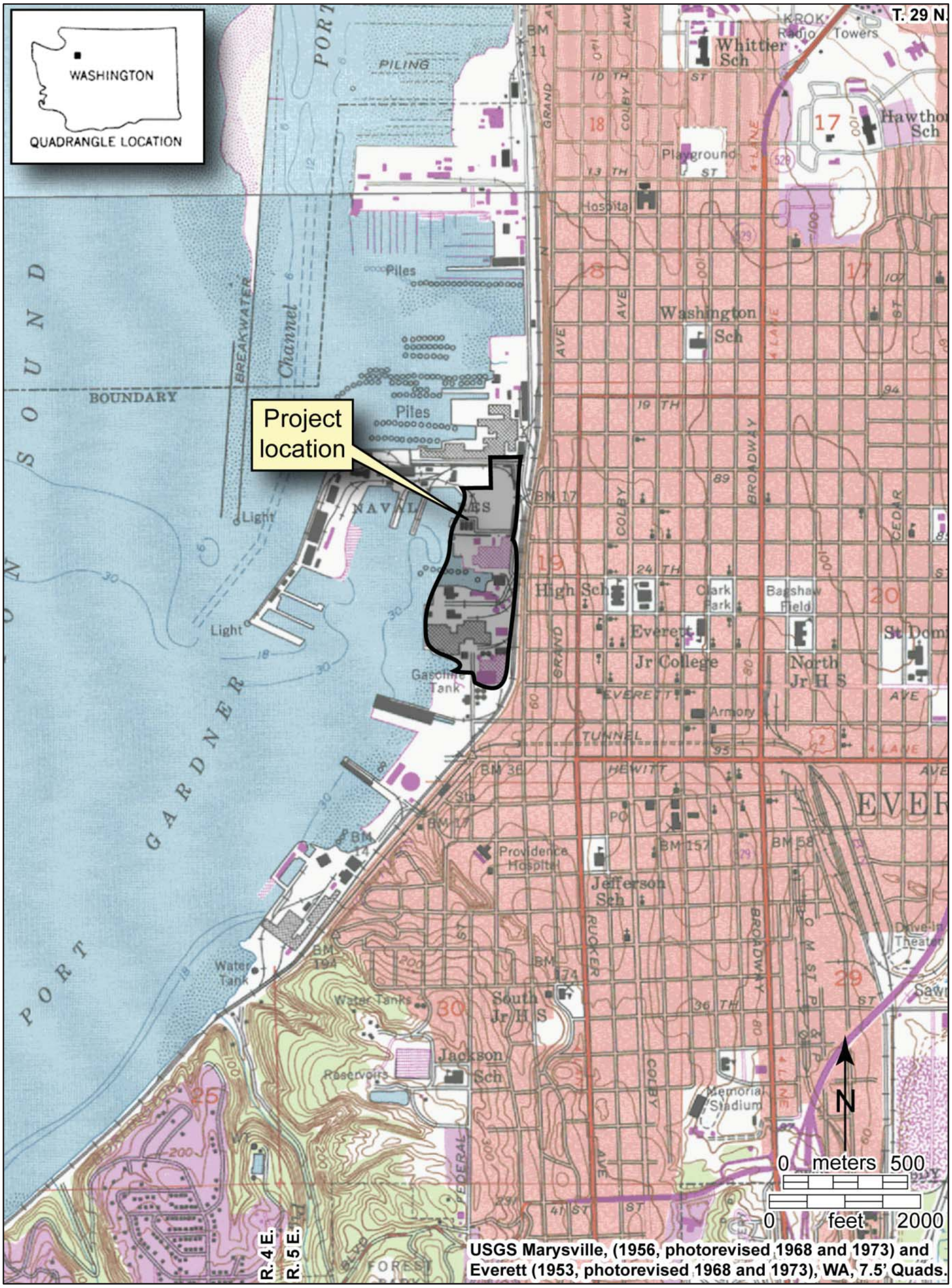

Figure 1. Project location.

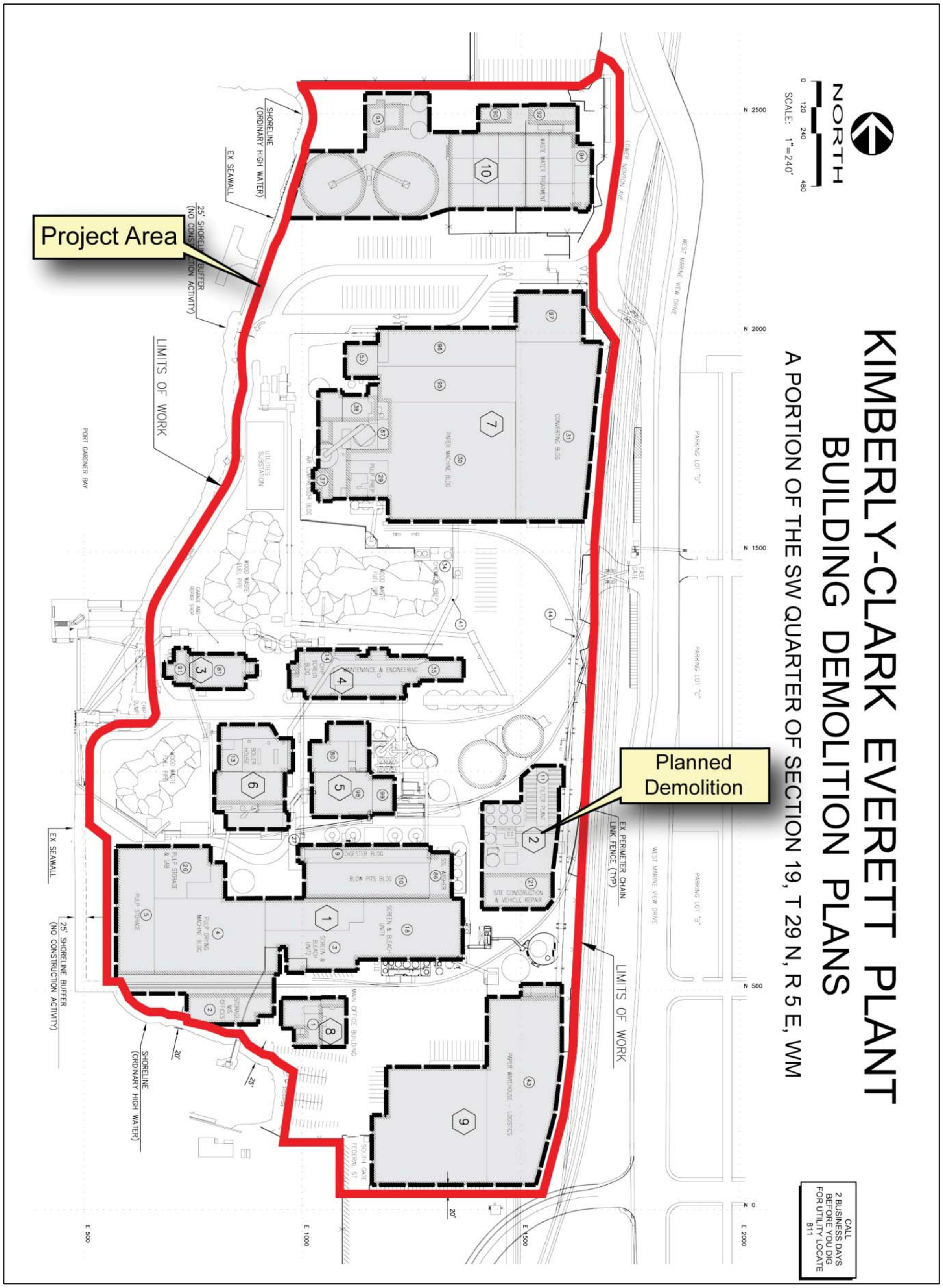

Figure 2. K-C WW upland project area showing the uplands, tidelands, and mill structures demolished during interim action cleanup efforts.

Figure 3. Proposed opportunistic cleanup locations in the K-C WW upland area.

registers in the vicinity of the project. The regulation also requires proponents to describe evidence for sites of historic, archaeological, scientific, or cultural importance in the vicinity of a project, and describe proposed measures to reduce or control impacts to those sites. Agencies are encouraged by SEPA to consult with others to find acceptable ways to avoid or mitigate any adverse impacts that may be caused by the project. Ecology prepared a SEPA checklist to identify potential project impacts to the surrounding environment in 2012 and determined the environmental cleanup will have no probable significant adverse impacts.

The project is also subject to several Washington state laws pertaining to archaeological cultural resources. For example, the Archaeological Sites and Resources Act [RCW 27.53] prohibits knowingly excavating or disturbing prehistoric and historic archaeological sites on public or private land. The Indian Graves and Records Act [RCW 27.44] prohibits knowingly destroying American Indian graves and provides that inadvertent disturbance through construction or other activities requires re-interment under supervision of the appropriate Indian tribe. In order to prevent the looting or depredation of sites, any maps, records, or other information identifying the location of archaeological sites, historic sites, artifacts, or the site of traditional ceremonial, or social uses and activities of Indian Tribes are also exempt from disclosure [RCW 42.56.300]. One goal of this assessment is to assist Aspect, Ecology, and K-C WW, Inc. in complying with these state laws and regulations.

Tribal Coordination

The current work at the K-C WW upland area is part of the Puget Sound Initiative (PSI) and Ecology has engaged the Tulalip Tribes about the PSI in the past. Ecology has developed contacts with cultural and natural resource staff members within the tribal community and has met with them to discuss PSI cleanup sites and cultural resources. Most of this communication has been in relation to other cleanup efforts in Port Gardner, but the Tulalip Tribes have been provided with specific information concerning the K-C WW upland area, as well. [redacted]

[redacted]

SETTING

Port Gardner is a shallow saltwater embayment on the northwest tip of the Everett Peninsula at the mouth of the Snohomish River. The Port is partially separated from Possession Sound by Jetty Island, a 2-mile-long, narrow, manmade island that blocks the dredged East Waterway of the Snohomish River mouth from being naturally filled with sediment. Port Gardner has been influenced by geologic events and geomorphologic changes throughout its history, including ice sheet glaciation, tectonic activity, climate change, and sea-level rise, and these processes have shaped the modern topography of the area. Human settlement and subsistence pursuits within the project area were structured by the attraction of and ease of access to abundant natural resources in the lowland delta, shoreline, and estuarine environments of the Snohomish River delta. Environmental diversity and a variety of natural resources concentrated in the project vicinity created an ideal location for both pre-contact and early Euroamerican populations. Ethnographic and historic records provide complementary information about more recent native cultural land use practices. Historical development of Port Gardner, especially dredging and filling, altered the natural geomorphology of the project vicinity.

Natural Setting

The environmental setting of the project area informs our expectations for cultural resources that may be found in its vicinity. Archaeological evidence indicates that people were living in what is now Washington by at least 13,800 years ago (Waters et al. 2011). Sea level fluctuation, climate variation, and tectonic activity have been the dominant forces of environmental change since the end of the Pleistocene. These environmental changes have affected the potential distribution of resources used by people as well as the suitability of particular landforms for human occupation throughout the Holocene. Other changes in the preservation and visibility of the archaeological record can be attributed to more recent development of the vicinity.

Geology

The Project is in the Puget Lowland, a large structural trough between the Cascade Range and the Olympic Mountains (Orr and Orr 1996). The Puget Lowland developed as a fore-arc basin during early subduction of the Juan de Fuca tectonic plate beneath the North America plate. More specifically, the project vicinity is bounded by active fault zones in the Everett Basin (Golder Associates, Inc. 2007). The Tertiary period sedimentary bedrock that is buried deep below the project area is covered by thick (305 to 945 meters) unconsolidated sediment that mainly originates from glacial ice (Johnson et al. 1996, 2001; Jones 1999; Mosher et al. 2000).

The modern topography and surficial geology of the Puget Lowland is the result of multiple continental glaciations that extended south from what is now British Columbia during the Pleistocene, between 1.8 million and 10,000 years ago. The last glacial maximum, known regionally as the Vashon Stade of the Fraser glaciation, began about 25,000 years ago and ended abruptly with the onset of climatic warming at the end of the Pleistocene (Easterbrook 2003). The Cordilleran Ice Sheet reached its maximum extent near the present town of Tenino, 83 miles (134 kilometers) southwest of the K-C WW upland area, about 16,950 calibrated years before the present (BP) during the Vashon Stade. The ice over the project area was about 1,300 meters (4,265 feet) at its thickest (Clague et al. 1980; Thorson 1989). The ice sheet retreated rapidly from the Puget Lowland after about 13,650 years ago if expressed as an uncalibrated radiocarbon date (Menard 1985; Porter and Swanson 1998; Thorson 1989). Large glacial lakes commonly formed along the ice front as the ice sheet retreated, inundating the land in the Puget Lowland that was not covered by ice. Most of the surficial deposits east of the project area were deposited during the Fraser glaciation, including glacial till that was deposited directly by ice and outwash that was deposited by glacial meltwater (Armstrong et al. 1965; Booth 1994; Booth and Goldstein 1994; Booth et al. 2004; Johnson et al. 2001; Menard 1985; Polenz et al. 2005).

Incision occurred when the Cordilleran Ice Sheet overrode the outwash, creating a number of large deep troughs and meltwater channels. As a result, the geomorphology of the Lowland is now dominated by well-defined, north-south-trending ridges that are separated by extensive uplands blanketed by glacial drift or till. The surfaces of the uplands commonly have topographic depressions that are occupied by small lakes and bogs (Mullineaux 1970). Much of the upland surfaces have not been extensively modified by postglacial erosion, except where streams have carved short, steep-sided canyons down to the Puget Sound. Pigeon Creek, which empties into Possession Sound just south of the K-C WW upland area, is an example of a creek that drains the glacial upland.

Global sea level was about 119 meters (390 feet) below the present shoreline during the last glacial maximum because of the large amount of water locked up in the ice. Global sea level rose rapidly as ice sheets around the world melted at the close of the Pleistocene. Marine water flooded the Puget Lowland after the ice sheet retreated past Admiralty Inlet, connecting the Puget Sound to the Pacific Ocean. Continued global sea level rise raised sea level to between 55 and 73 meters (180 and 240 feet) in elevation around 13,500 BP (Anundsen et al. 1994; Blunt et al. 1987; Booth et al. 2004; Carlstad 1992; Dethier et al. 1995, Easterbrook 2003, 1966; Kovanen and Slaymaker 2004; Polenz et al. 2005; Porter and Swanson 1998; Swanson 1994; Thorson 1980, 1981). The K-C WW upland area is at a very low modern elevation, so the entire project area would have been inundated during this marine high stand.

Relative sea level in the Puget Sound remained elevated and in sync with global sea level trends until the land in the Pacific Northwest began to rebound from the weight of the ice sheet (Thorson 1989). Depressed land areas uplifted up to 80 meters (260 feet) in the northern Puget Lowland, with the amount of uplift decreasing to the south where the ice was thinner. Uplift in the Everett vicinity is estimated at approximately 40 meters (130 feet) (Thorson 1989). Rebound of the land outpaced global sea level rise between about 12,000 and 9,000 years ago. The K-C WW upland area would have been exposed above the shoreline during the period of rebound. Rebound was complete by about 9,000 years ago and global sea level rise was once again the dominant geologic force in the region. Continued sea level rise quickly drowned the earliest Holocene shorelines again after about 9,000 years ago and renewed deltaic sedimentation and formation of deltas in Puget Sound embayments, such as the Snohomish River delta in Port Gardner (Crandell 1963; Dragovich et al. 1994). After 7,000 years ago, the rate of global sea level rise began to slow. Relative sea level was about 5 meters (16 feet) below the modern shoreline by about 5,000 years ago (Dragovich et al. 1994).

The Puget Lowland is geologically active due to structural deformation associated with the Cascadia Subduction Zone. Research on the Snohomish River delta, about 2 miles (3.2 kilometers[km]) north of the K-C WW upland area, found evidence for at least five episodes of plate movement since about AD 800 that resulted in three episodes of liquefaction, at least one abrupt subsidence event, and at least one tsunami (Bourgeois and Johnson 2001). The evidence for tectonic activity could be linked to a number of different fault zones and known tectonic events in the Lowland. Faulting on the Utsalady strand of the Darrington-Devils Mountain Fault Zone (DDMFZ), 21 miles (34 km) northwest of Everett on Camano Island, at least twice within the last 2,200 years may be responsible for some evidence for plate movement recorded in the Snohomish delta sediments (Johnson et al. 2003, 2004). Tectonic activity on the Seattle Fault Zone (SFZ), 26 miles (39 km) to the south, is known to have occurred in the past 1100 years and may also be responsible for signals of delta subsidence (Johnson et al. 2004). At least some of the Snohomish delta evidence also relates to tectonic activity along the South Whidbey Island Fault Zone (SWFZ), which crosses the Puget Sound just south of the project area (Johnson et al. 1996). Movement along these boundaries affects the condition and location of archaeological materials buried within the Snohomish River delta. Because movement along the fault zones differ in direction and magnitude during each event it is unclear just how much vertical offset the project area has experienced throughout the Holocene. One of the consequences of the vertical movement is the possibility of deeply buried archaeological sites in Snohomish River delta and floodplain sediments, especially if subsidence has governed. Sudden subsidence may preserve archaeological sites by quickly burying them through bank sloughing or sedimentation along the shoreline. A landslide appears to have occurred east of the K-C WW upland area in the past, based on the slumped nature of the bluffs to the north in historic documents and the now relatively gentle slope from the upland to the shoreline. Sediment composing the bluffs backing the coast probably collapsed into the sea, burying the shoreline.

Geomorphology

The East Waterway was historically dredged between the mainland shoreline and the mouth of the Snohomish River. The dredge was used as fill, called "Tract O," which maintained separation between the Snohomish River channel and the waterway that reaches a depth of 30 feet below mean lower low water (MLLW) (Eldridge and Orlob 1951). The K-C WW upland area is on the east side of the East Waterway. The surficial geology of the entire project area is mapped as artificial fill (Qf) (Menard 1985). This means fill is present across the entire surface of the K-C WW upland area, but the fill is of varying thicknesses, depending on the underlying landform. It is probable that some of the fill came from dredging the waterway or other dredging that commonly took place on the delta. It is also probable that the fill in the project area originated as mill waste and was dumped directly into Port Gardner from the shoreline (Orlob and Eldridge 1954).

A small bench of sandy advance outwash (Qgat) is mapped along the hillside at the east edge of the project. These outwash deposits are very old, representing the transition from the Fraser glacial period to pre-Fraser deposition, and they predate the arrival of humans to the region. The bench may be a landslide deposit that sloughed off of the bluffs and into Port Gardner during the Pleistocene. Vashon till (Qgt) is mapped to the east of the project boundary on the glacial upland at Everett (Menard 1985). Soils mapped in the project vicinity reflect the glacial origin of the sediments they formed within. For example, soils along Grand Avenue at the east edge of the project are mapped as Alderwood-Urban land complex (Debose and Klungland 1983). Alderwood soils form in glacial drift on glacially modified foothills and valleys. Everett soils, which form in glacial till, are mapped on the uplands east of the project (Debose and Klungland 1983). Cultural materials, if present, would not be deeply buried within the glacial soils and sediments. The project area is classified by soil scientists as Urban Land (NRCS 2013). There is potential for cultural materials to be buried deeply below fill along the historical shoreline where beach alluvium is below the urban land. The glacial sediment bench is a unique feature along the Puget Sound coastline between Mukilteo and Everett, which is mainly characterized by steep bluffs. The gentler slope in the project vicinity would have provided easier access down to the waterfront from the uplands.

Puget Sound shorelines are typically low-energy environments and are composed of mixed sand and gravel beaches. A beach profile that consists of one part gravelly or coarse sandy steep foreshore and one part low-gradient sandy or muddy low-tide terrace is typical of the region. Most of the sediment that has collected on the beach berm and backshore is too coarse to be carried by waves or tidal currents on a daily basis because it was deposited during winter storms. Sediment on the upper foreshore is moved little by little along the shoreline because it is the right size to be carried as bedload in the swash zone of waves. Tidal currents and waves carry finer-grained sediment down the coastline in suspension following longshore drift currents, dropping the silts and clays on the tideflat and in marshes when energy slows. The major source of sediment coming in to the project area before historical filling began was probably derived from the surrounding bluffs. The large variation in buried beach deposits in the project area attests to the glacial source of the beach sediment. Wave-induced erosion and the toe of the bluffs and gravity would have dislodged and reworked till, outwash, glaciomarine, and glaciolacustrine deposits in the vicinity into a heterogeneous beach. Another source of sediment into the project area would be the Snohomish River, which empties into Port Gardner and forms a wide delta just north of the project. Prevailing winds arrive from the south east, so waves would push sediment from the river into the project area. Even with such vast sediment sources, the Everett coastline in the project vicinity appeared to have been relatively straight without barrier or accretionary landforms. The wide berm in the project area is evidence for healthy past sources of sediment.

The Snohomish River Delta

The Snohomish River begins at the confluence of the Skykomish and Snoqualmie Rivers near Monroe, WA and ends in Port Gardner Bay. About 7.5 miles (12 kilometers) upstream from Port Gardner, the main channel of the Snohomish River splits into four distributaries including Ebey, Steamboat, and Union Sloughs and the Snohomish River channel mainstem. The distributaries of the Snohomish River occupy the entire bottom of the wide valley, which is bounded to the north and south by glacial moraines. The river delta filled in this valley forming the flat deltaic plain that the Snohomish River runs across today. Channel migration has reworked the delta plain resulting in a floodplain environment with wetlands transitioning downstream into estuaries that are heavily influenced by tides (Snohomish County Public Works Department 1991). Port Gardner Bay communicates with Possession Sound, which is bounded by the Everett mainland on the east and Whidbey Island on the west and it opens to Puget Sound on the south and to Port Susan and Saratoga Passage at the north.

Lower sea-levels during the early Holocene drove the Snohomish River to cut down through glacial sediment to reach a lower base-level. Elevated mid-Holocene sea level resulted in sedimentation in the valley bottom and infilling of the valley that was incised just a few thousand years earlier. Sedimentation in the valley bottom led to delta progradation at the river mouth. Port Gardner filled with sediment and the low-lying Holocene shorelines were buried. The lower Snohomish River valley filled from south to north with the oldest alluvium around Lowell and the youngest near Everett and then from east to west to reach around the Everett peninsula (Armstrong et al. 1965). The Snohomish River channels matured over time and developed meanders, levees, and sloughs in which they deposited gravels, sand and silt. The delta had been aggrading at a relatively constant rate until historic logging practices altered natural processes in the basin. The 1 to 4 meters of sediment exposed in the main river channel and slough cut banks in the lower delta typically reveal deposits accumulated during the last 1500 years (Bourgeois and Johnson 2001). According to Bourgeois and Johnson (2001), the Snohomish River delta channels and marshes have not migrated laterally since about 800 AD. The delta continued to grow west and curved around the Everett Peninsula throughout the late Holocene. Today, the very edge of the delta is just north of the project. The delta has not filled in Port Gardner in the vicinity of the project, so there is very deep water in the bay just west of the shoreline that is useful for harboring ships. The delta did provide alluvial sediment south of its proximal margin during the late Holocene and Snohomish River alluvium contributed to widening of the marsh and tideflats in the project vicinity.

Flora and Fauna

Vegetation across the Puget Lowland has changed significantly since the end of the Pleistocene. Lodgepole pine colonized newly deglaciated surfaces, followed quickly by Douglas fir, spruce, and alder. The climate of the Pacific Northwest was warmer and drier than today between about 10,000 and 6000 BP, with drought-like conditions in the summers (Whitlock 1992). Forests were more open and prairies were common throughout the Puget Lowland. Conditions similar to those today developed after 6000 BP as temperatures cooled and precipitation increased. Closed-canopy forest of western red cedar, western hemlock, and Douglas fir had become established in the Puget Lowland by about 5000 BP. Climate and vegetation have remained generally stable in western Washington since the mid-Holocene (Whitlock 1992).

Today, the Puget Lowland is part of the *Tsuga heterophylla* (western hemlock) vegetation zone, which is characterized by forests of western hemlock, western red cedar, and Douglas fir (Franklin and Dyrness 1973). Ground cover in the western hemlock vegetation zone is typically comprised of dense shrub and herbaceous undergrowth of sword fern, salal, Oregon grape, ocean spray, blackberry, red huckleberry, and red elderberry. Big leaf maple, red alder, black cottonwood, and other riparian plants thrive on the Snohomish River floodplain to the northeast. Wetlands and marshes typically support willow, alder, reeds, wapato, nettles, grasses, and skunk cabbage and these species would be found in the project vicinity (Franklin and Dyrness 1973). Estuarine environments contain salal, tule, cattail, stinging nettle, and a variety of roots and bulbs (Deur and Turner 2005). Plants that may have been present in the K-C WW upland site vicinity prior to historical development that would have been useful for food include blackberry, serviceberry, cranberry, thimbleberry, huckleberry, bracken, wood, and sword ferns, wild carrots, rose hips, tiger lilies, and crab apples. Numerous other plants found in the region provided fuel, medicines, and materials for tools, shelter, and transportation (Gunther 1945).

Large terrestrial animals that were once or are still found in the K-C WW upland area vicinity include elk, deer, black bear, coyote, bobcat, and mountain lion. Smaller mammals, including rabbit, squirrel, chipmunk, raccoon, weasel, beaver, and river otter are also resident around the APE (Ingles 1965; Larrison 1967). Migratory birds, such as geese, ducks, swans, and other water fowl are seasonally abundant in saltwater bays, sloughs, and on the river delta in the project vicinity (Angell and Balcomb 1982). Marine animal resources in north Puget Sound include several species of salmon, steelhead, flounder, perch, rockfish, dogfish, lingcod, herring, smelt, and sole (Miller and Borton 1980). Five salmon species use the Snohomish River for spawning and rearing, including Chinook, coho, chum, pink, and sockeye salmon, and steelhead, rainbow trout, cutthroat trout, and bull trout also use the river and would have been available for local fishers (Snohomish Basin Salmon Recovery Forum 2005). Although the project area is saltwater, the salmon species would have entered the Snohomish River by passing through its mouth, which is adjacent to the K-C WW upland area. Herring populations spawned in shallows in the Port Gardner, making them important forage fish for salmon populations and humans (Washington State Conservation Commission 2000). Mussels, clams, oysters, sea urchins, and other shellfish are available in various intertidal environments in the vicinity as well (Kozloff 1996). Marine mammals including harbor seal, sea lion, porpoise, orca, and whales also frequent the Puget Sound seasonally or year-round (Kruckeburg 1991).

Cultural Setting

People have lived on the accessible shores of Port Gardner Bay [redacted] for thousands of years. Native people used the [redacted] shoreline for shellfish collection, hunting, plant gathering and fishing. [redacted]. The shorelines were developed quickly after the Euroamericans converted their interests in the region from exploration to settlement. The history of this area is one of changing economic strategies, residence patterns, and population growth.

Prehistory

Evidence for the first human presence in the region roughly corresponds with glacial retreat from the Puget Lowland (Carlson 1990). The earliest well-established cultural period in North America, designated the Paleoindian period, is poorly defined and is represented by a few archaeological sites. A small number of isolated fluted projectile points that are characteristic of the Paleoindian period have been found in western Washington (Avey n.d.; Carlson 1990; Kopperl et al. 2010; Meltzer and Dunnell 1987; Osborne 1956). Other evidence of possible early human occupation involving the pursuit of now-extinct fauna was found at the Manis mastodon site on the Olympic Peninsula, radiocarbon dated to about 12,000 years ago (Gustafson et al. 1979; Gustafson and Manis 1984; Kirk and Daugherty 1978). Inferences about Paleoindian lifeways have been limited to presumptions about activities based on the isolated stone tools and their rare association with large extinct mammals, with few additional insights on subsistence economy or other aspects of culture. The projectile point styles of the Paleoindian period apparently did not persist past 10,000 years ago as they were replaced by regional variants (Carlson and Dalla Bona 1996).

Holocene occupation of the Puget Sound region is better understood than occupation during the Paleoindian period. Archaeological sites that represent the Early period (8000 to 5000 BP) or Old Cordilleran culture are locally termed “Olcott,” [redacted] (Butler 1961; Fladmark 1982; Kidd 1964; Mattson 1985). Typical Olcott artifacts are large stemmed or leaf-shaped points, scrapers, cobble flake tools and blade cores formed of basalt and dacite toolstone (Carlson 1990). Olcott sites are often located on glacial terraces or along lakes on glacial uplands (Wessen and Welch 1991). Many Olcott sites are classified as stone tool manufacturing sites because archaeological features with faunal and plant remains are ordinarily absent (Morgan 1999). Olcott assemblages are usually interpreted as evidence of an early, highly mobile hunting and gathering adaptation. Age estimates of Olcott sites have been inferred based on their similarity to dated components of assemblages from archaeological sites in British Columbia, as well as using projectile point cross-dating, obsidian hydration analysis, and luminescence dating of two archaeological sites [redacted] (Carlson and Dalla Bona 1996; Chatters et al. 2011). This land use pattern may have persisted for over 6,000 years and near its end is marked by increasing reliance on marine and riverine resources. Marine resource use may extend back farther in time, but evidence that might exist on early shorelines has been inundated by rising sea levels which reached near-modern elevations only about 5000 BP.

After about 5000 BP, larger populations organized in more complex ways to exploit a wide range of locally available resources including large and small mammals, shellfish, fish, berries, roots, and bulbs, with an increasing emphasis on salmon over time. Shell middens containing large quantities of shellfish remains and marine fish and mammal bone are common on the saltwater shoreline. Groundstone, bone, antler, and shell tools became increasingly common and more diversified through time. Full-scale development of marine-oriented cultures on the coast and inland hunting, gathering, and riverine fishing traditions as represented in the ethnographic record are apparent after about 2500 BP (Blukis Onat 1987). Large semi-sedentary populations occupied cedar plank houses located at river mouths and confluences and on protected shorelines. Artifacts made of both local and imported materials occur, indicating complex and diversified technologies for fishing, hunting, food processing, and storage. Wealth-status objects, status differentiation in burials, art objects, and ornaments are also represented during this period (Ames and Maschner 1999; Blukis Onat 1987; Matson and Coupland 1995; Fladmark 1982). Contact with Euroamericans in the late 18th Century lead to drastic changes in all Native American communities in the region, especially due to disease (Boyd 1998; Campbell 1989).

Ethnography

Ancestors of the Snohomish people lived in the project vicinity at the time of European contact. The traditional territory of the Snohomish stretched from the south half of Camano Island to the Snohomish River valley and along the mainland coastline from Mukilteo to Warm Beach (Baenen 1981; Indian Claims Commission 1974; Osmundson 1964; Ruby and Brown 1992). The *Sdo'hobc* band of the Snohomish lived along the lower Snohomish River [redacted]. The people [redacted] practiced a semi-sedentary, hunter-gatherer lifestyle that was oriented toward marine and coastal resources. They collected shellfish and fished for halibut, herring, smelt, eulachon, flounder, seal, and salmon (Baenen 1981; Haeberlin and Gunther 1930; Suttles and Lane 1990; Twedell 1974). They also hunted for deer and bear on the islands and uplands (Baenen 1981; Pembroke 1981).

Snohomish people resided in winter villages that consisted of large, multi-family plank houses [redacted]. Groups would leave the villages for shellfish, marine and freshwater fish, land game, waterfowl, sprouts, roots, bulbs, berries, and nuts during the spring, summer, and fall months and these resources were stored for winter, traded, or processed to be consumed (Suttles and Lane 1990). The project area would have provided numerous resources, predominantly marine fish and shellfish, but tules, cattails, and red cedar bark were also collected from marshes and used for making mats, rope, baskets, and other household items. Families would travel up the coast or across the Sound to establish their seasonal temporary camps (Baenen 1981; Deur and Turner 2005; Pembroke 1981; Smith 1941; Twedell 1974).

[redacted]

Isaac Ingalls Stevens, the first territorial governor and Superintendent of Indian Affairs, had a mandate to make treaties with the indigenous inhabitants of Washington to facilitate settlement of the region. Stevens negotiated a treaty with the Duwamish, Suquamish, Kikiallus, Stillaguamish, Snohomish, Skagit, Sauk-Suiattle, Swinomish and Lummi at Point Elliott in 1855 (Boswell 2007; Richards 1993). The treaty gave the tribes payment, retention of hunting and fishing rights, and services in exchange for lands (Lane 1973, 1975). The treaty also established the Port Madison and Snohomish (now Tulalip) Reservations where tribal members were supposed to move. The Tulalip Tribes are comprised of descendents of the Snohomish, Stillaguamish, Snoqualmie, Skykomish, Skagit, and Samish people (Ruby and Brown 1992:244; Swanton 1968). The Tulalip Reservation on the north side of Port Gardner Bay was carved out of Snohomish lands, so many Snohomish people chose to settle there. [redacted]

History

Historic settlement was slow to reach the heavily forested shoreline along Port Gardner Bay, but the abundant timber drew crews of loggers who supplied sawmills established along other parts of coastal Puget Sound as early as 1853. It was not until about 1861 or 1862, however, that the first non-Native settler, Dennis Brigham, claimed land along the shores of what is now the Everett peninsula. The former Massachusetts carpenter built a small farm and later filed for a homestead patent on a 160-acre parcel that includes a portion of the project area. The 1869 General Land Office (GLO) plat of the Port Gardner shoreline shows the Brigham property and the location of a building within the project area (Dilgard and Riddle 1973:5,8; LeWarne et al. 2005:66; Interstate Publishing 1909:I-314; O'Donnell 1993:6).

Several other settlers followed Brigham to this peninsula within a few years, including Erskine Kromer, who settled immediately to the south, and John King, who claimed land to the north. Kromer evidently worked for the telegraph company that planned to connect the United States with Europe from the west by running a line along the Pacific coast and then across the Bering Strait to Siberia and on through Russia (Figures 4 and 5). The Russian-American telegraph project, conceived by entrepreneur Perry Collins, was undertaken by the Western Union Company. A portion of the line was completed through

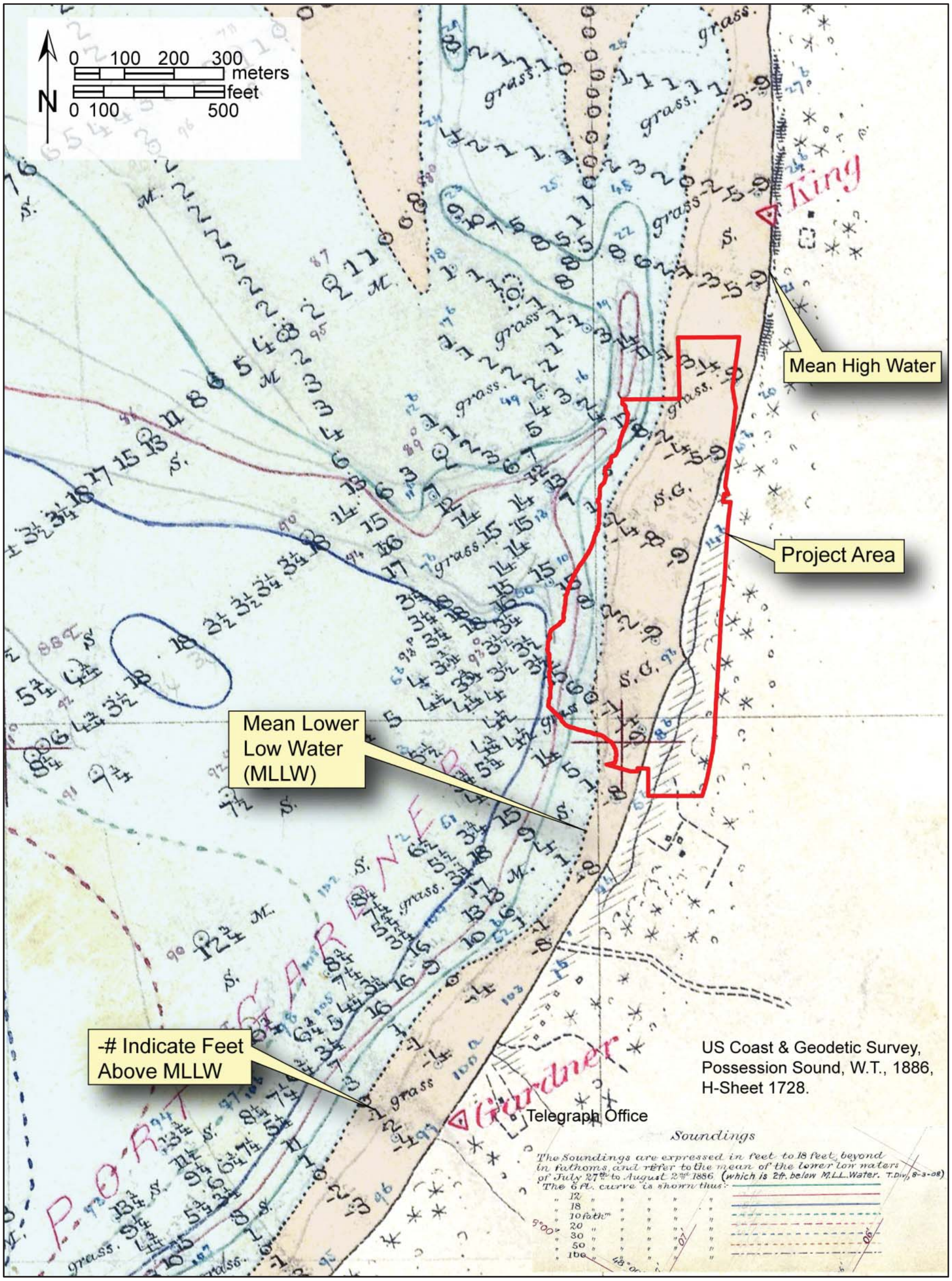

Figure 4. Historical H-sheet showing the mean historic shoreline and low water line; note the telegraph office and small structures shown just south of the project area in 1886.

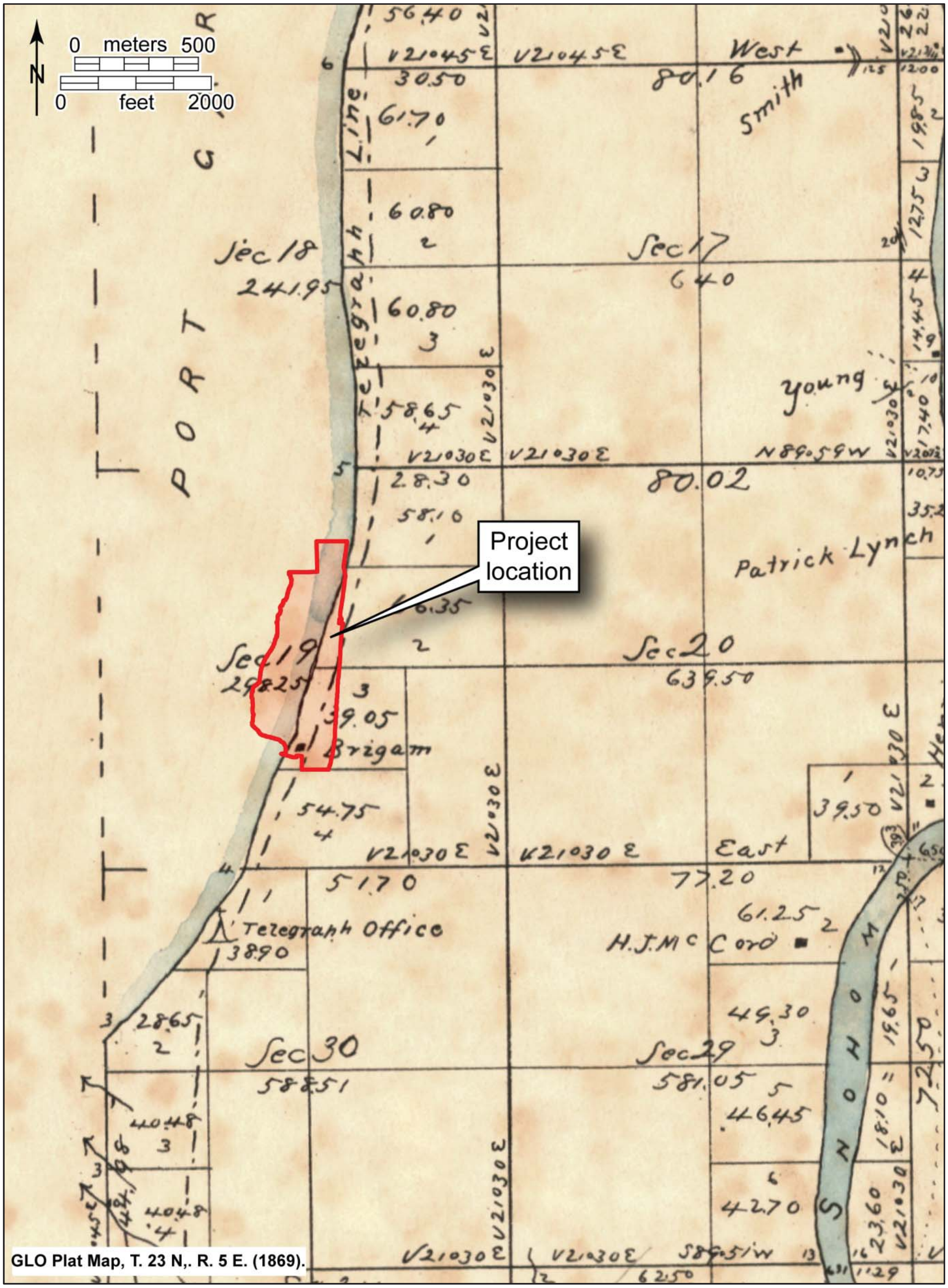

Figure 5. GLO plat map from 1869 showing Brigham's cabin mapped in the southern part of the project area and the telegraph line running through the east edge of the project.

Oregon, Washington and into British Columbia, but the effort was abandoned in 1867 after the transatlantic cable was successfully completed, offering a more direct link from the United States to Europe. The GLO map (Figure 5) shows that the Russian-American telegraph line extended along the Port Gardner Bay shoreline through the project area and that a building to the south on Kromer's property was used as a telegraph office (LeWarne et al. 2005:66; Ault 1975:3, 11-12).

The timber industry was the economic mainstay of the Puget Sound region during the early decades of development, and it became the focus of growth for Snohomish County when it separated from Island County in January 1861. Once transportation routes were established, the exploitation of the area's vast forest resources expanded quickly. Both logging and processing first began near coastal waterways, which provided easiest access, but then moved inland along rivers. Later, new roads and ultimately rail lines provided a means to transport logs as well as finished products (LeWarne et al. 2005:63).

Despite the advantageous location of the Everett peninsula, which was bounded by the bay and the Snohomish River, it took several more decades for a town to develop on the site. Not until 1889, the year that Washington became a state, did several entrepreneurs begin to accumulate land with the idea of platting a new city they planned to call Port Gardner. Brigham had sold his homestead along the bay in 1883 to Edmond Smith and by 1889 that parcel was purchased by Wyatt Rucker, who with his brother Bethel was a primary promoter of the new town. He and other investors acquired additional land that ultimately totaled approximately 800 acres (Interstate Publishing 1909:I-317) (Figure 6).

At the time that the Ruckers and their associates were involved in platting the townsite, a larger and more prominent group of investors also took an interest in the peninsula. The landscape had the natural characteristics of a profitable port with room for new industry but also proximity to the developing Monte Cristo mining district. A syndicate put together by Henry Hewitt of Tacoma and Charles Colby of New York obtained substantial backing from John D. Rockefeller and other Eastern investors and eventually purchased much of the Rucker group's interest in the site. The Everett Land Company was incorporated in November 1890 and in the following year began work to survey and lay out blocks of the new city to be known as Everett (Whitfield 1926:II-359, 361).

This development also coincided with the completion of the Seattle and Montana Railroad, a subsidiary of the Great Northern Railroad, which passed through Everett and connected Puget Sound with the Canadian Pacific Railroad. Several other towns along the Seattle and Montana right-of-way were platted at the same time, but it was Everett that eventually experienced the greatest growth. The Everett Land Company quickly attracted large industrial enterprises including a shipbuilding plant, a pulp and paper mill, a wire nail factory and several sawmills. Among these initial enterprises was the Parminter, Robinson and Company mill, which was located within the project area along Port Gardner Bay near the foot of 21st and 22nd Streets (Figure 7). The mill was in operation as early as 1892, and the complex included the first home of one of the mill owners, Thomas Robinson, and his family (Interstate Publishing 1909:I-326; Cameron et al. 2005: 108-109; Norman 2007) (Figure 8).

The prospect that the Great Northern's transcontinental line, which crossed the Cascade Mountains to the coast over Stevens Pass, would use Everett as its terminus fueled even more speculative interest in the future of the town. When the railroad was completed in 1893, however, James J. Hill chose Seattle as his line's main Pacific Coast port rather than Everett. The new city on Port Gardner Bay faced a short-term setback that was exacerbated by a severe nationwide economic downturn and disputes over tideland ownership. By 1897 the Everett Land Company had gone into receivership and industrial growth slowed considerably (Interstate Publishing 1909:I-326).

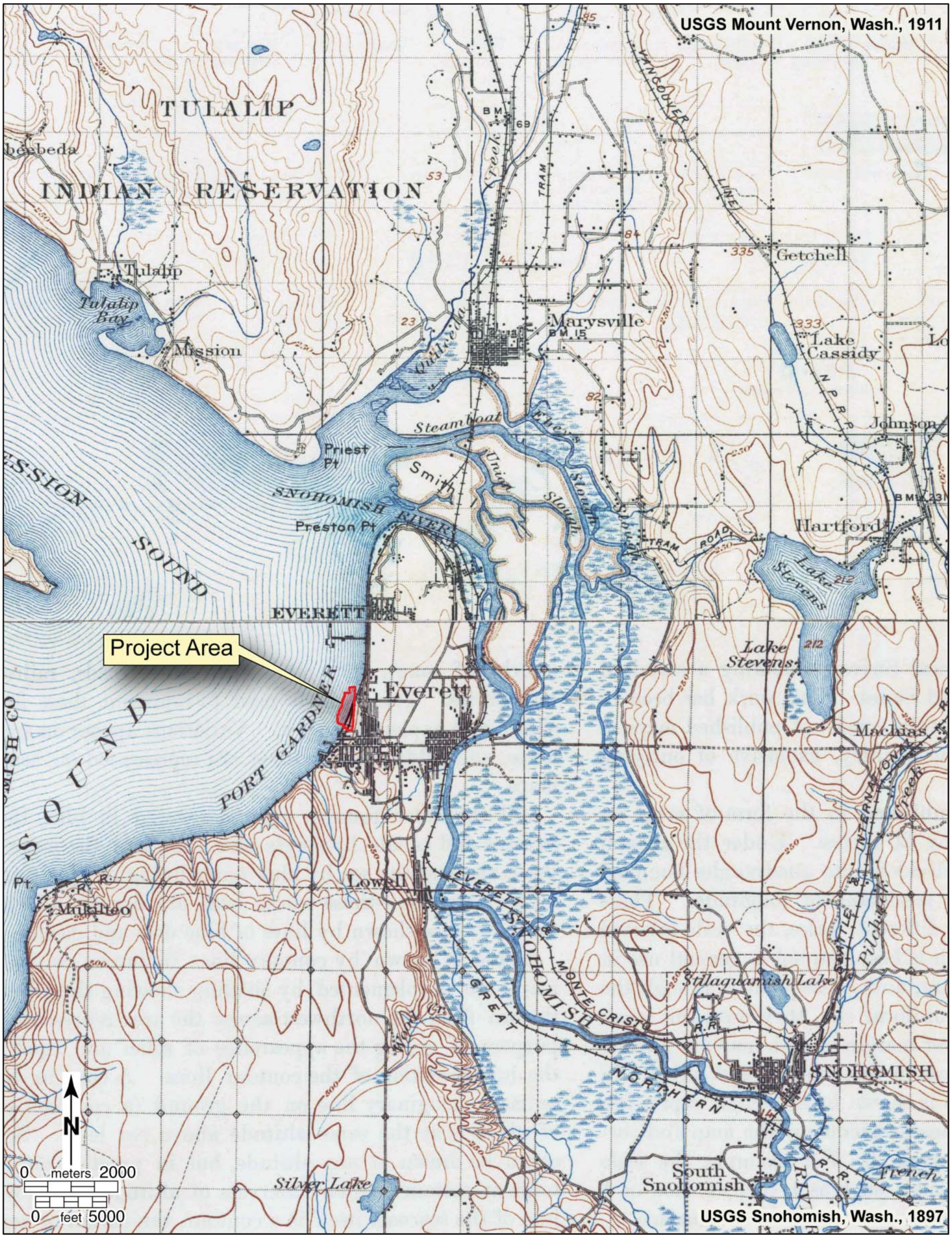

Figure 6. Early development in the vicinity of Everett, 1897 and 1911.

Figure 7. Birdseye view of the project area in 1893, showing the Parminter, Robinson Mill to the north and the Rucker Dock to the south.

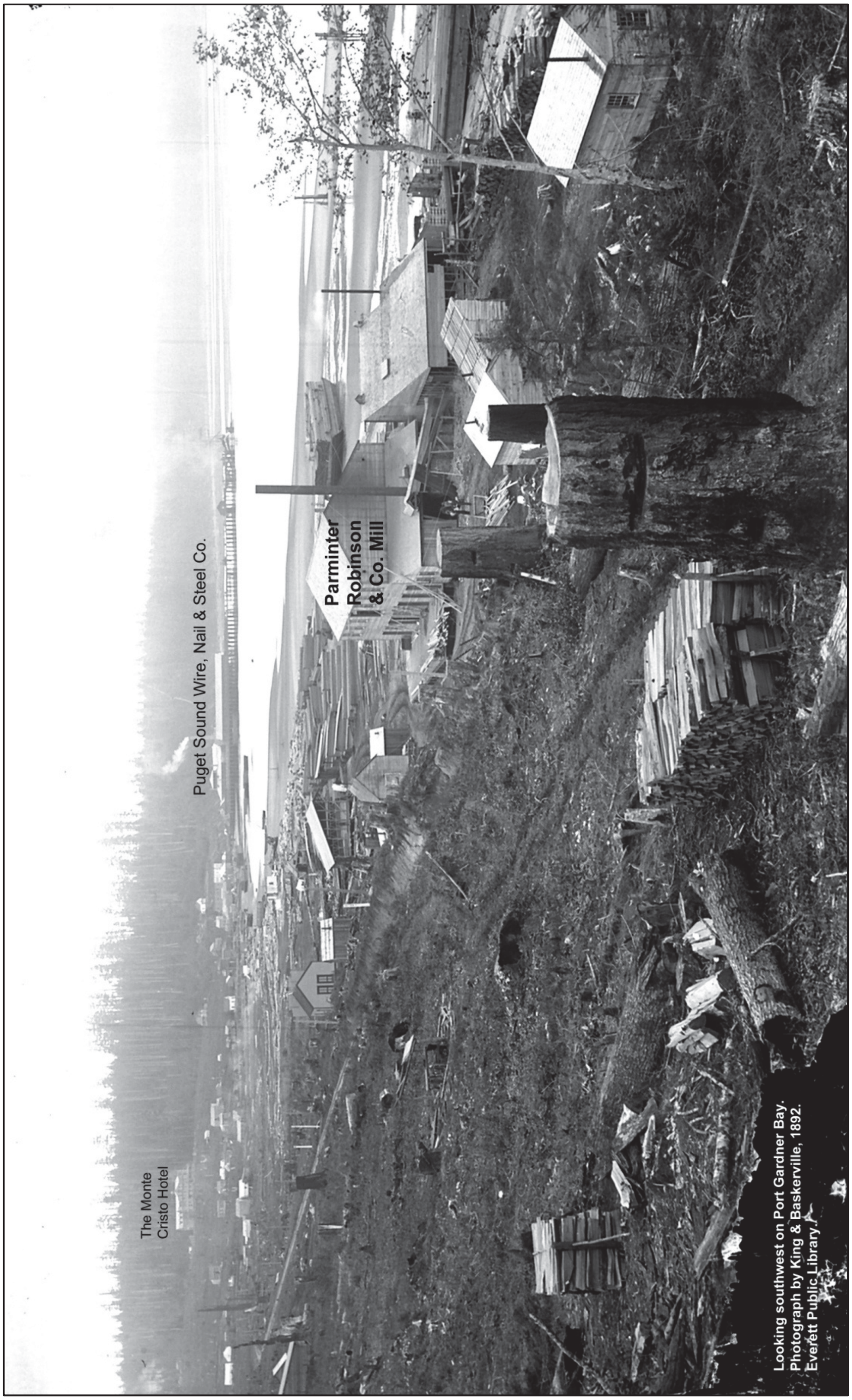

Figure 8. Overview of the project vicinity looking southwest from approximately 21st St and Grand Ave, 1892.

Hill helped the city to rebound when he acquired the Land Company's remaining property and in January of 1900 formed a new syndicate called the Everett Improvement Company under the capable direction of John McChesney. The Weyerhaeuser Company had just purchased more than 900,000 acres of Northwest timber land from the Northern Pacific Railroad, which Hill controlled, and both he and McChesney recognized Everett's prospects as a major milling center. Not only did Weyerhaeuser soon construct its first Northwest mill on Port Gardner Bay, but several other Midwestern lumbermen quickly built plants along the waterfront to take advantage of the region's extensive forest resources. A number of other manufacturing facilities were also located on the bay as well as "riverside" on the Snohomish River, but at the heart of Everett's development was the burgeoning timber-processing industry. The expansion proceeded so rapidly that by 1901 Everett had nine sawmills and thirteen shingle mills (Figure 9) (Cameron et al. 2005: 11-112, 119, 135-136; Interstate Publishing 1909:283-284).

Clark-Nickerson Lumber Company

Among the plants constructed during this period of unprecedented growth was the Clark-Nickerson Lumber Company, which was also backed by several prominent industrialists. The business was organized by David Clough, a former governor of Minnesota and acquaintance of Hill, who with M.J. Clark and E.A. Nickerson developed a large sawmill on 46 acres along the bay at the north end of the current project area. As with other businesses on the waterfront, the Everett Improvement Company donated this land to the company as long as a plant was built on the site. Originally some of this property had been given to the Thomas Robinson Manufacturing Company to erect a new sash and door plant, possibly on a portion of the original Parminter, Robinson mill site. When Clark-Nickerson expressed interest in the same location, Robinson agreed to move onto a parcel immediately to the north, just outside the current project area (Whitfield 1926:II-360-361; *Pacific Lumber Trade Journal* 6(6) Oct 1900:23)

Construction of both new plants began almost immediately. On its property Clark-Nickerson built a state-of-the art sawmill and planing facility that was in operation by September of 1901. According to trade journals, the mill had a capacity of 300,000 feet when running three shifts and could plane more than 100,000 feet per day. Once the mill was operational the company expanded the yard to 200 by 500 feet and work also continued work on a new dock that would provide deep-water moorage (*Pacific Lumber Trade Journal* 6(6) Oct 1900:23*; Columbia River and Oregon Timberman* II (2) Dec. 1900:7). By the following spring Clark-Nickerson installed a new gang flooring machine and also an electric light plant. The company was evidently shipping its lumber to California, Mexico, Hawaii and South Africa, so it further improved its wharf for larger ocean-going vessels. Contracts were let to dredge a channel around the dock, removing 50,000 yards of sediment and leaving a channel 24 feet deep at low tide and 200 feet wide (see Appendix C, Map 2) (*Pacific Lumber Trade Journal* 6(12) April 1901: 15; 7(2) June 1901: 15).

The company's major stockholder, E.A. Nickerson, sold his shares in the spring of 1901 to another Midwest industrialist, D.M. Robbins, who was the brother-in-law of David Clough. With the new management, trade journals reported that development plans included construction of large yards so that the company could maintain a stock of 15,000,000 to 20,000,000 feet of lumber at any time. In order to accomplish this goal it was necessary to fully utilize its site, which had expanded to 54 acres, by driving piles and filling a much large area. There were also rumors that the company had purchased a steamer line between Washington and California (*Pacific Lumber Trade Journal* 7(4) August 1901: 18).

E. A. Nickerson, the former head of Clark-Nickerson, became a half owner of the nearby Robinson Mill, which was renamed the Robinson Manufacturing Company. With the new infusion of capital the

Figure 9. The Port Gardner waterfront in 1902.

company made improvements to its sash and door factory and began to fill more of the tidelands around the site to build a substantial wharf. Evidently the first step was to build a retaining wall around the property and then to erect a flume that was connected to the Clark-Nickerson sawmill. The flume, which began operation in the fall of 1901, carried the mill's sawdust and waste for use as fill for Robinson's wharf. According to one publication, "Within a few months the entire site will be filled, thus preventing destruction by teredo, and making a good foundation for future buildings" (*Pacific Lumber Trade Journal* 7(7) Nov. 1901:15; *Pacific Lumber Trade Journal* 7(5) Sept 1901: 15).

At the same time, Clark-Nickerson also made improvements to its plant. The company constructed a new brick and stone building to house two 150-horsepower boilers for the planing mill and dry kiln. Work began soon thereafter on a new dry kiln and also the installation of a complete sprinkling system. The Sanborn Fire Insurance map of the Clark-Nickerson complex in 1902 shows that much of the plant was built on a wharf extending at a southwesterly angle from the shoreline with the sawmill, machine shop, lath mill and other associated buildings on the wharf's southwest section. The dry kiln and planing mill were located on what was called the Upper Wharf to the north, and lumber was stored in sheds and on piles and timbers (see Appendix C, Map 2). During this period the company was expanding its shipping in the cargo trade to Africa, Asia and Australia, and despite its dredged dock space, some vessels evidently anchored offshore in deep water opposite the Clark-Nickerson Mill where they were not as severely affected by the tides (*Pacific Lumber Trade Journal* 7(5) Sept 1901: 15; 7(9) Jan 1902: 15; 7(11) March 1902: 14; Sanborn 1902).

Clark-Nickerson was initially the largest mill on the waterfront, but over time other mills surpassed it in size. By 1910 the number of timber-related industries in Everett had grown to 11 lumber mills, 16 shingle mills and 17 combination plants, spread out along the bay as well as riverside (Cameron et al. 2005:136) (Figure 10). Historian Norman Clark identified a "sawdust baronage" of powerful entrepreneurs who ran these plants, led by David Clough who went on from Clark-Nickerson to build "a galaxy of milling and logging outfits" in which many of his extended family members were involved (Clark 1970:59-60). To keep pace in the industry, Clark-Nickerson expanded and made improvements to its plant, adding lumber yards that extended north to the property line with the Robinson mill as well as east along the railroad. In addition, several fuel bins and a large refuse burner were installed along the south side of the sawmill (see Appendix C, Map 4) (Figure 11) (Sanborn 1914).

Everett Flour Mill

With new wood products facilities springing up along the bay, other industries were also attracted to the site. By the fall of 1900 the Everett Flour Mill Company had begun building a facility on what a newspaper called "…a desolate stretch of bog land on the shore of the bay, about 1000 feet south of the big lumber mill of Clark-Nickerson and Co…." The Everett Improvement Company donated nearly four acres in what is now the project area to the mill owners with the provision that a facility would be built capable of producing at least 600 barrels per day. A 50 by 225-foot area was filled as a base for the five-story plant and adjacent buildings, which were completed in early 1901. The main mill building was set on concrete piers and was a prominent landmark along the water front. At a point along mean high tide a structure for shavings and sawdust was also erected and eventually Great Northern railroad spurs provided access for shipping (see Appendix C, Map 1) (Whitfield 1926: II-361; *Seattle Times*, Sept. 13, 1900:; Sanborn 1902).

By 1914 a grain elevator and a flour and feed warehouse had been added inland from the main building. The company produced a popular brand of flour known as "Best Ever-ett" and remained in operation until the 1920s (Figure 12) (see Appendix C, Map 3). The facility was purchased by Sperry Flour

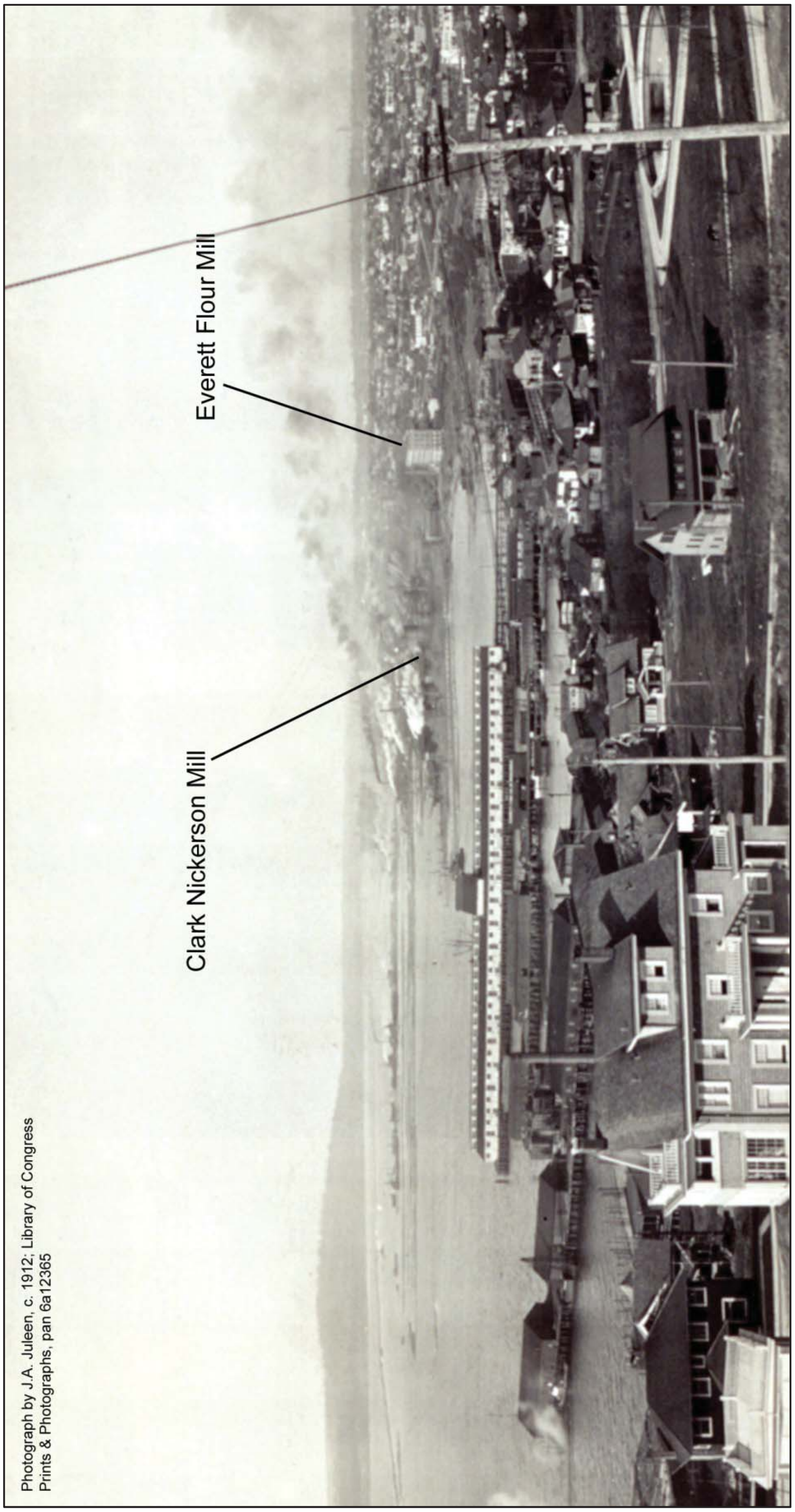

Figure 10. Overview of Port Gardner showing the Clark-Nickerson Mill and the Everett Flour Mill, c. 1912.

Figure 11. Overview of the Clark-Nickerson Mill, c. 1927.

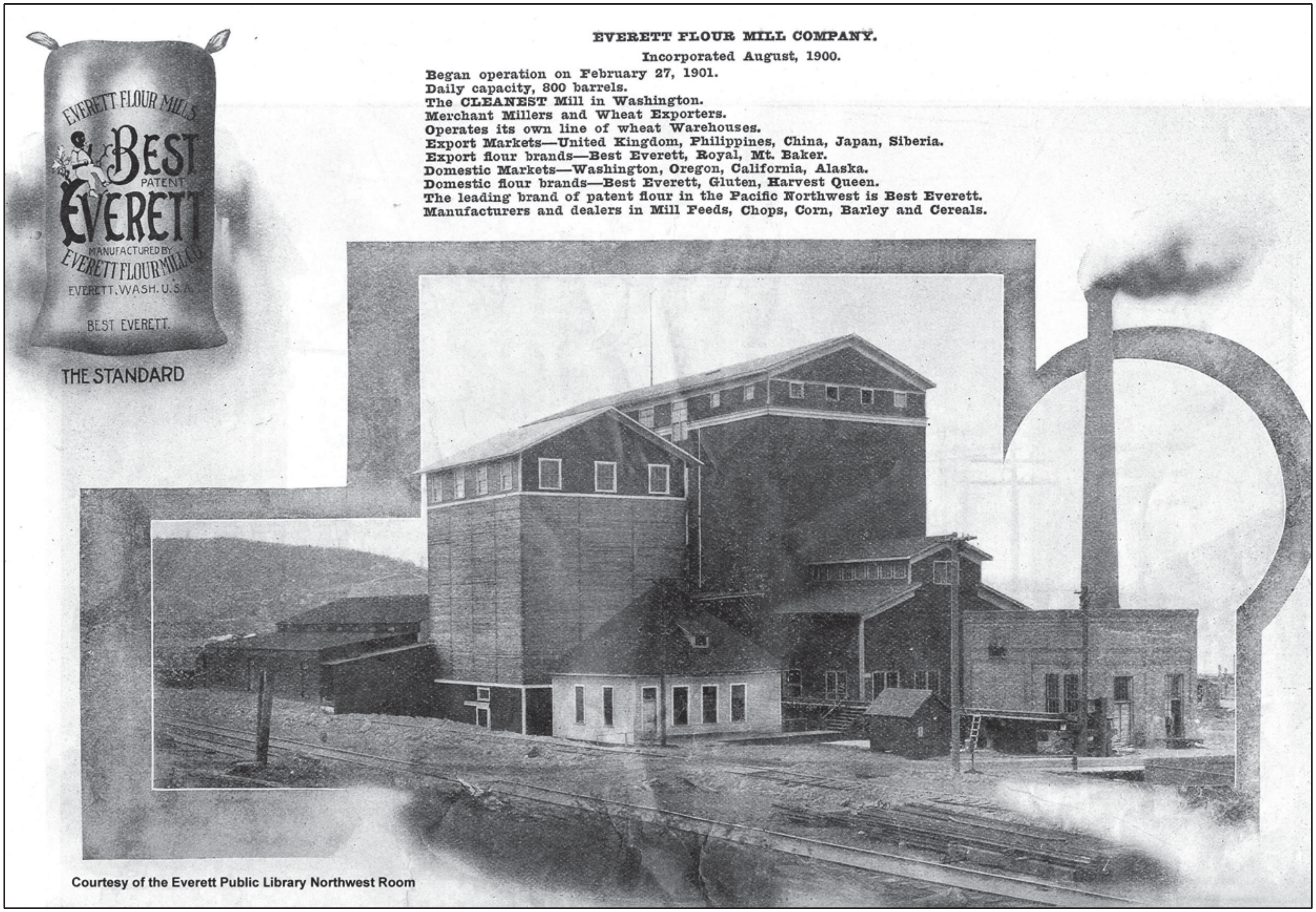

Figure 12. Advertisement showing the Everett Flour Mill, c. 1915.

Company, which operated the mill for a few years. In 1926 the old mill buildings were dismantled and removed and Sperry moved to a new location (Sanborn 1914; Whitfield 1926:II-361).

In addition to these industrial plants, the waterfront in the project area was lined with small cabins and houses that the Sanborn map of 1902 identified as "Squatters' Shacks." Stretched along the high tide line south of the Everett Flour Mill as well as east of the Clark-Nickerson wharf near the railroad tracks, these small dwellings likely housed waterfront workers, sailors and other laborers and their families (see Appendix C, Maps 1, 2). Little is known about these people, but by 1914 Sanborn maps show no more of these dwellings, so possibly these squatters were forced out through legal action initiated by the Everett Improvement Company (see Appendix C, Maps 3, 4). The tideland areas at the base of 24th or 25th streets south of the flour mill and also at the foot of Everett Avenue were popular public bathing beaches before later industrial development took place (Figure 13). Sanborn maps and photographs show one or two small bathhouses and boat rentals that were interspersed with the other dwellings along this part of the waterfront in the project area (see Appendix C, Maps 1, 2) (Sanborn 1902; 1914; Dilgard and Riddle 1973: 40).

Low wages, dangerous working conditions and repeated rises and falls in the lumber market made life difficult for industrial workers, some of whom likely lived in the squatters' shacks in the project area. All of Snohomish County became strongly unionized in the early twentieth century, and industry leaders like Clough used whatever tactics necessary to keep profits high and stem the influence of organized labor. A shingleweavers' strike in 1916 ultimately led to tragic clash between union members and the police that resulted in seven deaths and became known as the Everett Massacre (O'Donnell 1993: 38-40).

American participation in World War I soon caused significant changes along the waterfront. The government's need for vessels as part of the defense effort led private investors to construct a shipyard on Port Gardner Bay between the base of Everett Avenue and 25th Street south of the Everett Flour Mill site in the project area. The Norway-Pacific Construction and Dry Dock Company, with modern facilities to build steel ships, was completed in the fall of 1918. Despite some contracts in hand, the company's timing was extremely poor. The signing of the Armistice in November of 1918 caused demand for ships to collapse and the company soon faced bankruptcy. By 1925 the plant was dismantled and the shipyard's main building was torn down (Whitfield 1926:I-404; Polk 1919:742).

A more successful wartime measure was the establishment of the Port of Everett. The business community saw a port district as the means to encourage new commercial and industrial enterprises along the waterfront. In a special election held in July of 1918 the public overwhelmingly agreed. During the boom years of the 1920s annual shipping tonnage climbed sharply, and many new businesses located along the waterfront while some of the established ones expanded or became more diversified. Near the end of this huge growth period, the land south of the Clark-Nickerson mill, including the property on which the Everett Flour Mill and the Norway Pacific shipyard had once stood, was sold to a new enterprise called the Puget Sound Pulp and Timber Company (Whitfield 1926:I-404).

Puget Sound Pulp and Timber Company

Much of the following discussion on Puget Sound Pulp and Timber Company and its successor companies was developed as part of the Level II Documentation for the Kimberly-Clark Mill Site Main Office Building (Boswell and Sharley 2012). The Puget Sound Pulp and Timber Company was incorporated in 1929 and had an initial valuation of $12 million, all privately financed by investors who planned to build a large state-of-the-art pulp plant in Everett. Its principals were from the Pacific Coast and had been active in various areas of the forest products industry for several decades. The president,

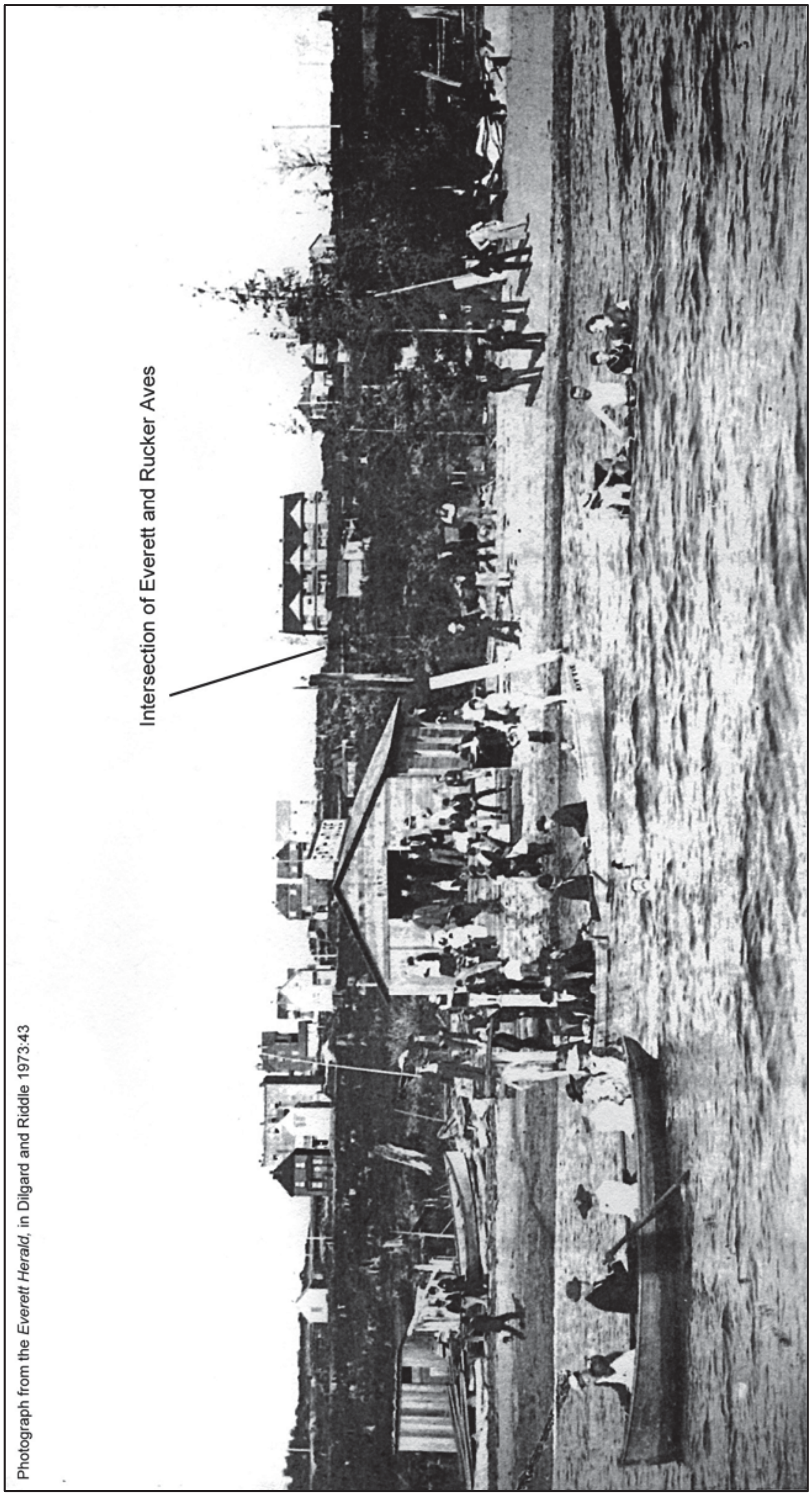

Figure 13. The bathing beach at the south end of the project area, near the base of Everett Ave., 1905. The bath house depicted is likely the one shown in block 618 on the 1902 Sanborn Fire Insurance Map (see Appendix C, Map 1).

Ossian Anderson, had previously served as the head of the San Juan Pulp Manufacturing Company of Bellingham and Fidalgo Pulp Manufacturing Company in Anacortes, and both of these companies were merged into the new corporation. Directors came from Northwest business, banking and industry, including U.M. Dickey, president of Consolidated Dairy Products, and H.M. Robbins, who was head of the Clark-Nickerson Lumber Company (*Pacific Pulp and Paper Industry* 3 (5), April 1920:35-36; (3(7), June 1929:32).

The property chosen for the Puget Sound Pulp and Timber Company mill was a 32-acre parcel on the Everett waterfront adjacent to the Clark-Nickerson Lumber Company operations, sometimes referred to as “the old shipyard site.”’

Puget Sound Pulp and Timber chose Hardy S. Ferguson, a renowned consulting engineer on pulp and paper mill projects, to design and oversee construction of the mill. Ferguson wanted to incorporate all of the latest engineering practices into the facility and based some of his design and machinery choices on successful Swedish mills. Ferguson came to Everett in August of 1929 to initiate the construction phase of the project. There he finalized plans with his personal representative J. H. McCarthy, who would serve as resident engineer (*Pacific Pulp and Paper Industry* 3(5), Apr. 1929:36; 3(12) Nov. 1929:36; 3(10) Sept. 1929).

Bids were quickly solicited and awards made on major construction contracts. Albertson, Cornell Brothers of Tacoma were named the general contractors for the project with Isaacson Ironworks of Seattle supplying the structural steel. One of the first major tasks was to dredge a 30-foot channel in front of the mill site on Port Gardner Bay and develop moorage for ocean-going vessels. Puget Sound Bridge and Dredging Company and its subcontractors began this work as soon as contracts were let in late August of 1929. Original specifications called for a 610’ by 88’ dock as well as a bulkhead and stone riprap along the shoreline. American Pile Driving Company of Everett drove several thousand piles for the wharf after the dredging company had moved its spoils to fill low-lying areas of the site (*Pacific Pulp and Paper Industry* 3(10) Sept. 1929, 3(11), Oct. 1929:42; *Pacific Builder and Engineer*, Aug. 31, 1929: 5; Sept. 14, 1929:6; *Everett Herald*, Sept. 4, 1929).

Very quickly after dredging and pile driving for the new wharf began, plant construction got underway at the pulp mill site. The first building to break ground was the company office, which would become the center for all business operations. Puget Sound Pulp and Timber Company executives and mill supervisors were housed temporarily in offices in downtown Everett until the building was completed. The company hoped to move into its new quarters on the south end of the mill site by December, so construction moved quickly with footings in place and foundation poured by early October of 1929 (*Everett Daily News*, Oct. 27, 1929:6; *Pacific Pulp and Paper Industry* 3(10) Oct. 1929:42; 4(1) Jan. 1930:62).

Several unusual features of the overall mill plan set the Puget Sound Pulp and Timber Company’s new facility apart and also addressed the goals of promoting efficiency and full utilization of timber while limiting waste. One of these innovations was to incorporate a large sawmill within the pulp processing layout. This mill would be used to break down logs into cants of uniform sizes, which would then be fed by uniquely designed conveyors into a corresponding series of chippers to make wood chips for the pulp. Some of these chippers were among the largest ever installed on the West Coast and could accommodate squares that were up to 20 inches in diameter. Mill supervisors could control the quality of the material used in the process and an elaborate washing system would further ensure that the logs would be as clean and defect-free as possible. Puget Sound Pulp and Timber also had its own timber holdings and planned to provide a steady supply of logs in 40 foot lengths of diameters ranging from 12 to 40 inches (*Pacific Pulp and Paper Industry* 3(13) Dec. 1929: 35).

Other notable innovations included straight and noticeably wider digester pipes that made it easier to dump the digester into the blowpits and handle the stock more gently. In addition, larger wooden blend tanks could hold several batches of pulp as they moved between the digester and drying room, eliminating any slight differences among batches. Scandinavian fourdrinier drying machines purchased for the mill dried the pulp in much thinner sheets than American-made machines and were the most modern available in Europe and completely new on the West Coast (*Pacific Pulp and Paper Industry* 5(4) Mar. 1931:47-48).

The mill was essentially designed in a "U" shape so that material could be moved efficiently through the manufacturing process. From the sawmill and cut-up plant where the logs were first processed, the cants moved up two steel-belt conveyors to the chipping plant and chip screen room, which were housed in an adjoining steel and brick building. Once processed, refined chips were then sent on long rubber conveyor belts to storage hoppers over the digesters, while sawdust was diverted to the hogged fuel conveyor from the sawmill. An acid plant with a standard two-tower system received the necessary chemicals, including sulphur, limestone and lime, which were first sent to storage facilities by an overhead tram from the dock.

The digester building contained five digesters, each with 18-ton yield capacity. These units had the ability to cook the chips in three different ways and were outfitted with specially placed pipes to permit easier drainage of the cooking liquor. The cooked stock was then washed and separated before being combined in a large blending tank to ensure pulp uniformity. An extensive screening process followed before the brown stock was sent through a two-stage bleaching process. A separate building housed the bleach liquor plant, which chlorinated lime paste and stored the bleaching liquid until it was sent through rubber pipes to the bleach room. The material was then moved into a large machine room which housed two dryers. These machines were able to dry 100 tons of pulp per day, forming pulp sheets and using pressure rollers to keep the sheets in contact with the drying cylinders. Storage warehouses and a separate laboratory for quality control and monitoring of all the chemical processes completed the main components of the mill (*Pacific Pulp and Paper Industry* 4(8), July 1930: 25-26; 4(10), Sept. 1930: 47, 49-54).

Among the other early work begun at the site was excavation for the blowpits and sulphur storage and driving of the piles for the digester building. Footings for the stores and repair building were also begun in early October and foundation work for acid storage tanks as well as the plant and tower. In order to get supplies to the mill site as quickly as possible during construction, the company negotiated with the Great Northern Railroad to build a 1500-foot line into the property. Once the spur was in place, needed materials were sidetracked and readily available for contractors' use. Later the railroad constructed additional spurs within the complex, including one directly from the Great Northern main line to the dock for easy movement of the pulp to market by both transcontinental and overseas shipping (*Pacific Pulp and Paper Industry* 3(10) Oct. 1929:42; 4(7) June 1930: 33; *Everett Herald*, Sept. 27, 1929:1; *Everett Daily News*, Oct. 27, 1929:6).

Local newspapers and industry journals regularly described the progress of the huge project, which employed at least 200 men as the construction process gained momentum. Good fall weather helped to keep the work on schedule, if not ahead of the original predictions for a late summer start-up date. Once steel was unloaded at the site, contractors began raising the steel superstructures for some of the plant's main buildings in November of 1929. By January 1930 some of the plant machinery had also

begun to arrive. The first ocean-going vessel to use the company's new wharf, the 4211-ton *S.S. Lena Luckenbach*, docked in early March, unloading more than 300 tons of cast-iron pipe for construction use. The machine room was among the final segments of the mill to be finished, with the fourdrinier drying machines from Sweden arriving at the dock near the end of May. By the beginning of June, mill construction was nearing completion (*Everett Daily News*, Oct, 25, 1929:8; *Pacific Pulp and Paper Industry* 4(1) Jan. 1930:62; 4(3) Mar. 1930:48; 4(7) June 1930:33).

Testing began on various sections of the new mill to make sure the equipment was in running order. The sawmill was the first to operate with its initial batch of logs broken down into cants on June 12, 1930 (Figure 14). The acid system and the digesters were started up a few days later, and the pulp mill followed, with finished pulp running through the drying machines. The first operation as a complete unit took place on July 1st, coinciding with the delivery of the first water from the City of Everett's new Sultan River pipeline (*Pacific Pulp and Paper Industry* 4(8) July 1930:25).

As the economic depression worsened in 1931, industry publications reported that Ossian Anderson had made several trips to the East Coast and California, contacting buyers and later "negotiating matters of far-reaching consequences" (*Pacific Pulp and Paper Industry* 5(12) Nov. 1931:14). The Anacortes mill halted production again for a number of months in early 1932 and it was followed by the closure of the Everett facility on June 1st. When production in Everett resumed on July 20, 1932, management announced that it would "conduct its operations on a curtailed basis commensurate with the requirements of the market and the mill's trade" (*Pacific Pulp and Paper Industry* 6(9) Aug. 1932:13). Behind the scenes, however, negotiations were underway to solve the severe financial problems facing the company. According to summaries of court documents and other sources, Puget Sound Pulp and Timber had originally mortgaged its holdings for $4.5 million, and the financial firm of Pierce, Fair and Company had raised the funds by selling shares in a syndicate at $1000 each. The company had been able to meet its obligations until August of 1931, when it paid only half of the bond interest with the rest in the form of a note. By June 1932 the syndicate had received no further interest payments and so a partitioning agreement was negotiated in which the Bellingham, Anacortes and Clear Lake properties were released from the mortgage, but the syndicate retained the Everett mill and the Hartford and Eastern Railroad as well as some timber lands in Snohomish County (*Pacific Pulp and Paper Industry* 8(2) Feb. 1934:6-7; Adams 1951:161).

Throughout this period the whole harbor area was undergoing changes. To improve opportunities for new businesses to locate in Everett during these difficult financial times, the Port of Everett began a project to fill part of the tidelands near the foot of 21st Street as part of an agreement with the pulp company. It was important to maintain deep-water access, so the Port developed what was called Tract O, which added protective fill west of Puget Sound Pulp and Timber land to within 300 feet of the south end of the jetty. This jetty, which had been built and then extended by the Corps of Engineers since the 1890s, stretched more than 2300 feet south of the Snohomish River mouth. Its purpose was to act in conjunction with dikes to prevent silting of the harbor while maintaining portions of the Snohomish River as a fresh-water port. These projects had never been entirely successful and repeated dredging was necessary. The fill added by the Port in the early 1930s created the East Waterway which was intended to remain free of silt deposition (Dilgard and Riddle 1973:49-51, 54).

Formation of the Soundview Pulp Company

The Soundview Pulp Company, formed on July 15, 1932, took title to the Puget Sound Pulp and Timber property and became the manager of the assets, although Ossian Anderson continued to operate the mill under a friendly lease arrangement of $1 per month. A proposal by Soundview directors to merge

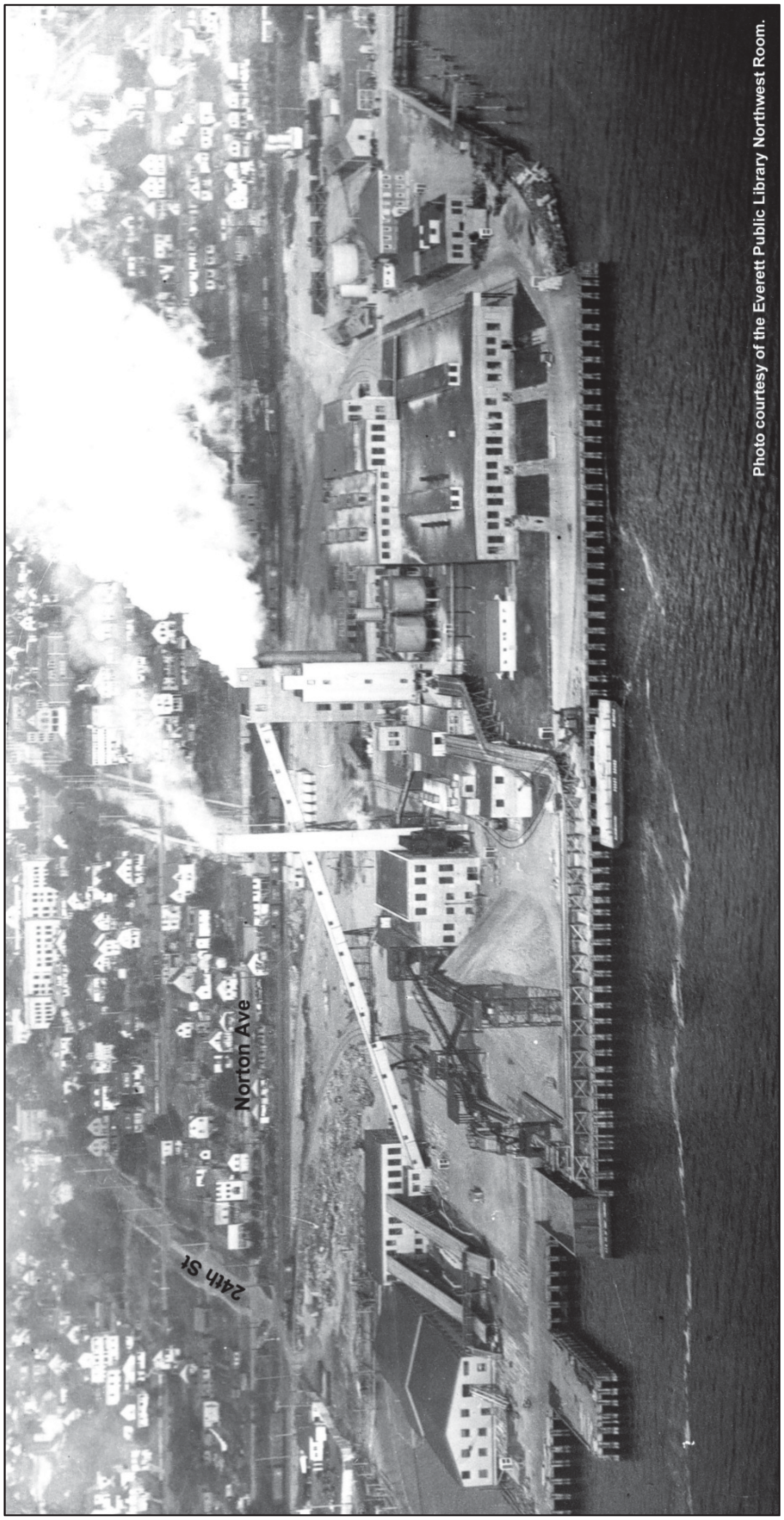

Figure 14. Puget Sound Pulp and Timber Company mill nearing completion in 1930.

with two other pulp and paper companies led to a legal battle with some of the minority shareholders, and the courts eventually voided the merger. Soundview then ended its lease with Puget Sound Pulp and Timber Company and on March 1, 1934, took over management of the Everett mill. G. J. Armbruster remained as the superintendent of the plant and Leo Burdon, who had lengthy experience in the industry, was named operating manager. U.M. Dickey, a Seattle businessman and vice president of the Board of Directors, became the general manager of the mill. Most of the rest of the officers and directors of Soundview were prominent San Francisco businessmen (*Pacific Pulp and Paper Industry* 8(3) Mar. 1934:24; Soundview Minute Book, Vol. 1, Washington State University (WSU) Manuscripts, Archives and Special Collections (MASC), Cage 251).

On the recommendations of Dickey, the company made a number of upgrades and additions to various parts of the mill. Among the changes were improvements to the acid tower, installation of a new sprinkler system in the dryer and warehouse buildings and the purchase of two automatic wood barkers for the sawmill to increase log utilization. Probably the most significant additions were two new bleaching units that would allow production of the highest quality bleached pulp and increase the overall capacity of the plant. As Dickey argued to the Board:

> The reputation of the mill has suffered under Puget Sound Pulp and Timber Co. administration by a combination of the absence of adequate bleaching facilities and an effort on the part of management to crowd the productive capacity of the mill. This adverse reputation is a serious obstacle to the sale of the mill's product and it is of great importance that a reputation for high quality product should be gained as well as that the mill should be mechanically equipped to produce pulp even up to the grade required for cellophane and rayon use (Soundview Minute Book, Vol. 1, May 14, 1934, WSU,MASC).

Throughout his tenure at Soundview, Dickey continued to urge the Board to make improvements to the mill and increase its productive capacity. The installation of acid heating and digester circulating systems as well as several additional digesters were among the initial projects that brought new technological innovations to the facility. In what later became one of his most important contributions, Dickey also encouraged the company to develop a timber acquisition plan that would ensure a steady log supply. (Soundview Minute Book, Vol. 1, Nov. 9, 1934; Dec. 26, 1934; Vol. IV, May 10, 1937, WSU,MASC; *Everett Daily Herald*, Feb. 8, 1954: 21, 27).

U.M. Dickey replaced Harry Fair as president of the Soundview Pulp Company after an election of the Board of Directors on August 6, 1936, and Fair became chairman of the Board. During that year the company also made a major new investment in the expansion of the mill's capacity. A complete new processing unit, which included an acid plant, boilers, digesters, and a bleach plant as well as dryers and other equipment, was added to the complex (Figure 15). The mill's output was boosted to nearly 600 tons of bleached sulphite wood pulp per day, and the new equipment also gave the mill the capability of producing some of the highest grades of specialty paper. The company financed the $2.1 million addition by the sale of nearly 21,000 new shares of capital stock as well as two $500,000 issues of debentures (Soundview Minute Book, Vol. III, Aug. 6, 1936; Adams 1951:162; *The Argus* 43, June 20, 1936:4).

Pulp industry prospects continued to improve as the United States moved closer to World War II. A local newspaper published Soundview's forecast that it would be able to pay off its $1 million debt for the new addition to the plant within two years. As soon as the United States entered the war, however, the plant was subject to the needs of the defense effort. The company agreed to invest $170,000 in the equipment to produce nitrate pulp for military use under the direction of the War Production Board. At the Board meeting in late October of 1942 Soundview directors were also notified that all of the

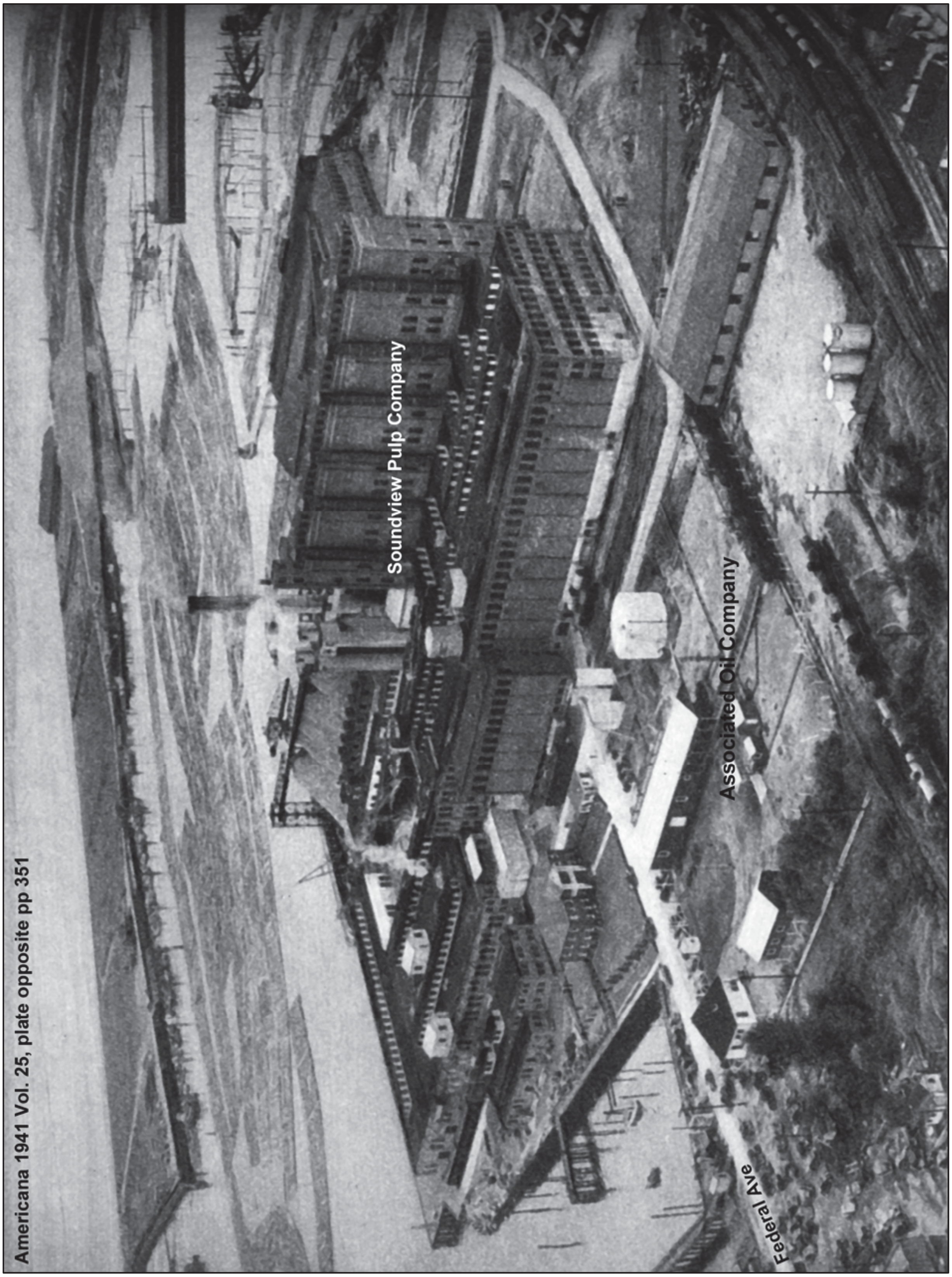

Figure 15. The Soundview Pulp Company, c. 1940

production of the mill after November 1 of that year would be allocated for war purposes (*Seattle Times*, Jan. 22, 1937; Soundview Minute Book, Vol, IV, July 29, 1942; Oct. 26, 1942).

As the war years came to an end, Soundview was in a sound financial position to continue its expansion of the mill. As timber conservation increasingly became a focus of the industry, the company once again added new equipment that applied the latest technology to these goals. In 1945 the company installed a new system for debarking pulp wood logs that made use of hydraulic pressure to save an additional 20 percent of the wood fiber when the bark was removed. The company was also one of the first in the industry to use the chemi-pulp or hot acid process as well as the SO2 recovery process in pulp production (*Everett Daily Herald*, Feb. 8, 1954:20).

Soundview Pulp Company was already the largest single sulphite pulp producing plant in the world when Scott Paper Company representatives came West to discuss a possible merger in the summer of 1951. Scott had been searching for a new location for a Pacific Coast mill, and Soundview's waterfront site and large timber holdings were attractive as was its strong cash position. The plan to exchange shares of common stock to carry out the merger received the approval of directors from both companies by November of 1951 (*Pulp and Paper* 25(13), Dec. 1951:40).

Scott's goal was to build a new paper plant at the Everett site and use the Soundview pulp facility and timber resources to establish an integrated paper manufacturing and distribution operation. Once the merger was complete, construction of the paper mill began adjacent to the pulp mill. By December of 1953, the first of the company's new high-speed paper machines had begun production and a second went on line a few months later. At the grand opening of the new facility in February of 1954, plans were already underway to construct another new section for two more of these high-speed units and related equipment for installation in 1955 (*Scott Broadcast*, 10(8) Nov. 1954:1).

Environmental concerns and changing industry practices characterized the more recent history of the Everett mill as pulp and paper production continued. New state and federal regulations on pollution control influenced continuing plant upgrades over the decades. In 1964 Scott completed a wastewater treatment facility at the Everett site. A decade later, the company converted the mill to an ammonia-based sulphite process and installed a recovery furnace (Figure 16). A secondary treatment facility for effluent was constructed in 1979. Other innovative programs included a joint project with the Snohomish County PUD to build a cogeneration plant to provide electrical power as well as steam for the company's tissue plant (Zwaller and Cross 2003:1).

After Scott merged with the Kimberly Clark Corporation in 1995, additional investments were made at the plant to put in place new technologies for better environmental protection as well as more efficient plant production (Figure 17). The company constructed a larger wastewater treatment system and added a new effluent outfall in cooperation with the cities of Everett and Marysville. In 2000 Kimberly Clark converted the pulp-making operation to a chlorine dioxide system, which produces less dioxin than the older chlorine process. To meet new company goals, Kimberly-Clark attempted to sell the mill. When negotiations failed, all mill operations ended in April 2012 and the last of the Everett waterfront mills shut down permanently (Benbow and Batdorf 2012:1).

Figure 16. The Scott Paper Company in 1977.

Figure 17. The Kimberly-Clark Mill in 2006.

PREVIOUS INVESTIGATIONS

Fifteen cultural resources investigations have been completed within 1 mile of the project, including general overviews, field surveys and project-related assessments (Table 1). Early cultural resources investigations were usually regional, large-scale surveys, summaries, and inventories of known resources for agencies like the National Park Service, the United States Army Corps of Engineers (USACE), and the Office of Archaeology and Historic Preservation (now Department of Archaeology and Historic Preservation [DAHP]) (Blukis Onat 1987; Dunnell and Fuller 1975; Miss and Campbell 1991). Archaeological investigations became more targeted and project related later in time.

Table 1. Previous Cultural Resource Investigations Within Approximately One Mile of the Project Area.

AUTHOR	DATE	PROJECT	[redacted]	RESULTS*
Dunnell and Fuller	1975	An Archaeological Survey of Everett Harbor and the Lower Snohomish Estuary-Delta	[redacted]	None
Blukis Onat	1987	Resource Protection Planning Process Identification of Prehistoric Archaeological Resources in the Northern Puget Sound Study-Unit	[redacted]	Overview
Evans-Hamilton	1988	The Location, Identification and Evaluation of Potential Submerged Cultural Resources In Three Puget Sound Dredged Material Disposal Sites	[redacted]	None
Robinson	1990	A Cultural Resources Survey of SR 5: Everett Park and Ride Preliminary Site #8, Snohomish County, Washington	[redacted]	None
Miss and Campbell	1991	Prehistoric Cultural Resources of Snohomish County, Washington	[redacted]	None
Demuth	1998	Technical Report: Historic, Cultural, and Archaeological Resources Assessment for Everett-to-Seattle Commuter Rail Project Environmental Impact Statement	[redacted]	Historic buildings
Johnson	2000	Letter Report: Proposed California Street Overpass, Everett, Washington	[redacted]	None
Barnard and Gordon	2005	Sunken Vessels and Aircraft Containing Hazardous Materials in Puget Sound	[redacted]	One sunken vessel
Johnson Partnership	2005	Appendix I: Cultural and Historic Resource Analysis 12th Street Marina & North Marina Redevelopment 3333Project Port of Everett	[redacted]	Historic buildings
Juell	2006	Archaeological Site Assessment of Sound Transit's Sounder: Everett-to-Seattle Commuter Rail System, King and Snohomish Counties, Washington	[redacted]	None
Hartmann	2008	Technical Report: Cultural Resources Assessment for the Swift Bus Rapid Transit Project, Snohomish County, Washington	[redacted]	None
Baker and Allen	2010	Cultural Resource Inventory for the Community Health Centers of Snohomish County – Replacement of the Broadway Clinic Building Project, Everett, Snohomish County, Washington	[redacted]	None
Lenz et al.	2011	Cultural Resource Assessment for the Broadway Bridge Replacement Project, Everett, Washington	[redacted]	Historic bridge and two buildings
McDaniel	2011	Cultural Resources Inventory Report, Everett Shipyard Cleanup Project, 1016 14th Street, Everett, Washington	[redacted]	None
Boswell and Sharley	2012	Level II Documentation of the Kimberly-Clark Mill Site Main Office Building	[redacted]	Historic building

*Newly recorded cultural material identified within one mile of project area.

By the 1990s, archaeological investigations were more commonly associated with transportation-related projects. For example, cultural resources investigations were completed for the Washington State Department of Transportation's (WSDOT) Everett Park and Ride and California Street Overpass projects, as well as for the Swift Bus Rapid Transit project that WSDOT accomplished in partnership with Snohomish County (Hartman 2008, Johnson 2000, Robinson 1990). Cultural resources investigations

related to transportation projects were also undertaken for Sound Transit's Everett to Seattle Commuter Rail line and the City of Everett's Broadway Bridge replacement over the Burlington Northern Santa Fe (BNSF) Railroad (Demuth 1998; Juell 2006; Lenz et al. 2011).

Two previous cultural resources investigations were completed for the Port of Everett, including one for the 12th Street Marina and North Marina redevelopment project and one for the cleanup of the Everett Shipyard [redacted] (Johnson Partnership 2005; McDaniel 2011). One historic bridge and historic buildings were identified in the project vicinity by Demuth (1998), the Johnson Partnership (2005), and Lenz et al. (2011). Two other previous investigations highlight cultural resources submerged in the port, including one for dredging by the USACE and one related to cleanup of spills associated with sunken vessels by the Environmental Protection Agency (EPA) (Barnard and Gordon 2005; Evans Hamilton 1988). Barnard and Gordon (2005) identified a sunken vessel called the *Al-ind-esk-a-sea* in Port Gardner at 222 feet below sea level [redacted]. Cleanup in the project vicinity also sponsored Level III documentation of the K-C WW upland area mill main office building before it was demolished as part of this project (Boswell and Sharley 2012). Just one assessment not associated with transportation was recently completed for the Community Health Centers of Snohomish County for replacement of a clinic in Everett (Baker and Allen 2010).

Two cultural resources have been recorded within 1 mile of the project (Table 2). One of these resources is a pre-contact lithic isolate and the other is an historic church. Site 45SN88 is a bipointed CCS knife (10 by 4.5 centimeters wide and 12 millimeters thick) identified during private home construction [redacted] (Mattson 1980). The isolate's setting was further described in 1991 when a new site form was filled out, but the artifact was not illustrated and no new data was presented (Stenholm 1991). The forms state that any other cultural materials that may have once associated with the knife have since been destroyed. Site 45SN555 is the Trinity Episcopal Church cemetery (columbariam), located adjacent to the Trinity Church Sanctuary originally constructed ca. 1920 (DAHP 2013). The church still stands [redacted]. There are no previously recorded sites within the project boundary.

Table 2. Previously Recorded Sites Within Approximately One Mile of the Project Area.

SITE NO.	COMPILER/DATE	AGE	DESCRIPTION	[redacted]
45SN88	Mattson 1980; Stenholm 1991	Pre-contact	Connerman Site (Lithic isolate)	[redacted]
45SN555	DAHP 2013	Historic	Trinity Episcopal Church Columbariam	[redacted]

This assessment is focused on archaeological resources and does not address historic buildings in the K-C WW upland vicinity. Nine surveys of historic buildings have already been completed within 1 mile of the APE and historic buildings have been documented as a result. These surveys are not included in Table 1. One contingency of the SEPA determination of no significant adverse project impacts was that demolition of the Puget Sound Pulp and Timber Main Office Building could not occur until adequate evaluation, documentation and recordation of the building was complete, which was fulfilled in 2012 (Boswell and Sharley 2012; Kimberly-Clark Worldwide, Inc. 2012). The results of previously completed cultural resources investigations provide expectations for cultural resources in the project vicinity.

EXPECTATIONS

Although the K-C WW upland area has been altered by filling, diking, pile driving, wharf building, and more recent shoreline development, it is still sensitive for significant buried cultural resources. Background research summarized above indicates that the vicinity was used intensively by Native Americans prior to Euroamerican settlement. [redacted] otential also exists for encountering other types of fishing and resource procurement camps or features along the historical shoreline. Archaeological remains along the Port Gardner shoreline may include evidence of village and camp sites; fishing, hunting, and shellfish collection and processing sites; and locations of other traditional activities (Table 3).

Table 3. Native American Site Types and Activities that May Be Represented in the Project Area.

SITE TYPE/ ACTIVITY	ARCHAEOLOGICAL EVIDENCE	ASSOCIATED LANDFORM
Village	Archaeological remains would consist of midden containing discarded shell and bone, scatters and concentrations of fire-modified rock, as well as a variety of stone, bone, or wooden tools and debris from stone tool making. The remains of buildings, poles, and other structures may be present and organic materials, such as mats and basketry, could be preserved in buried wet sites.	Beach, Backshore, or Upland
Seasonal Campsite	Archaeological remains of campsites may consist of middens containing discarded shell and bone, scatters or concentrations of fire-modified rock, and stone, bone, or wooden tools. Debris from stone tool making may be present and it is possible the remains of shelter poles, mats, and planks may be preserved. Less diversity of faunal, lithic, and feature remains	Beach, Backshore, or Upland
Sweat lodge	Archaeological evidence of such a structure would consist of a concentration or scatter of fire-modified rock and, perhaps, structural remains.	Beach, Backshore, or Upland
Cemeteries	Archaeological evidence of a burial would be human bones that may be associated with grave goods or other artifacts.	Beach, Backshore, or Upland
Cooking	Archaeological evidence of cooking activities would be dominated by fire-modified rock (FMR), with larger concentrations of FMR representing oven features. Pit features may contain identifiable charred food remains.	Beach, Foreshore, Backshore, or Upland
Weir Fishing	Archaeological remains of weir fishing in the project area would be difficult to identify. If present, fish weirs would consist of a series of aligned posts or stakes that have been pointed on one end with woody fibers, twigs, or other material woven horizontally between. The weirs are most likely to be along the shoreline where tidal channels or streams emptied into Port Gardner.	Foreshore or Marsh
Line or net fishing	Archaeological evidence for the continued use of a fishing area could result in accumulation of anchor stones or weights. Isolated artifacts, such as hooks, could also be present, but would be difficult to identify.	Foreshore or Marsh
Shellfish collection and processing	Shell middens are a widespread type of archaeological site. In addition to marking past locations of village and camp sites, middens form in shellfish processing areas. Middens at residential sites usually contain a mix of bone, lithic debitage, FMR, and tools. Midden made from refuse at a shellfish processing site is dominated by shell.	Foreshore or Beach
Sea-mammal Hunting	Little archaeological evidence of these resource procurement activities would be left at the hunting site; however, butchered bone may be in nearby camps or villages. Pointed stakes may remain below low water levels today.	Foreshore, Marsh, or Delta
Duck hunting	Archaeological evidence of duck nets would consist of the remains of paired posts. Duck or geese bones may be present in village or camp middens and projectile points or other hunting equipment could be identified. Little archaeological evidence of duck hunting activities would be left at the hunting site.	Beach, Foreshore, Backshore, or Upland
Land Mammal hunting	Isolated projectile points could be found alone or with butchered bone near a kill site. Projectile points may also be in a village or camp and would provide evidence of game hunting activities.	Upland, Beach, or Backshore

Table 3. Native American Site Types and Activities that May Be Represented in the Project Area.

SITE TYPE/ ACTIVITY	ARCHAEOLOGICAL EVIDENCE	ASSOCIATED LANDFORM
Wood & Fiber Collection	Archeological evidence of plant collection activities includes, bark peeled cedar trees, cedar trees with plank removals or bark stripping, structural remains, expedient lithic flake and cobble implements, fire-modified rock from cooking, processing , or fabrication fires and preserved mats, basketry, or other fiber or wood products.	Upland, Beach, Foreshore, Backshore, or Marsh
Toolstone collection and tool manufacture	Processes of stone tool fabrication using chipping and grinding would leave discarded stone debitage behind as part of the archaeological record. Broken Discarded or misplaced tools could be identified in camps, villages, or as isolated finds.	Upland, Beach, or Backshore
Petroglyphs	Archaeological evidence of a petroglyph would be a marking or pecking pattern carved onto or into a strategic rock face, boulder, or large cobble.	Beach, Foreshore, or Backshore

Recent studies have documented subsidence of the Snohomish delta and, depending on degree and location, sudden subsidence could have preserved pre-contact or ethnographic period archaeological sites by quickly burying them through bank sloughing or sedimentation. The portions of the project area that were once part of the backshore and beach landforms were particularly susceptible to burial by landslides and mass wasting from the uplands east of the project area. In fact, it appears a large landslide occurred at the north end of the project area in the past based on the slumped bluff profile and inclined vegetation. The intertidal zone is predominantly vulnerable to liquefaction and subsidence related to tectonic activity, which would result in disturbance and burial by sedimentation. Sub-tidal portions of the project area would also be prone to subsidence and sedimentation, but probably do not harbor archaeological resources. Delta and shoreline environments provide excellent potential for preservation of archaeological sites where wave action is subdued (Lewarch et al. 1996; Stanley and Warne 1997; Waters 1992).

Deltas are composed of bottomset, foreset, and topset beds and only the sub-aerial topset beds of a delta would be stable enough to occupy or preserve evidence of pre-contact human occupation. Most of the project area was at least partially inundated as a marsh on the delta front prior to historic development. Pre-contact archaeological deposits in the project area would most likely be related to hunting, fishing, or other marsh-type resource procurement and sites, if present, would be buried under fine-grained intertidal alluvium that historically accumulated on top. Pre-contact archaeological materials or ethnographic deposits in this setting would probably exhibit signs of tidal reworking or rapid burial as a result of alluvial processes on the delta front or subsidence. More substantial pre-contact and ethnographic period archaeological sites associated with cooking, camping, and habitation would probably be on elevated landforms, if present, near the former shoreline along the east margin of the property where a beach was once present.

The project area is also very sensitive for historical archaeological resources. Although a number of Euroamerican explorers and traders visited Port Gardner between the 1820s and 1850s, the permanent Euroamerican presence along Port Gardner's southeast shoreline dates to the early 1860s. Archaeological evidence of Euroamerican visitors may be found in archaeological sites in the vicinity and would consist of artifacts like glass beads, metal tools and pots, guns, buttons and other new materials and technologies. Historical cultural materials dating after 1862 are more clearly attributed to Euroamericans and could include architectural, industrial, domestic and other assemblages (Table 4). Cultural materials associated with nineteenth-century homesteading, mills and railroads, early industry, and residential occupation may be in the project area. Euroamerican entrepreneurs significantly altered

Table 4. Historical Site Types and Activities that May Be Represented in the Project Area.

SITE TYPES / ACTIVITIES	ARCHAEOLOGICAL EVIDENCE	ASSOCIATED LANDFORM
Early Homestead	Archaeological evidence of early historic homesteading could be in the form of agricultural ditches, levees, old roads and foundations, structures in ruin, debris concentrations, or artifact scatters. Highest potential for encountering these would be at the south end of the property near the foot of Everett Avenue, closest to Brigham's cabin.	Upland, Beach, Backshore, or Marsh
Great Northern Railroad	Archaeological evidence of the Railroad in the project vicinity might consist of wooden trestle, ties, metal spikes, pilings, a particular kind of fill under the trestles, metal hardware, ruins of support structures, and mass deposits of industrial debris along the tracks, such as piles of slag, coal, cinders, and other debris. These materials are expected to be more common along the east edge of the project area.	Upland, Beach, Marsh, Backshore, or Foreshore
Everett Flour Mill	Pilings of wood and concrete, horizontal decking, discarded machinery, demolition debris, industrial artifacts, abandoned utilities, and railroad remains are all forms of archaeological evidence related to the Everett Flour Mill that may be in the project area. These materials may be buried below fill and debris associated with the Puget Sound Pulp and Timber Company.	Upland, Beach, Marsh, Backshore, or Foreshore
Clark-Nickerson Lumber Co. Mill	Pilings, bulkheads, horizontal decking, discarded machinery, demolition debris, industrial artifacts, abandoned utilities, and railroad remains may be buried below mill deposits associated with the Puget Sound Pulp and Timber Company.	Upland, Beach, Marsh, Foreshore, or Sub-tidal delta
Puget Sound Pulp and Timber Company	Pilings, bulkheads, horizontal decking, discarded machinery, demolition debris, industrial artifacts, abandoned utilities, and railroad remains, building foundations and evidence for past structures where piers were historically present below fill laid down by the Soundview Pulp Company or disturbed by excavations for new utilities and construction by later mill owners.	Upland, Beach, Marsh, Backshore, Foreshore, or Sub-tidal delta
Soundview Pulp Company	Pilings, horizontal decking, structural foundations, discarded machinery, demolition debris, industrial artifacts, abandoned utilities, and railroad remains.	Upland, Beach, Marsh, Backshore, Foreshore, or Sub-tidal delta
Scott Paper Company	Pilings, horizontal decking, structural foundations, discarded machinery, demolition debris, industrial artifacts, abandoned utilities, and railroad remains related to the Scott Paper Company . It may be difficult to discriminate between cultural materials related to Soundview Pulp Company and Scott Paper Company.	Upland, Beach, Marsh, Backshore, Foreshore, or Sub-tidal delta
Log dumps and rafting areas	Modern maps of the project vicinity show pilings in the rafting areas marked on historic maps. Other archaeological features, such as rope, waterlogged rafts, pilings, horizontal decking, industrial artifacts, or logging tools like peaveys, cable, and chain could be present.	Marsh, Foreshore, or Sub-tidal delta
Debris concentrations	If the debris is industrial in origin it may contain tools, hardware, or byproducts. If the debris originates from a residential source it may contain broken home items, ceramics, empty bottles, or other evidence for residential and social activities. The concentrations or scatters of artifacts may be interbedded with layers of wood waste or fill.	Upland, Beach, Marsh, Backshore, or Foreshore
Temporary Dwellings	Remains of squatter shacks, structures or artifact scatters at the lower fill boundary in the vicinity of their shacks south of the mill. Deposits could contain information regarding lifestyles of employees belonging to identifiable ethnic or socioeconomic groups. Evidence for the ethnicity of squatter occupants may be in the form of structural architecture or imported items, such as ceramics, clothing, medicines, or food jars.	Upland, Beach, or Backshore

and filled the shoreline and old beach surfaces are certainly present below the fill. The fill itself might contain historical archaeological deposits or objects in the form of artifact dumps or scatters and possibly stable surfaces that could have been occupied between fill events. Maps of the project area show docks and wharves expanding at a great pace, especially between 1900 and 1910 and between 1929 and 1936.

Three deposits, or strata, were expected in the project area based on background research and review of the previously completed borings that will be discussed below. Fill would be below the dock structures and along the shoreline parallel with the upland. Delta sands and dredged sediment would be expected in the intertidal portions of the project area that are not covered with fill, where sediments are largely the product of modern delta progradation and active estuarine processes. The top 10 feet of fill is expected to be highly disturbed by repeated mill construction cycles and utility installation and upgrades. Deeper fill may be less disturbed and its stratification may reflect the historic context. Natural deposits are expected to be rare above 20 fbs, as the entire Snohomish River mouth is controlled and artificial. Holocene-age deposits below the fill are expected to grade from coarse to fine from northeast to southwest across the project area, as one moves from more proximal to distal along the delta shoreline.

METHODS

Research began with examination of records at the Department of Archaeology and Historic Preservation (DAHP) for previously recorded sites and reports of previous investigations in the project vicinity. Other background information was collected from ethnographic and historic accounts, regional cultural resource investigations, the collections of local historical societies, and from environmental reports and other sources. The holdings of the Everett Public Library, the Seattle Public Library, and the University of Washington Library and Special Collections were searched for information related to the Everett waterfront. General Land Office (GLO) and Bureau of Land Management (BLM) cadastral survey and land entry records were reviewed, and researchers completed a search of historical maps in Washington State University's on-line map collection and the online resources of the Great Northern/Northern Pacific Railway Historical Society, as well as at the University of Washington and Everett Public Libraries. Copies of numerous industry trade publications were also found at the University Washington Library as were microfilm of historic newspapers. Photographs in the University of Washington's and Everett Public Library's digital collections were also reviewed.

Geoarchaeological analysis was undertaken once historical and environmental research was complete. Previously completed geotechnical investigations provide a means of researching buried landforms and their histories within the project area. Geotechnical data was reviewed to determine depth of fill across the K-C WW upland area and to find out if sufficient evidence is available below the fill to characterize contrasting environmental settings that could have hosted early inhabitants. The logs of 154 previously completed borings were then reviewed and 69 of the most descriptive logs recounting the deepest deposits in the K-C WW upland are were selected to be entered into a Rockworks™ software database. A summary of the core data entered into the database is in Appendix B. The borelogs reviewed were provided by K-C WW, Inc. and compiled by Aspect Consulting for this project. The purpose of the geotechnical investigations was installation of groundwater sampling monitoring wells and understanding the extent of soil contamination. The boreholes were drilled using direct push or hollow stem auger methods by Cascade Drilling and using hand augering methods by Aspect. The results of geotechnical analysis will eventually be presented in a report, but a document summarizing the cores was not available for this assessment (Germiat 2013). Bores ranged from 1 to 31.5 fbs with an average depth of 14 feet below the surface (fbs). The average depth to the base of the limited selection of cores used for this geoarchaeological assessment is 17.7 fbs. The results of geoarchaeological analysis are in the following section. The borelog data was used to construct a 3-dimensional model of the fill topography and detailed cross-sections were also compiled to aid in the development of the sensitivity maps found at the end of this assessment.

All the background research allowed for formulation of the expectations for cultural resources in the project area, as described above. These combined data were then used to model the sensitivity for buried cultural resources in the project area, especially within the 11 areas slated for opportunistic cleanup. The sensitivity model uses a limited number of geomorphic variables to predict the risk of clean up or other actions intersecting Native American or historical archaeological sites. The geomorphic variables, such as beach or marsh that were defined from the results of geotechnical borings, are combined with ethnographic and historical information to be as complete a representation as possible. SWCA used ArcGIS Spatial Analyst, an extension of the ESRI ArcGIS software program designed to analyze spatial data and relationships, to build the archaeological sensitivity model. Spatial Analyst is particularly useful for suitability modeling, that is, combining a variety of data sets to identify the most suitable or likely places for a particular activity or occurrence. GIS layers are created from the data sets and the layers are stacked or overlaid. Although questions remain about precise locations of archaeological material in the project area, this assessment has characterized areas of risk within the K-C WW upland area in a way that allows planners to take areas assigned a moderate to high risk for buried cultural resources into account when designing cleanup procedures.

Models oversimplify complex systems and the results of modeling should be used with caution. Additional data that would greatly increase the accuracy and utility of this model includes bathymetry information dating to between 1902 and 1936 and data from archaeologically monitored borehole and other excavations. The following model only reflects sensitivity for cultural resources based on information collected from archaeological and geotechnical sources. Contemporary Native American use of the shoreline may include additional sensitive areas and other areas of traditional value that could be affected by cleanup activities may also exist in the project boundary.

GEOARCHAEOLOGICAL ANALYSIS

Existing borehole data from the K-C WW upland area was categorized by the project geoarchaeologists using a facies approach that organized the downhole lithology into vertical and lateral sequences. Three strata, Fill, Holocene, and Pleistocene were identified in the borings. Each sediment layer logged by Aspect is a unit with distinct observable physical properties, such as color, lithology, texture, and sedimentary structure, called a lithofacies and each stratum hosts a number of lithofacies (Miall 2000). Each lithofacies is the product of a depositional process and has a set of distinctive lithologic characteristics. Lithofacies analyses develop interpretations of past environments by characterizing the geometry of deposits and modes of sedimentation within a localized area, and are an important tool for reconstruction of the local landscape history (Eyles et al. 1985; Gilbertson 1995; Miall 2000; Reading 1978). Lithofacies analyses also offer a way to generate reasonable expectations regarding areas of potential archaeological sensitivity within a study area because grouping depositional sequences on the basis of facies types facilitates interpretation of landscape characteristics, assists in identification of site formation processes, determines the suitability of the physical substrate for habitation or as potential resource areas, and establishes a relative chronological sequence. A 3-dimensional model of the fill topography and detailed cross-sections were compiled to facilitate the following geoarchaeological discussion (Figures 18 through 23). Eleven lithofacies were identified in the Fill stratum and 17 lithofacies were identified in the Holocene stratum (Table 5). Individual facies were not named for Pleistocene deposits, which pre-date the arrival of humans to the region.

Fill

The 11 lithofacies identified in the fill are named for their dominant constituent and include layers of Asphalt, Brick, Concrete, Rubble, Peat, Gravel, Sand, Silt, Clay, Wood, and Voids (Table 5). Many of the fill layers are contaminated and give off a petroleum odor. The materials used to fill in the tideflats west

Figure 18. Map of previously completed borings used to model the sub-surface stratigraphy in the project area and cross-section transects in relation to opportunistic cleanup areas.

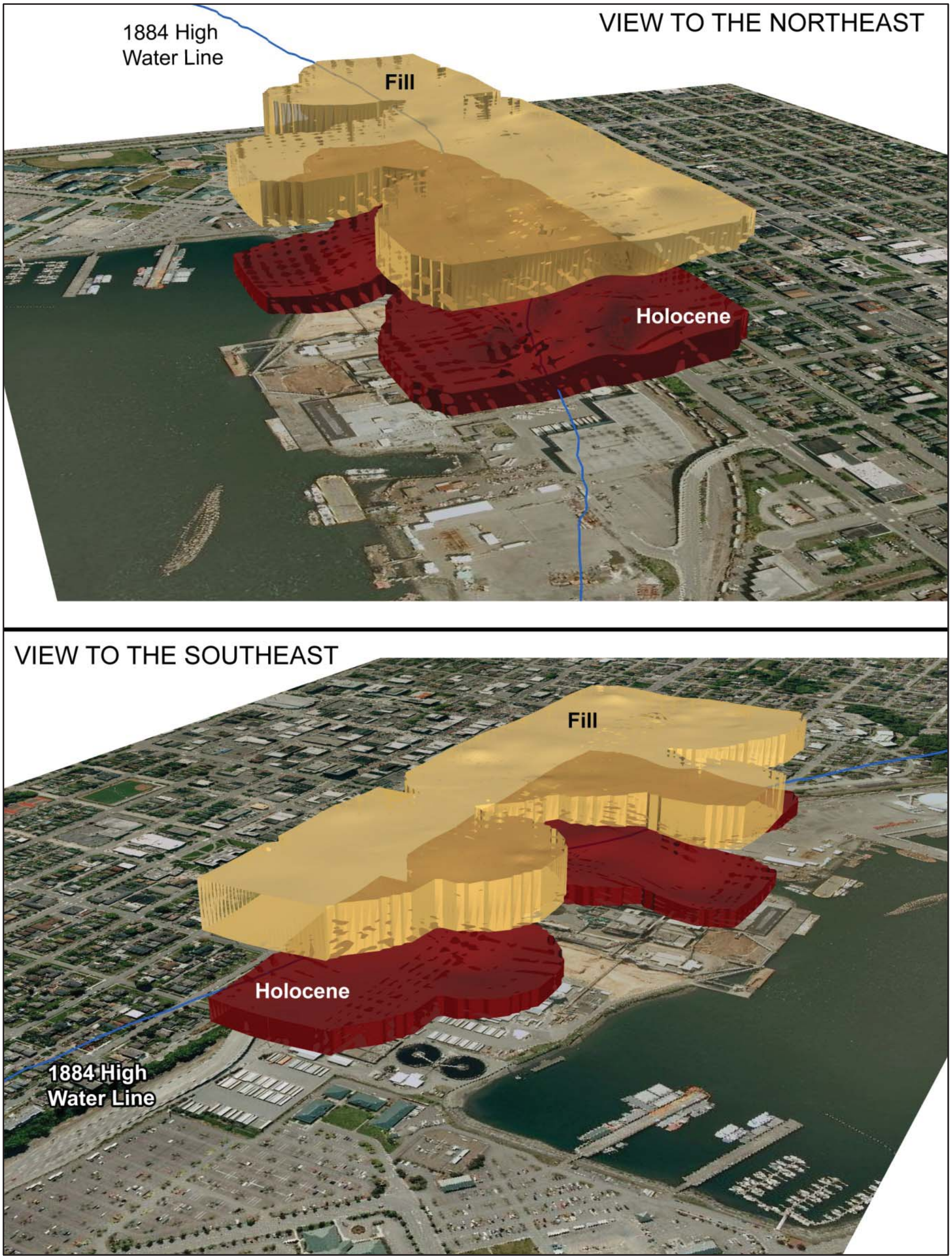

Figure 19. 3-D model of project area stratigraphy showing fill and Holocene deposits overlain by the streetscape.

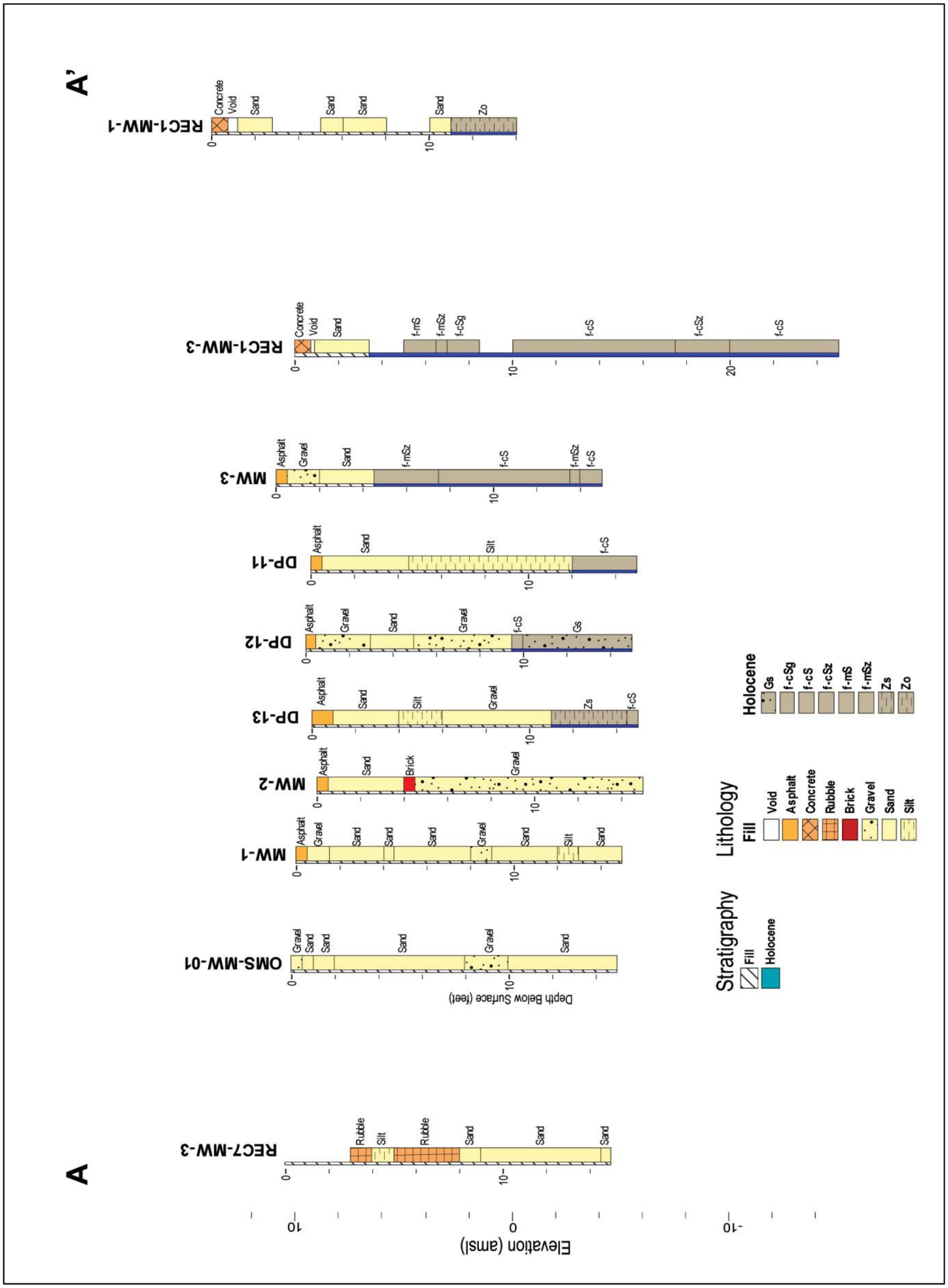

Figure 20. A-A' cross-section.

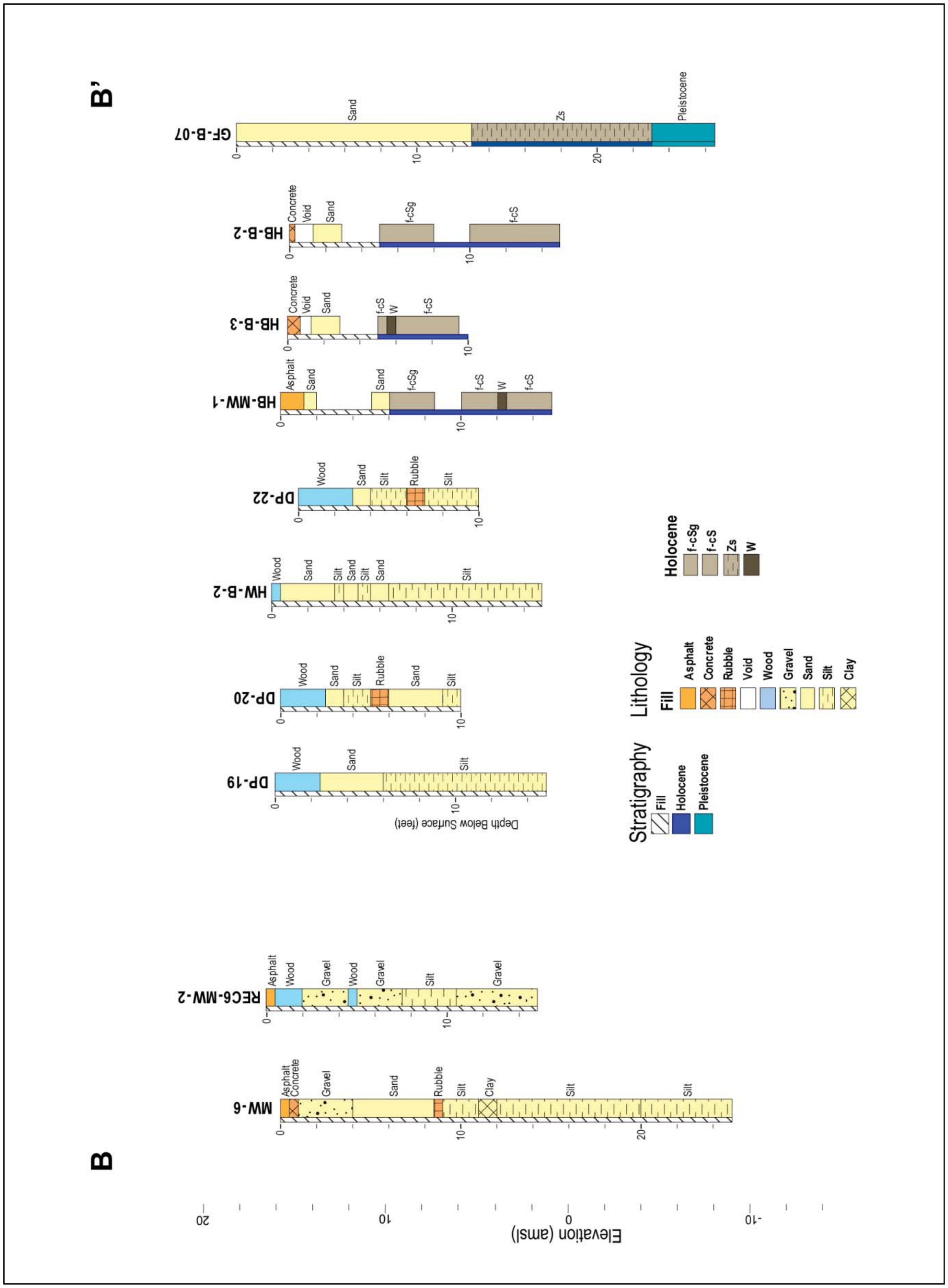

Figure 21. B-B’ cross-section.

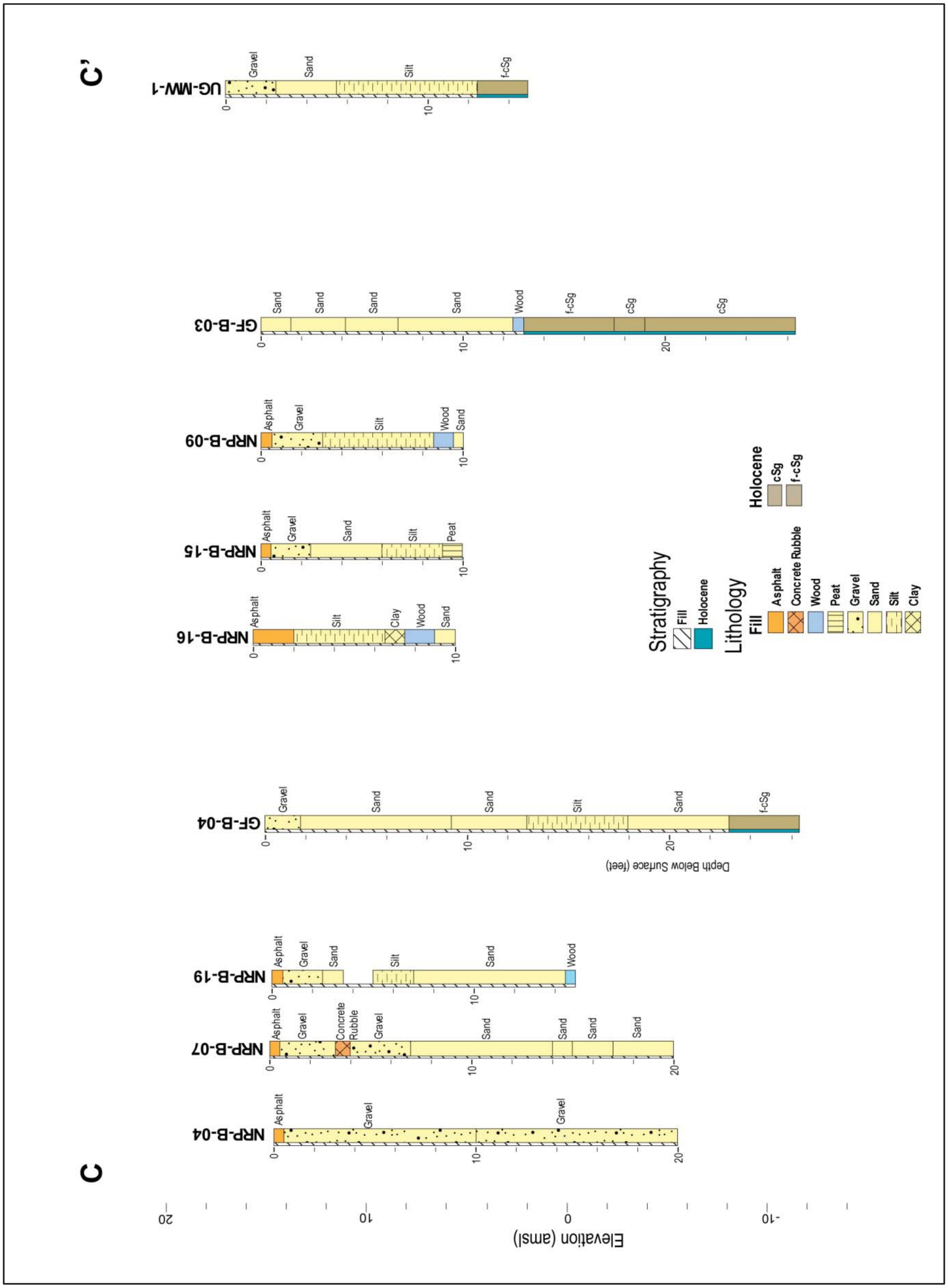

Figure 22. C-C' cross-section.

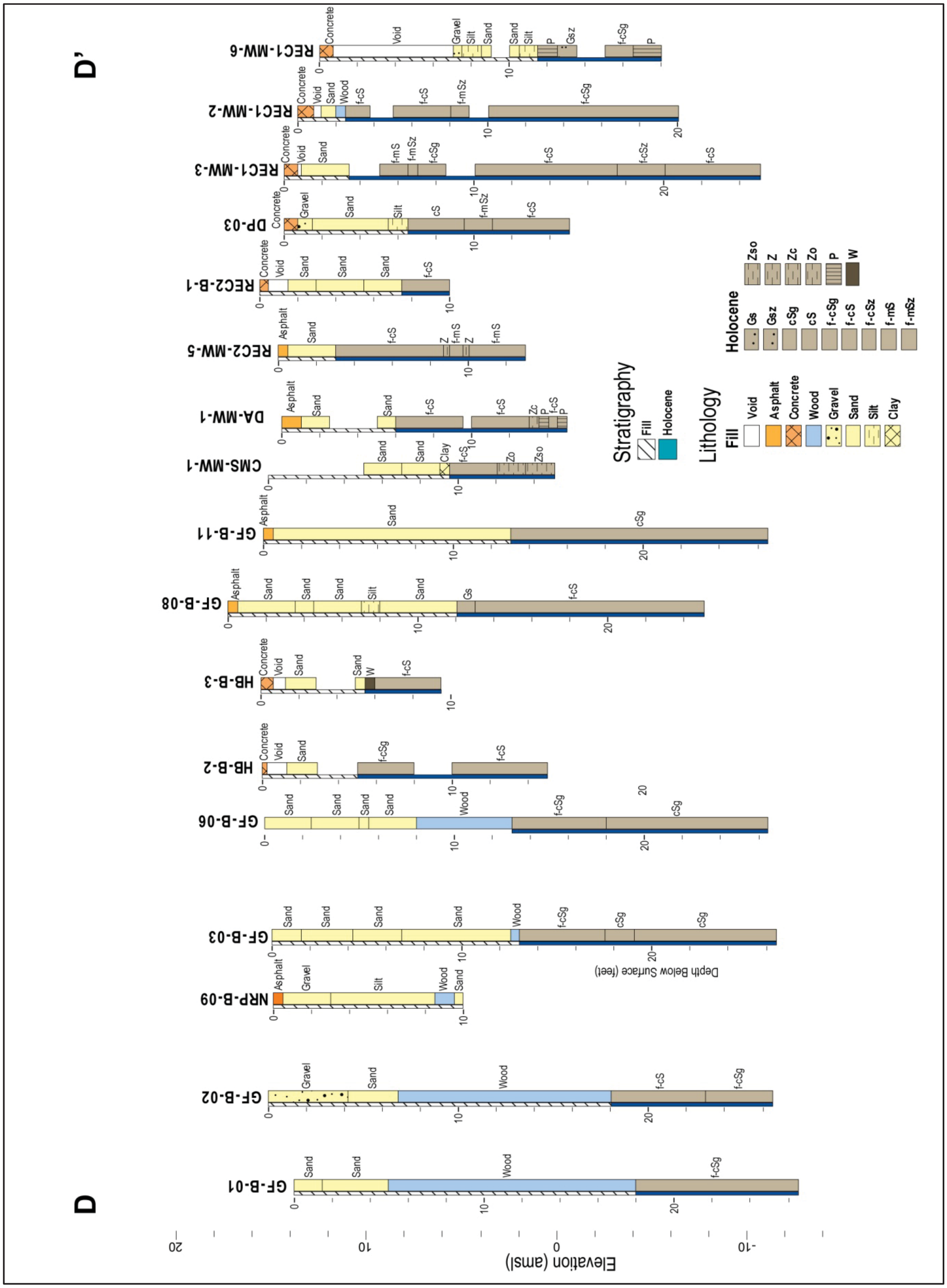

Figure 23. D-D' cross-section.

Table 5. Typical Descriptions of the Historical Fill and Holocene-aged Lithofacies Recorded in Borings in the K-C WW Upland Area With Inferred Depositional Environments and Shorthand Nomenclature.

FILL LITHOFACIES	TYPICAL DESCRIPTION	
Asphalt	Asphalt; mainly at the ground surface.	
Brick	Bricks in a matrix of sand and gravels with other wood debris and plastic.	
Concrete	Concrete; mainly at the ground surface.	
Rubble	Concrete rubble in a matrix of silty, gravelly, sand.	
Peat	Dark brown peat with a large component of sawdust.	
Gravel	Grayish brown, sandy or silty, angular to sub-rounded, small to very large pebbles, sometimes with scattered shell fragments and dispersed cultural debris; commonly described as crushed rock.	
Sand	Brown to dark gray, usually gravelly, sometimes silty, fine to very coarse sand with iron oxide mottles, organic and woody debris, and scattered shell fragments; gravels range from very few to common, very small to large pebbles when present; silt is commonly concentrated in thin beds within the sand units when present; scattered historical cultural debris; highly variable deposit.	
Silt	Varies from black to brown to bluish gray, sometimes gravelly and usually sandy, silt with scattered organic and woody debris; gravels are few to common, sub-rounded to angular, small to large pebbles when present; sometimes with a significant amount of wood waste; rarely clayey.	
Clay	Dark gray to grayish green, usually silty, clay.	
Wood	Wood chips, sawdust, and wood waste.	
Void	Structural void space.	
HOLOCENE LITHOFACIES	**TYPICAL DESCRIPTION**	**INFERRED DEPOSITIONAL ENVIRONMENT**
Gs	Dark brownish gray, sandy, sub-rounded, small to large pebbles.	Beach or Upland
Gsz	Gray, sandy, silty, small to very large pebbles with many organic debris.	
cSg	Gray, gravelly, coarse to very coarse sand with few to common, rounded, very small to large pebbles; sometimes with few woody debris.	
cS	Gray, coarse to very coarse sand with a few pebbles.	
f-cSg	Gray, occasionally silty, gravelly, fine to very coarse sand; gravels are few to common, small to large pebbles; sometimes with few wood chips or shell fragments.	
f-cSzg	Dark brown, gravelly, very silty, fine to medium sand.	
f-cS	Black to dark gray to brown, sometimes silty, gravelly, fine to very coarse sand with a few small to large pebbles; sometimes with organic or woody debris and scattered shell fragments.	Backshore, Foreshore, or Beach
f-cSz	Gray, silty, fine to coarse sand with very few, very small pebbles; silt component commonly in the form of thin interbeds with small organic debris.	
f-mS	Brown to dark gray, fine to medium sand sometimes with very few, small to very large pebbles and scattered shells; sometimes slightly silty.	
f-mSz	Dark gray to gray, silty, fine to medium sand; usually with organic debris and shells.	
Zs	Black to dark gray, sandy silt; sometimes laminated and organic-rich; sometimes with very few, small pebbles; sand is usually fine- to medium-sized.	
Zso	Dark brown, fine to coarse sandy, organic-rich silt.	
Z	Brown or gray silt	Marsh, Backshore, or Sub-tidal delta
Zo	Dark brown peaty silt to organic-rich silt with woody debris.	
W	Wood.	
P	Brown fibrous peat.	
Zc	Gray clayey silt.	

LITHOFACIES BASED ON MODAL GRAIN SIZE	SECONDARY PROPERTIES OF NATURAL DEPOSITS	MODIFIERS FOR SAND
G – Gravel	g – gravelly	c – coarse
S – Sand	s – sandy	m – medium
Z – Silt	z – silty	f - fine
W – Wood	c – clayey	
P – Peat	o – organic-rich	

of the historical shoreline are mainly composed of thick sand layers with pockets of gravel and silt. Gravels are more common above about 6 fbs and silt is more common below about 6 fbs, suggesting the early sources of fill were from offshore dredging activities and the fill source later changed. Wood debris related to mill waste is also a common component in the fill west of the historical shoreline, especially in the top 15 feet of fill north of borehole HB-B-2, in the form of wood chips and sawdust (see Figure 18).

Layers of wood and sawdust were also called out as individual deposits in the borelogs. Other cultural materials identified as discrete deposits in the fill include bricks and concrete rubble. Brick in borehole MW-2 at 4 fbs, drilled along the historical average low water level, may relate to mill structures built by the Soundview Pulp Company. Nearby borelogs noted nails, tile, ceramics, charred wood, and slag in the sand between 4.5 and 6 fbs as well. Rubble is commonly found between 5 and 9 fbs in cores drilled west of the historical shoreline on what would have been the tideflats, or foreshore landform, prior to the 1930s. This rubble is probably related to dumping off of the piers rather than *in situ* structural debris. Rubble in borehole REC7-MW-3 at the west edge of property may relate to mill construction after about 1930 and rubble in borehole NRP-B-07 between 3 and 4 fbs could be part of the expanded Clark Nickerson Mill, as well.

The fill thickens from east to west, from about 10 to 23 feet (see Figure 19). Many cores did not sample deeply enough to characterize the base of the fill, especially west of the historic shoreline. The fill east of the historic shoreline is almost completely composed of sand, and is an average of 6 feet thick (varies from 2.5 to 12 feet). Void spaces are at the top of the fill east of the historical shoreline and they represent the empty space between current pile-supported floor slabs of structures that were drilled through and the underlying sedimentary fill. Units recorded as voids are not equivalent to samples with no recovery. Evidence of the squatters, buried mill materials or structures, and any other historic surfaces were generally absent from cores drilled on the beach and backshore portion of the shoreline that would have been the highest elevation land in the historical project area. One layer of wood at about 2 fbs in borehole REC-1-MW-2 could be related to the squatters or bath houses that were in the southern project area between 1902 and 1914 (see Appendix C, Maps 1, 2).

Holocene-age Deposits

The naturally deposited, or Holocene, facies types are also classified according to the modal grain-size of the depositional layer, indicated with a capital letter. Table 5 includes the shorthand nomenclature scheme used to categorize the naturally deposited sediments in the project area, as well as a list of secondary properties used to further describe those lithofacies. Glacial deposits below the Holocene sediment were not usually encountered in the shallow borings, but the brown, gravelly, silty, fine to coarse sand below 23 fbs at the base of borehole GF-B-07 and compact, gray, silty, fine to very coarse sand also below 23 fbs at the base of borehole GF-B-13 are probably glacial in origin.

A layer dominated by sand-sized sediments would be designated with the letter “S.” Secondary properties were designated by a lower-case letter appearing to the right of the capital letter. The lower case letters may represent secondary constituents of the depositional unit, or may be used as an additional descriptor term for the modal grain-size. For example, in the facies type f-mSz, “S” indicates that sand is the primary constituent; the “f-m” shows the sand ranges from fine to medium in texture, and the “z” signals silt as a secondary component. The 17 lithofacies in Table 5 relate to different sub-environments of Port Gardner, such as the sub-tidal delta, marsh, upland, beach, foreshore, and backshore. The borelogs include gravelly (Gs and Gsz), sandy (cSg, cS, f-cSg, f-cS, f-cSzg, f-cSz, f-mS, and f-mSz), silty (Zs, Zso, Z, Zo, and Zc), and organic (W and P) facies (Table 5).

Natural deposits below the fill across the project area are mostly composed of sand, mainly thick deposits of f-cS, cS, and f-mS that are sometimes silty (f-mSz and f-cSz) or gravelly (Gs, f-cSg, and cSg). The coarser deposits of sand and gravelly sand represent a beach environment, while the finer-grained sands suggest a foreshore or intertidal depositional environment. Beach sands and gravels are sometimes interbedded with deposits of natural wood (W). One layer of black, f-cS with scattered shell fragments below the fill from 12-15 fbs in DP-11 could represent a cultural deposit. The coarser deposits are concentrated north of borehole GFB-11, but are found across the project area too. Finer-grained sands and silts are concentrated south of borehole GFB-11, but are also distributed across the project area. Natural deposits are more variable along the intertidal zone where the sand deposits are interbedded with naturally deposited units of silt (Zs, Zso, Zo, Z, and Zc) and gravel (Gs and Gsz). Backshore sediments deposited along the far eastern edge of the property include silt (Zo) and peat (P) units. The natural deposits were not described in great detail on the geotechnical borelogs, so it is not possible to define any evidence for landslides or subsidence based on the existing data.

Other borehole data is available from the south end of the current project collected for ExxonMobil Environmental Services (AMEC 2010). The stratigraphy there is described as consisting of fill overlying recent marsh deposits and glacial sediment by the geotechnicians. Mixed beds of fill including layers of Sand, Silt, "Peat," and Wood extend to depths of between 20 and 27 fbs. The fill contains pockets of wood and brick debris up to 10 fbs. The fill deposits below an average of 20 fbs overlie a more homogeneous unit of Holocene-aged, organic-rich and clayey silt or a unit of medium sand. The more homogenous deposits beneath the fill were originally interpreted as part of the fill, however, AMEC (2010) state the silt and fine-grained sands are probably intertidal deposits. Materials that occur at depths greater than 27 fbs were interpreted to be Pleistocene-aged glacial deposits. Glaciers pre-date the arrival of humans to the region and therefore, only the very surface of a glacial deposit harbors potential for buried cultural materials. Similar stratigraphy is expected across the project area.

SENSITIVITY MODELING

The major goal of this assessment was to model the sensitivity for buried cultural resources within the K-C WW upland project area based on background research and existing geotechnical data. Geomorphic landforms defined in GIS provided the base-line data set for model building and evidence for historic development of the shoreline was overlain on top of the modeled pre-development coastline. Existing borehole data provides a third dimension of information allowing us to determine how deeply sensitivity for cultural resources extends and what types of archaeological resources might be present within depth ranges. Although the following results apply to the entire K-C WW upland area, specific formation and cultural histories are provided for the 11 areas slated for opportunistic cleanup, as excavation is imminent in those spots. Targeted site formation and cultural histories can be compiled relatively quickly for other specific locations within the K-C WW upland area in the future, if needed, now that the model has been constructed.

Landforms

Landforms act as the ideal base for the sensitivity map because, as related to the shoreline, the landforms in the project area represent availability for use and occupation. Landforms that are always underwater are assigned low sensitivity for buried cultural resources. Moderate sensitivity is given to landforms that are intertidal and were therefore used for resource procurement or other ephemeral activities. Landforms that are rarely inundated along the shoreline are assigned high sensitivity for buried cultural resources, as these would be the types of landforms past people would have lived or camped on and used for other activities, such as resource processing and cooking. Modern filling of the project area results in geologic maps that classify the lad as urban. So, bathymetric data from early historic maps was used to determine which portions of the project area were sub-tidal, intertidal, and sub-aerial. Sub-aerial landforms identified in the project area include the upland, beach, and backshore. Intertidal landforms in the project area are the foreshore, which includes the tideflats, and marsh. Finally, the delta front is the only sub-tidal landform identified in the K-C WW upland area.

Vicinities of alluvial fans and wetlands would have provided rich resources and potential camping areas during the early Holocene, while glacial terraces were the preferred landforms for occupation. During the middle Holocene, wetlands, the shoreline, and forested uplands would have been landforms on which resource procurement and temporary camping took place, and glacial uplands and creek mouths were the preferred locations for occupation. With the exception of glacial uplands, many of these landforms have been inundated by sea-level rise during the Holocene. The shoreline, especially sand spits and creek mouths, became the preferred landforms for occupation during the late Holocene. The following paragraphs introduce these landforms and discuss them in terms of potential to contain archaeological materials.

Snohomish River Delta

Deltas are complex estuarine and nearshore land systems that were highly productive for pre-contact people. The distal end of the Snohomish River delta is just north of the project area and most of the delta landform in the project vicinity is sub-tidal. The sub-tidal portion of the delta was used much less often by Native Americans than the sub-aerial portion [redacted]. Delta-front silts and sands supported marsh environments, as well as river channel distributaries, at the delta front. Topographically low areas between distributary tidal channels often consist of muddy floodplain sediment or marsh grasses and silt if they are not completely inundated. Littoral drift cells in Port Gardner push sediment-laden plumes of fresh water south from the mouth of the Snohomish River to distribute fine-grained alluvium along the shoreline (Mutti et al. 2000).

Marsh

Tidal marshes are wetlands dominated by herbaceous plant species, such as grasses, rushes, or reeds, at the ecotone between aquatic and terrestrial land systems. Marshes provide habitat for plant and animal species that have adapted to flooded conditions with low oxygen levels. Marshes were highly productive for pre-contact peoples providing saltwater and freshwater fish, shellfish, waterfowl, terrestrial mammals, and a range of plant species useful for technical, food, and medicinal purposes. Salt water marshes, like those at the mouth of the Snohomish River, are found along protected coastlines and they are tidally influenced each day. Salt marshes flourish where sediment collects faster than the rate of delta subsidence, as it did on the Snohomish delta until historic development. The slow currents in the Snohomish River estuary allowed the fine particles in suspension in the river to be trapped by the marsh vegetation and to drop. This way, the salt marshes on top of the delta allowed the delta to grow west into Port Gardner throughout the Holocene.

Foreshore

The foreshore, or intertidal zone, is the portion of a shoreline that is inundated at high tide and exposed at low tide. Tideflats occupy the foreshore where tidal action is moderate and plenty of sediment is available, like at the mouth of the Snohomish River. The surface of the tide flat gently slopes from the beach to the subtidal zone in deeper water. The tideflat surface is marked by meandering channels, typically created during ebbing flow. Tideflats support abundant and diverse resources important to Native Americans, such as shellfish, migratory birds, and plants like tule and cattail for making mats, stinging nettle for fiber for cordage and nets, as well as estuarine roots, rhizomes, and bulbs. Site types associated with the foreshore include weirs and traps made with posts and flexible withes. Temporary camps could be established seasonally on adjacent high ground. Beach foreshores that do not host extensive tideflats can also be important sources of resources, offering suitable substrates for formation of eelgrass beds and spawning grounds for various species of fish (Jackson et al. 2002).

Beach

Beaches are coastal accumulations of sediment, usually of clasts that are sand-sized or larger. The sediment from the beach buried in the K-C WW upland area derived from the Snohomish River delta and the bluffs to the east. The sediment was moved by tides and waves to form the beach after about 5,000 years ago (Johannessen and MacLennan 2007). Beaches have characteristic profile forms, which are determined by the steepness of the waves and the size of sediment (Downing 1983; Masselink and Hughes 2003; Thomas and Goudie 2000). Beaches are usually dry landforms, except during severe winter storms, so they were preferred for human use and occupation. Beaches provided easy access to the surrounding bay, marshes and tideflat resources and the upland where hunting and gathering also occurred. They also represent a high point in the shoreline topography that may have been utilized by Native Americans and early Euroamericans alike.

Backshore

The backshore is the supratidal portion of a beach that is usually only inundated during storms. A low ridge or berm usually separates the backshore from the beach berm (Elliott 1978). Backshore zones of beaches along the Puget Sound shores are usually narrow because the beaches are backed by bluffs and uplands rather than the dune fields that are typical of a wider coastal plain. Backshore zones can sometimes be inundated by fresh water if creeks draining the uplands flow along the bluff base. Wetlands will develop in wetter portions of the backshore, which would be attractive resource procurement locations for Native Americans. People could occupy the drier portions of the backshore environment and they would be protected from onshore winds and most waves. The east edge of the backshore in the project area appears to have been wet, according to historic maps (see Figure 4).

Upland

The bluffs ringing much of Puget Sound began forming shortly after the retreat of the continental glaciers, and in fact, most probably developed only after sea level began stabilizing about 5,000 years ago (Downing 1983; Shipman 2004). The bluff edges, and uplands behind, would have been available to inhabitants of the region beginning in the early Holocene. These areas may have supported camps of early hunter-gatherers who moved from location to location with little specialization in settlement type. These early camps would be characterized by Olcott or earlier style stone tools and fire modified rock (FMR) from campfires. Later users, more focused on the marine shoreline where fish, shellfish, and sea mammals could be found, were more likely to use the uplands and bluffs for special purposes, some related to resources like the cedar, game animals, berries, and other plants found there, as well as other purposes unrelated to subsistence, like burials. The project area marks a portion of the coastline where the bluffs are not extremely steep and the shoreline could have been accessed relatively easily from the upland.

The horizontal extent of the six historical landforms results in a model of the sensitivity for late pre-contact cultural resources in the project area. The applicability of the model is limited to the mid-Holocene and later because sea level variability before about 5,000 years ago did not allow development of productive littoral habitats. The resulting GIS map (Figure 24) depicts areas of high, medium, and low risk for finding pre-contact or very early historical period Native American archaeological sites. Highest risk areas, according to the model, are along the historic beach and sub-aerial landforms and the lowest potential for identification of sites is in areas that were historically inundated, like the sub-tidal delta. Moderate levels of risk for identification of pre-contact or very early historical period Native American archaeological sites is assigned to the intertidal zone, including the foreshore and marsh landforms, where human use was limited and sites are generally ephemeral in type. About half of the 11 opportunistic cleanup areas are on landforms with high sensitivity for buried resources. These are the Xylene UST 29/Latex Spill (2), GF 11 (8), Diesel AST Area (9), Bunker C ASTa (10), and Bunker C ASTb (11) proposed cleanup areas (Table 6). The Naval Reserve Parcel UST Area (1), Bunker C USTs71/72/73 (5), and Boiler/Baghouse Area (6) are on landforms with moderate sensitivity for buried cultural resources and the Rail Car Dumper Hydraulic System Building (3), Diesel UST 70 (4), and Heavy Duty Shop sump (7) are on the sub-tidal delta that has been assigned low sensitivity. There are no cleanup areas proposed on the upland.

Cultural materials associated with the earliest historical occupation of the project vicinity would also be along the shoreline on the beach or backshore landforms that were dry and available for use in the early 1860s. As marshland was reclaimed for agricultural use and drained the marshes became available for occupation as well. So, sensitivity for early historic cultural resources looks very similar to the sensitivity map for pre-contact cultural resources. Most of the earliest development in the vicinity was at the northeast edge of the project at the Robinson Mill, nearest areas 1 and 2. James Brigham settled at the far south end of the project and his cabin may have been as close as the foot of California Street, nearest areas 10 and 11 (see Figure 5).

Borehole data provides vertical limits to the sensitivity for buried historical cultural materials, as well as ground-truths information about the contents of the historic fill. For example, Cultural debris, such as brick and concrete fragments, woody debris, charred wood, slag, cinders, tile, ceramic fragments, and glass were described in the fill in MW-1, MW-2, DP-12, DP-13, DP-20, DP-22, GF9-MW-1, REC1-MW-9, REC7-MW-3, NRP-B-07, and UST70-B-2. Only one of these borings, NRP-B-7 is within one of the 11 proposed cleanup areas, in the Naval Reserve Parcel UST Area (1). The borehole data, in general, show deeper fill to the west where the project area was once part of Port Gardner and shallower fill to the east along the historical beach. Both the fill and underlying natural deposits are highly variable, so it is not possible to make broad generalizations about their nature for the entire project area. Instead, the stratigraphy will be characterized by proposed opportunistic cleanup area. Table 6 also describes the depth of the fill and the general stratigraphy of each opportunistic cleanup area, based on the borehole data. Sensitivity for buried cultural resources increases where fill is slightly shallower.

By overlaying the outline of the shoreline in 1886, and the shoreline with wharves in 1902, 1914, 1957, and 2013, we can observe a progression of waterfront development that generally trends from east to west and from north to south across the project vicinity. Areas where piers overlap, or where piers have been present since the shoreline was first developed, indicate areas that have not been dredged and where cultural materials would be preserved (Figure 25). Areas with the highest preservation potential are areas 1, and 8 through 11, which all have moderate to high potential for buried early historical and pre-contact cultural resources.

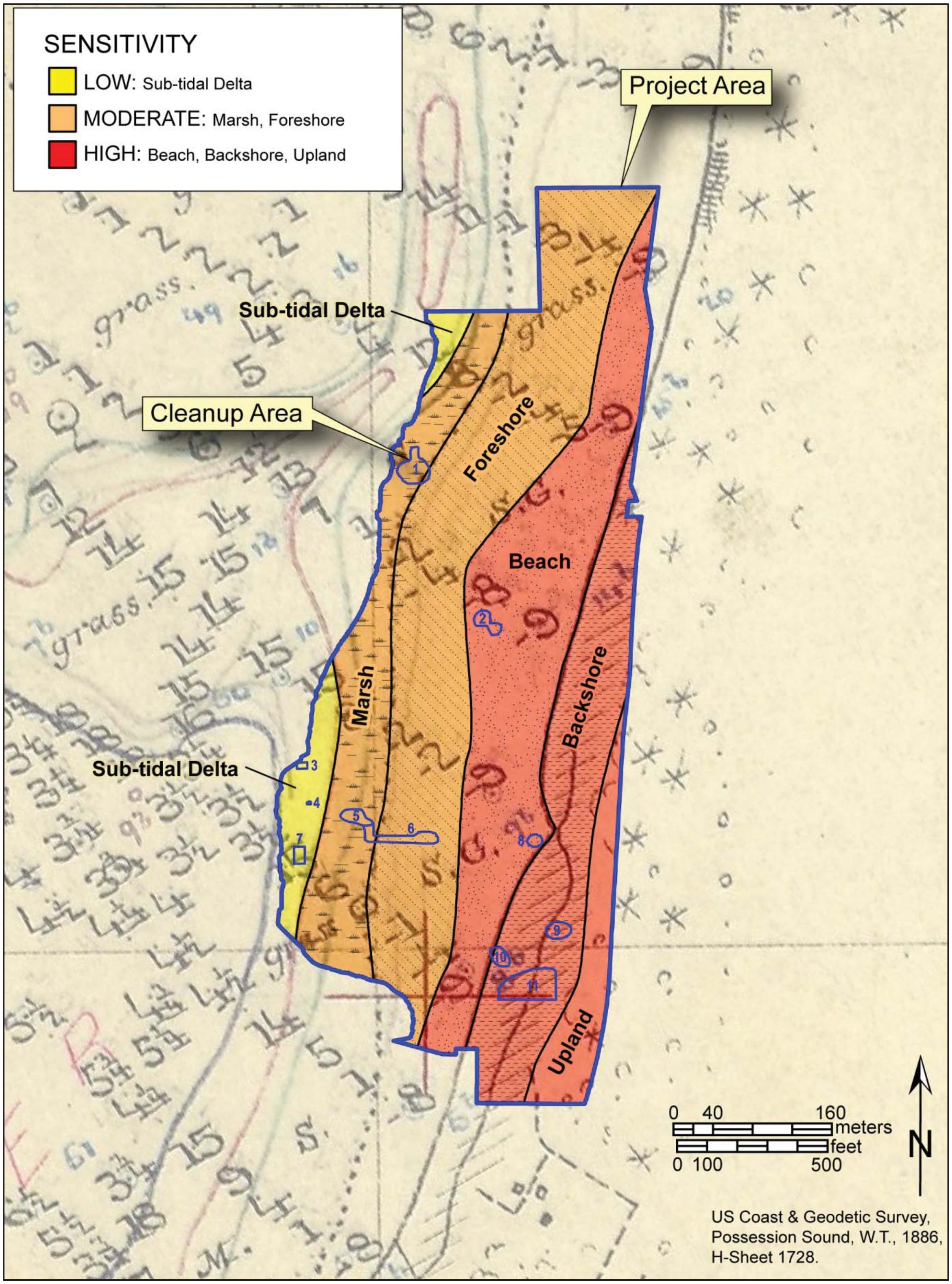

Figure 24. Areas of risk for finding pre-contact, early historical period Native American and early historical period archaeological sites, based on landforms and the historical shoreline.

Table 6. Sensitivity for Buried Cultural Resources by Cleanup Area With Summary of Fill and Holocene Stratigraphy Characteristics Based on Analyzed Borehole Data.

AREA NO.	NAME	LANDFORM	CHARACTER-IZATION OF NATURAL DEPOSITS	SENSITIVITY FOR PRE-CONTACT AND <1900 HISTORIC	EXPECTED DEPTH OF FILL	CHARACTER-IZATION OF FILL	SENSITIVITY FOR HISTORIC >1900
1	Naval Reserve Parcel UST Area	Marsh	Natural deposits not sampled	Moderate	Over 20 feet	Mixed fill to 7 fbs; Sand 7-15 fbs; Woody debris 15-17 fbs; Sand to 20 fbs	Moderate
2	Xylene UST 29/Latex Spill	Beach	Natural deposits not sampled	High	Over 12.5 feet	Gravels to 6 fbs; Silt 6-12.5 fbs	Low
3	Rail Car Dumper Hydraulic System Building	Sub-tidal Delta	Natural deposits not sampled	Low	Over 20 feet	No borings in area 3; Gravels expected near surface overlying Sand based on nearby borings	Low
4	Diesel UST 70	Sub-tidal Delta	Natural deposits not sampled	Low	Over 15 feet	Gravelly to 2.5 fbs; Sandy to 15 feet	Low
5	Bunker C USTs71/72/73	Marsh	Natural deposits not sampled	Moderate	Up to 30 feet	Wood chips and rubble 0-5 fbs; Gravel 5-12 fbs; Beds of Sand and wood chips 12-20 fbs; Sand to at least 30 fbs	Low
6	Boiler/ Baghouse Area	Marsh	Natural deposits not sampled	Moderate	Over 12 feet	Gravelly sand or silt 0-3 fbs; Wood and concrete 4-5 fbs	Low
7	Heavy Duty Shop sump	Sub-tidal Delta	Natural deposits not sampled	Low	Over 15 feet	No borings in area 7; Sand expected 0-15 fbs based on nearby borings	Low
8	GF 11	Beach	Pebbly sand with wood fragments 13-26.5 fbs	High	About 13 fbs	Sand 0-13 fbs	High
9	Diesel AST Area	Backshore	Bedded fine to coarse sand and silt 3-13 fbs; shells below 12.5 fbs	High	About3 fbs	Sand 0-3 fbs	High
10	Bunker C ASTa	Backshore	Gravelly coarse sand 10 - 26 fbs; overlying organic-rich silt to 31.5 fbs	High	About 10 fbs	Gravel 0-2; Sand 0-10	High
11	Bunker C ASTb	Backshore	Sometimes silty or peaty sand 8-12 fbs overlying gravelly sand to at least 20 fbs	High	Varies greatly from about 6 to 15 feet	A foot of gravel overlying Sand or Silt 5.5-8 fbs; Some rubble above 3 fbs; Wood at base of fill where it is deeper	High

Sanborn maps provide detail about the historical activities that occurred in the project area over time and they allow targeted expectations to be formulated on where certain types of sites might be within the project area (Table 7). Sanborn maps show areas where people may have dumped cultural debris off the piers or where concentrations of structural remains, artifacts of a certain type, or specific industrial materials might be identified. For example, the squatters housing along the shoreline south of the mill shown on the 1902 Sanborn maps present an opportunity to identify cultural materials related to residential and social themes dating to between 1902 and 1914 at the base of the historic fill. Foundations and related deposits of structures that are shown on both the 1914 and 1957 Sanborn maps might still be present just below the modern asphalt and concrete surfaces of the decommissioned mill today.

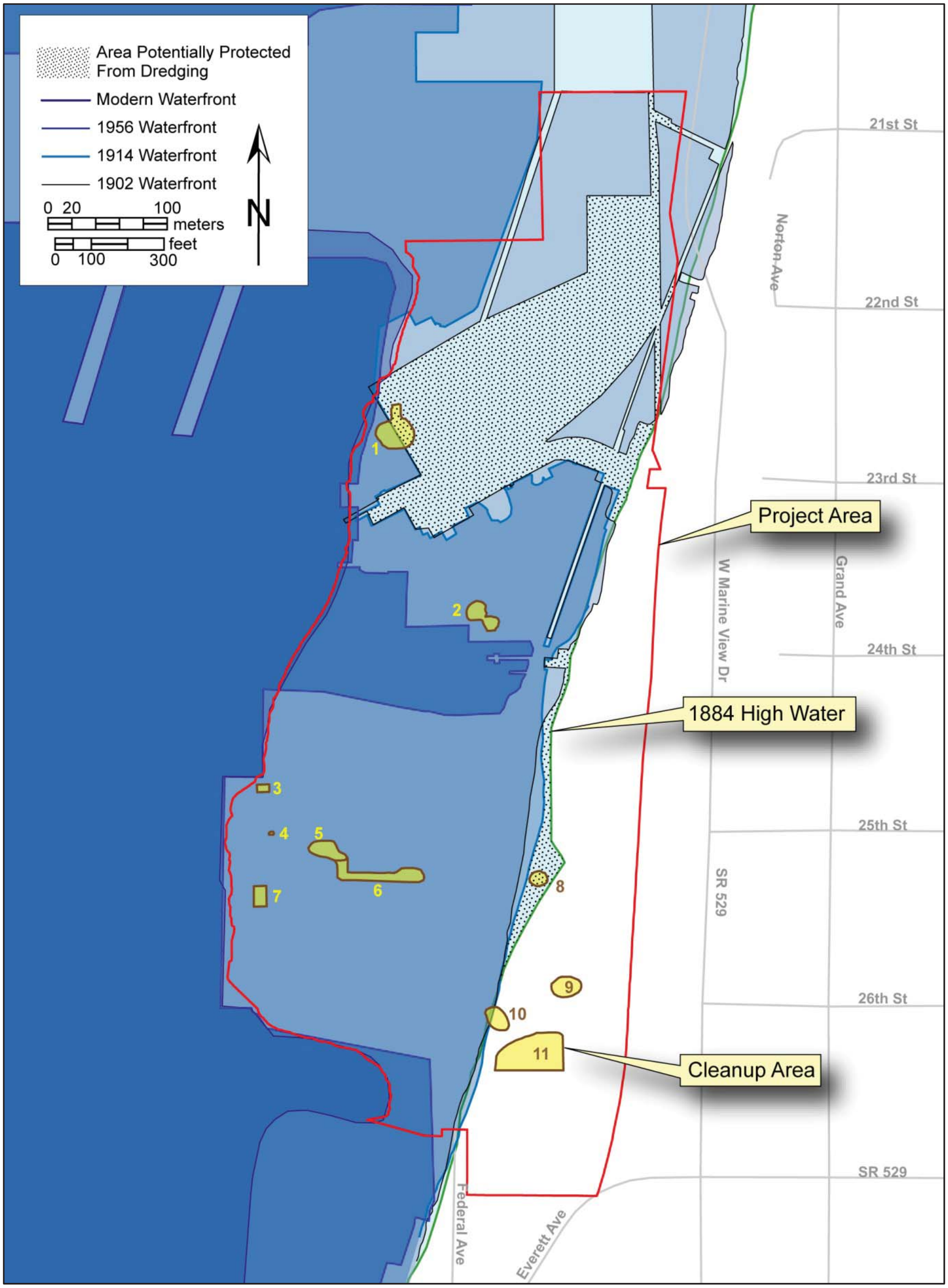

Figure 25. Map showing pre-fill shoreline and outlines of piers from historic maps from 1902, 1914, 1957 and 2013; shaded areas mark parts of the project area that have been protected from dredging.

Table 7. Historical Activities By Cleanup Area Over Time Based on Sanborn Maps and Sensitivity for Historical Cultural Resources Dating After 1900.

AREA NO.	1902	1914	1957
1	Clark-Nickerson Deep Water Dock	Clark-Nickerson Shipping Wharf	US Naval Reserve Training Center
2	Port Gardner/Beach	Port Gardner/Beach	Scott Paper Stock Tanks and pump near stock preparation area
3	Port Gardner	Port Gardner	Open wharf area near hog fuel pile; between slicer dock and Tractor shed at the Scott Paper Mill
4	Port Gardner	Port Gardner	Open wharf area near hog fuel pile; between slicer dock and Tractor shed at the Scott Paper Mill
5	Port Gardner/Salt marsh	Port Gardner/Salt marsh	Transit corridor for machines and mill waste between the Boiler and Paper Warehouse at the Scott Paper Mill
6	Port Gardner/Salt Marsh	Port Gardner/Salt Marsh	Sulphur storage, Burner, Cooler, and Digester Buildings of the Scott Paper Mill
7	Port Gardner	Port Gardner	Pulp warehouse of the Scott Paper Mill
8	Beach with Squatters Shacks	Beach just west of Nassau Road	Open wharf area between Scott paper office, the filter plant, the digester building, and the blow pits
9	Along backshore of beach with Squatters Shacks at the west edge of Nassau Road	Intersection of Nassau Rd and 26th Street	Open area at the northwest corner of the Scott paper General Warehouse headquarters
10	Beach and Backshore with Squatters Shacks	Open space just southeast of intersection between Federal Road and 26th Street; likely beach-like and sometimes wet.	Associated Oil Company Oil/Fuel Tank yard; below tanks
11	Along backshore of beach with Squatters Shacks	Open beach between Nassau and Federal roads	Associated Oil Company Oil/Fuel Tank yard; below tanks and near pumps

Sanborn maps can also be used to show where cultural materials would not be expected based on an absence of historic occupation or where more recent disturbance might have obscured archaeological evidence of earlier historic occupation. Table 7 shows a time-series catalog of culture history based on Sanborn information for each of the 11 opportunistic cleanup areas. These data correspond with the maps provided in Appendix C. Area 1 has moderate potential for buried historical resources and areas 8 through 11 have high potential for historical cultural resources. These results are similar to the sensitivity for buried pre-contact and early historical cultural materials and good preservation potential.

CONCLUSION AND RECOMMENDATIONS

The model of sensitivity for buried cultural resources in the K-C WW upland project area shows that potential is highest for both pre-contact Native American cultural resources and historical cultural materials along the pre-fill natural Port Gardner shoreline. The results are based on background research, historic maps, and existing geotechnical data. Although questions remain about precise locations of archaeological material within the K-C WW upland area, this overview has characterized areas of risk in a way that allows planning for future clean up. Above all, this assessment has shown the abundance of known resources and potential for cultural resources around the Port Gardner shoreline. In moving forward planners should take into account the locations and settings of known and suspected archaeological sites in the vicinity, as well as high and moderate risk areas within the project area, when designing cleanup procedures. Mitigation undertaken as a consequence of inadvertent discovery during implementation of cleanup can be costly and time consuming.

Excavation work associated with the interim cleanup actions will primarily occur in fill. It has already been determined that the cleanup actions will be observed by a geologist who will ensure the excavation does not extend below the fill and that a professional archaeologist will only be contacted to assess the find if a potential archaeological object is observed by the geologist. SWCA recommends this process be applied to areas assigned low to moderate risk for buried cultural resources and an Inadvertent Discovery Plan (IDP) should be devised for this work. Proposed cleanup areas with low to moderate sensitivity for cultural resources are the Naval Reserve Parcel UST Area (1), Rail Car Dumper Hydraulic System Building (3), Diesel UST 70 (4), Bunker C USTs71/72/73 (5), Boiler/Baghouse Area (6), and Heavy Duty Shop sump (7). SWCA also recommends an archaeological monitor be present to view any excavation below the fill in areas assigned low to moderate potential for buried cultural resources and that details of this process be defined in a Monitoring and Discovery Plan (M&DP).

SWCA recommends that an archaeologist be present to monitor interim actions in areas assigned high risk for buried cultural resources. Proposed cleanup areas with high sensitivity for cultural resources are the Xylene UST 29/Latex Spill (2), GF 11 (8), Diesel AST Area (9), Bunker C ASTa (10), and Bunker C ASTb (11) cleanup areas. Additional archaeological investigations are recommended in areas assigned high risk for buried cultural resources where cleanup investigations would breach the fill and penetrate the underlying natural sediment. In addition, appropriate Native American tribes should be contacted to inquire about traditional cultural resources and other areas of traditional value that could be affected by the proposed project and may not have been previously recorded by archaeologists.

In the event that construction activities reveal such resources and an archaeological monitor is not present during the construction work, the contractor should cease construction and follow the steps defined in the IDP. If any construction activities encounter human remains, whether burials, isolated teeth, bones, or mortuary items, work in that area should stop immediately and the area surrounding the discovery should be secured.

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APPENDIX A: CORRESPONDENCE

APPENDIX A HAS BEEN REDACTED

APPENDIX B: CORE LOG SUMMARY

Table B-1. Core Log Summary.

BORING	UTMs (Zone 10, NAD83) NORTHING	EASTING	STRATIGRAPHY	DEPTH (fbs) TOP	BOTTOM	LITHOLOGY	DESCRIPTION
AP-MW-1	558440.324	5314929.122	Fill	0	0.5	Asphalt	Asphalt.
				0.5	6.5	Sand	Brown to dark gray, fine to medium sand with very few pebbles; moist; iron-oxide-gray mottles and scattered shells and organic debris.
			Holocene	6.5	8.5	f-mSz	Dark gray, silty, fine to medium sand; wet; scattered organic debris and shells; many organics and shells between 8 and 8.5 fbs.
				8.5	15	f-cS	Dark gray, fine to very coarse sand with very few pebbles.
Boiler-MW-1	558322.106	5314877.542	Fill	0	0.7	Concrete	Concrete.
				0.7	2	Silt	Dark gray, sandy, gravelly, silt; numerous organic debris; moist; petroleum-like odor.
				2	3.8	Sand	Dark gray, gravelly, fine to medium sand; moist; slight petroleum-like odor.
				5	9	Sand	Dark gray, coarse sand with faint petroleum-like odor; moist.
				10	14	Sand	Gray, gravelly, fine to very coarse sand; gravels are few to common, very small pebbles; wet; visible separate phase product and strong petroleum-like odor at 12 fbs.
				15	20	Sand	Gray, coarse to very coarse sand with very few, very small pebbles; wet; numerous shell fragments.
CMS-MW-1	558511.368	5314815.391	Fill	5	7	Sand	Dark gray, slightly silty, fine to medium sand; wet.
				7	9	Sand	Dark gray, fine to coarse sand with very few, small to large pebbles; wet.
				9	9.5	Clay	Dark gray, silty clay; wet.
			Holocene	9.5	12	f-cS	Dark gray, fine to coarse sand with few, small to large pebbles; wet.
				12	13.5	Zo	Dark brown, organic-rich silt; peat-like; wet.
				13.5	15	Zso	Dark brown, fine to coarse sandy, organic-rich silt; wet.
DA-MW-1	558511.66	5314781.801	Fill	0	1	Asphalt	Asphalt.
				1	2.5	Sand	Dark gray, gravelly, very silty, fine to medium sand; moist.
				5	6	Sand	Dark gray, gravelly, very silty, fine to medium sand; wet; plastic sheeting at 6 fbs.
			Holocene	6	9.5	f-cS	Dark gray, fine to coarse sand with very few, scattered pebbles; wet.
				10	13	f-cS	Dark gray, fine to coarse sand with very few, scattered pebbles; wet.
				13	13.5	Zc	Gray, clayey silt; wet.
				13.5	14	P	Brown, fibrous peat; wet.
				14	14.5	f-cS	Brownish gray, fine to medium sand with common to many organic debris; wet.
				14.5	15	P	Brown, fibrous peat; wet.
DP-03	558485.448	5314704.175	Fill	0	0.75	Concrete	Concrete, 9 inches thick.
				0.75	1.5	Gravel	Brown, sandy, angular, small to large pebbles; wet.

Table B-1. Core Log Summary.

BORING	UTMs (Zone 10, NAD83) NORTHING	EASTING	STRATIGR-APHY	DEPTH (fbs) TOP	BOTTOM	LITHOLOGY	DESCRIPTION
				1.5	5.5	Sand	Brown to gray, silty, gravelly, fine to coarse sand; wet; wood at 4 fbs; strong petroleum-like odor.
				5.5	6.5	Silt	Black silt.
			Holocene	6.5	9.5	cS	Gray, coarse to very coarse sand with very few, scattered pebbles; wet.
				9.5	11	f-mSz	Dark gray, silty, fine to medium sand; wet.
				11	15	f-cS	Gray, fine to coarse sand with very few, scattered pebbles; wet.
DP-11	558411.289	5314693.101	Fill	0	0.5	Asphalt	Asphalt.
				0.5	4.5	Sand	Brown to dark brown, gravelly, fine to coarse sand; very moist.
				4.5	12	Silt	Dark gray, silt with scattered woody debris; wet; slight hydrogen sulfide odor.
			Holocene	12	15	f-cS	Black, fine to coarse sand with scattered shell fragments; wet; hydrogen sulfide odor.
DP-12	558397.478	5314694.045	Fill	0	0.5	Asphalt	Asphalt.
				0.5	3	Gravel	Brown, very silty, pebbles with a trace of sand; moist.
				3	5	Sand	Brown, gravelly, fine to coarse sand; moist; contains burnt and melted plastic and charred brick.
				5	9.5	Gravel	Brown, very silty, sub-angular, small to large pebbles; contains charred brick and burnt and melted plastic between 5 and 8 fbs.
			Holocene	9.5	10	f-cS	Black, fine to coarse sand; wet.
				10	15	Gs	Dark brown to dark gray, very sandy, sub-rounded, small to large pebbles; wet; hydrogen sulfide odor at 14 fbs.
DP-13	558385.311	5314698.949	Fill	0	1	Asphalt	Asphalt.
				1	4	Sand	Brown, very gravelly, fine to coarse sand; very moist.
				4	6	Silt	Dark brown, silt with few pebbles; very moist.
				6	11	Gravel	Brown, very silty, sub-angular, small to large pebbles; wet; contains firebrick, ceramic and wood fragments.
			Holocene	11	14.5	Zs	Dark gray to black, sandy silt; wet.
				14.5	15	f-cS	Black, fine to coarse sand; wet; trace of silt.
DP-18	558349.088	5315040.737	Fill	0	2.5	Wood	Wood chips.
				2.5	10	Silt	Gray, sandy, gravelly, silt; gravels are common, sub-rounded, small to large pebbles.
DP-19	558404.633	5315054.31	Fill	0	2.5	Wood	Wood chips.
				2.5	6	Sand	Gray, very silty, fine to medium sand with few, small to large pebbles; moist.
				6	15	Silt	Gray to bluish gray, silt with few pebbles.
DP-20	558421.516	5315028.792	Fill	0	2.5	Wood	Wood chips.
				2.5	3.5	Sand	Gray, gravelly, silty, fine to medium sand; moist.

Table B-1. Core Log Summary.

BORING	UTMs (Zone 10, NAD83) NORTHING	EASTING	STRATIGR-APHY	DEPTH (fbs) TOP	BOTTOM	LITHOLOGY	DESCRIPTION
				3.5	5	Silt	Dark gray, gravelly, sandy silt; moist.
				5	6	Rubble	Concrete rubble.
				6	9	Sand	Black, gravelly, silty, fine to medium sand; wood chips at 7 fbs; wet.
				9	10	Silt	Brown, sandy silt; wet.
DP-22	558469.126	5315013.547	Fill	0	3	Wood	Wood chips.
				3	4	Sand	Gray, very silty, fine to medium sand; moist.
				4	6	Silt	Dark gray, sandy, gravelly silt; moist.
				6	7	Rubble	Concrete rubble.
				7	10	Silt	Mottled gray and brown, sandy silt; moist.
GF9-MW-1	558429.183	5314984.615	Fill	0	0.5	Asphalt	Asphalt.
				0.5	1.5	Sand	Brown, gravelly, very silty, fine to medium sand; moist.
				1.5	3.5	Sand	Brown, gravelly, fine to coarse sand with brick debris; moist.
				5	6.5	Sand	Dark gray and brown, gravelly, fine to coarse sand; wet.
				6.5	9	Sand	Dark gray, very silty, fine to coarse sand; wet.
				10	12	Sand	Dark gray, silty, fine to coarse sand; wet.
				12	15	f-cS	Dark gray, slightly silty, fine to coarse sand; wet.
GF-B-01	558549.941	5315414.397	Fill	0	1.5	Sand	Gray, slightly silty, gravelly, fine to very coarse sand; gravels are common, very small to large pebbles; loose; slightly moist.
				1.5	5	Sand	Gray, silty, fine to medium sand; loose; moist to wet.
				5	18	Wood	Wood chips; becomes loose below 8 fbs and very loose below 11 fbs.
			Holocene	18	26.5	f-cSg	Gray, gravelly, fine to very coarse sand; gravels are few to common, very small pebbles; very loose; wet; trace of silt.
GF-B-02	558508.19	5315350.092	Fill	0	4.2	Gravel	Silty gravel.
				4.2	6.8	Sand	Black, silty, fine to medium sand; wet; moderately compact.
				6.8	18	Wood	Wood chips.
			Holocene	18	23	f-cS	Gray, fine to coarse sand with trace of silt; very loose; wet.
				23	26.5	f-cSg	Gray, gravelly, fine to very coarse sand; gravels are few to common, very small pebbles.
GF-B-03	558523.561	5315231.763	Fill	0	1.5	Sand	Gray, gravelly, fine to very coarse sand; gravels are common to many, rounded, small to very large pebbles; loose; slightly moist.
				1.5	4.2	Sand	Gray, fine to medium sand; "clean"; moist; loose.
				4.2	6.8	Sand	Gray, silty, fine to very coarse sand with very few pebbles and woody debris.
				6.8	12.5	Sand	Gray, slightly silty, fine to medium sand; loose; wet; gradual lower boundary.

Table B-1. Core Log Summary.

BORING	UTMs (Zone 10, NAD83) NORTHING	EASTING	STRATIGR-APHY	DEPTH (fbs) TOP	BOTTOM	LITHOLOGY	DESCRIPTION
				12.5	13	Wood	Wood chips.
			Holocene	13	17.5	f-cSg	Gray, gravelly, fine to very coarse sand with very few, scattered wood chips; very loose; wet.
				17.5	19	cSg	Gray, gravelly, coarse to very coarse sand; gravels are few to common, very small pebbles; very loose; wet.
				19	26.5	cSg	Gray, gravelly, coarse to very coarse sand; gravels are few to common, very small pebbles; very loose, becoming compact below 25 fbs; wet.
GF-B-04	558432.762	5315244.419	Fill	0	1.8	Gravel	Grayish brown, slightly silty, slightly sandy, gravel; slightly moist.
				1.8	9.25	Sand	Gray, silty, fine to medium sand; loose; moist.
				9.25	13	Sand	Gray, fine to coarse sand with trace of silt; very loose; wet.
				13	18	Silt	Interbedded gray, sandy silt and silty, fine to coarse sand; soft; wet.
				18	23	Sand	Gray, silty, fine to coarse sand with wood chips; very loose; wet.
			Holocene	23	26.5	f-cSg	Gray, gravelly, fine to very coarse sand; gravels are few to common, very small pebbles; trace of silt; loose; wet.
GF-B-05	558389.354	5315141.537	Fill	0	1.8	Sand	Gray, gravelly, fine to coarse sand; loose; slightly moist.
				1.8	5.5	Sand	Fine to coarse sand with few pebbles and coarse sand; loose; very moist.
				5.5	11.5	Sand	Coarse to very coarse sand with few pebbles; very loose; wet; shells present below 8 fbs; organic or slight hydrocarbon odor at 8 fbs; trace of silt at 10 fbs.
				11.5	14.5	Sand	Gravelly, coarse to very coarse sand; gravels are common, very small pebbles; contains shells.
				14.5	15.5	Sand	Silty, fine to medium sand with woody debris; very loose.
				15.5	23	Sand	Gray, coarse to very coarse sand with trace organics; moderately compact; wet; organic or slight hydrocarbon odor.
				23	26.5	Gravel	Gravelly, coarse sand to coarse sandy, very small pebbles with very few shells; slight organic or hydrocarbon odor.
GF-B-06	558519.817	5315063.666	Fill	0	2.5	Sand	Gray, very gravelly, fine to coarse sand; gravels are very many; loose; slightly moist; slightly musty odor.
				2.5	5	Sand	Gray, fine to coarse sand with trace of silt; moderately compact; slightly moist.
				5	5.5	Sand	Gravelly, coarse to very coarse sand; gravels are few to common, very small pebbles; loose; wet.

Table B-1. Core Log Summary.

BORING	UTMs (Zone 10, NAD83) NORTHING	EASTING	STRATIGR-APHY	DEPTH (fbs) TOP	BOTTOM	LITHOLOGY	DESCRIPTION
				5.5	8	Sand	Gray, gravelly, coarse to very coarse sand; gravels are few to common, very small pebbles; loose; slightly moist; trace of silt; becomes moderately compact near 7.5 fbs.
				8	13	Wood	Wood chips.
			Holocene	13	18	f-cSg	Gravelly, fine to coarse sand; loose; wet; trace of silt/clay.
				18	26.5	cSg	Gray, gravelly, coarse sand to coarse sandy, rounded, small to very large pebbles; wet; moderately compact; trace woody debris.
GF-B-07	558570.694	5314998.645	Fill	0	13	Sand	Brown, slightly silty, gravelly, fine to very coarse sand; gravels are few to common, very small to large pebbles; very loose; moist to wet; becomes gray with trace silt below 6 fbs; common to many woody debris below 10 fbs.
			Holocene	13	23	Zs	Gray, sandy silt with laminae of reddish brown, organic-rich silt; soft; wet; becomes very stiff below 21 fbs.
			Pleistocene	23	26.5	Pleistocene	Brown, silty, fine to coarse sand with very few pebbles; diamict fabric present; compact; wet.
GF-B-08	558508.404	5314935.195	Fill	0	0.5	Asphalt	Asphalt.
				0.5	3.5	Sand	Gray, gravelly, silty, fine to coarse sand; moist.
				3.5	4.5	Sand	Brown, gravelly, coarse to very coarse sand; gravels are few to common, very small pebbles.
				4.5	7	Sand	Brown, fine to medium sand with iron staining.
				7	8	Silt	Dark gray, very sandy, silt and very silty, sand; very moist.
				8	12	Sand	Brown to gray, gravelly, fine to coarse sand, fining upwards; gravels are few to common, very small pebbles; wet.
			Holocene	12	13	Gs	Gray, sandy, small to large pebbles; wet.
				13	25	f-cS	Gray, fine to coarse sand with few pebbles; wet; many woody debris at 14 fbs; becomes mostly coarse sand below 20 fbs; slight hydrogen sulfide odor at 23 fbs.
GF-B-10	558301.411	5314948.696	Fill	0	2	Concrete	Concrete.
				2	4.5	Sand	Brownish gray, silty, fine to medium sand; loose; moist.
				4.5	5	Silt	Brown, sandy silt; moist; moderately compact.
				5	6.8	Sand	Gray, silty sand; loose; moist.
				6.8	8	Silt	Brown, sandy silt; wet; compact.
				8	20	Sand	Gray, gravelly, coarse to very coarse sand; gravels are few to common, very small pebbles; loose; wet; trace of silt.
			Holocene	20	23	f-cS	Fine to coarse sand; very loose.
				23	26.5	f-cSz	Gray, silty, fine to coarse sand with very few, very small pebbles; moderately compact; wet.

Table B-1. Core Log Summary.

BORING	UTMs (Zone 10, NAD83) NORTHING	EASTING	STRATIGR-APHY	DEPTH (fbs) TOP	BOTTOM	LITHOLOGY	DESCRIPTION
GF-B-11	558495.264	5314852.948	Fill	0	0.5	Asphalt	Asphalt.
				0.5	13	Sand	Black to dark gray, silty, fine to medium sand; charcoal odor; loose; becomes fine to coarse and wet below 10 fbs.
			Holocene	13	26.5	cSg	Gray, gravelly, coarse sand; gravels are few to common, very small pebbles; moderately compact; wet; gravels increase, with layer of wood chips 1 inch thick at 20 fbs; trace of silt and fine sand, common wood fragments at 25 fbs.
GF-B-12	558361.815	5314831.065	Fill	0	0.5	Asphalt	Asphalt.
				0.5	7	Sand	Mottled brownish orange, slightly silty, gravelly, fine to coarse sand.
				7	10	Silt	Dark gray, very (fine to medium) sandy, silt; wet; wood at 8.5 fbs.
GF-B-13	558550.526	5314797.836	Fill	0	6.8	Sand	Grayish brown, slightly silty, gravelly, fine to very coarse sand; gravels are common to many, angular, very small to very large pebbles; loose; moist.
			Holocene	6.8	9.2	f-cS	Fine to coarse sand with few, very small pebbles and shell fragments; loose; wet.
				9.2	11	f-cSg	Gravelly, fine to very coarse sand with shell fragments; gravels are few to common, very small pebbles; poorly-sorted; loose to very loose; wet; wood chips or debris between 12 and 13 fbs.
				11	14	f-cS	Fine to very coarse sand with very few, very small pebbles; poorly sorted.
				14	23	f-cS	Slightly silty, fine to very coarse sand with shell fragments and very few, scattered, very small pebbles; very loose; slight sulfide odor.
			Pleistocene	23	25.5	Pleistocene	Gray, very silty, fine to very coarse sand; very compact; wet; diamict fabric.
GF-B-14	558457.719	5314741.026	Fill	0	2	Sand	Brown, sometimes silty, gravelly, fine to coarse sand; gravels are few to common, very small to large pebbles; petroleum-like odor; very loose; slightly moist.
				2	6.8	Sand	Gray, fine to medium sand with trace shells; faint petroleum-like odor.
			Holocene	6.8	23	f-cSg	Gray, gravelly, fine to very coarse sand; gravels are few to common, very small to large pebbles; very loose; wet; becomes moderately compact below 10.5 fbs; compact below 20 fbs.
				23	26	cSg	Gray, gravelly, coarse to very coarses sand; gravels are few to common, very small pebbles; wet; compact.
				26	26.1	Zo	Organic-rich silt with woody debris; 0.5 inch thick.
				26.1	31.5	Z	Brown silt; very soft; wet; slight hydrogen sulfide odor.

Table B-1. Core Log Summary.

BORING	UTMs (Zone 10, NAD83) NORTHING	EASTING	STRATIGR-APHY	DEPTH (fbs) TOP	BOTTOM	LITHOLOGY	DESCRIPTION
GF-B-15A	558403.407	5314674.63	Fill	0	13	Sand	Brown, gravelly, fine to coarse sand with few building debris; gravels are few to common, very small to very large pebbles; wet; moderately compact; very loose below 5 fbs; gray to black below 10 fbs.
				13	18	Gravel	Black, slightly silty, gravel; wet; moderately compact.
			Holocene	18	28	f-cS	Dark gray to black, slightly silty, fine to coarse sand with trace shell fragments; few, very small to small pebbles below 25 fbs; very loose; wet.
				28	31.5	f-cSg	Gray, gravelly, fine to coarse sand with very few shell fragments; gravels are few to common, very small to large pebbles; trace of silt; very compact; wet.
HB-B-2	558549.459	5315028.561	Fill	0	0.3	Concrete	Concrete.
				0.3	1.3	Void	Empty void.
				1.3	2.9	Sand	Brown, slightly silty, gravelly, fine to coarse sand; moist.
			Holocene	5	8	f-cSg	Brown, gravelly, fine to coarse sand; trace of silt; moist to wet; color becomes brown to black below 6.5 fbs.
				10	15	f-cS	Dark brown to black, fine to coarse sand with few pebbles and trace of silt; wet.
HB-B-3	558528.739	5315014.26	Fill	0	0.7	Concrete	Concrete.
				0.7	1.3	Void	Empty void.
				1.3	2.9	Sand	Brown, fine to medium sand with very few pebbles; becomes fine to coarse sand at 2.5 fbs; moist.
			Holocene	5	5.5	f-cS	Brown, fine to coarse sand with very few pebbles; wet.
				5.5	6	W	Wood.
				6	9.5	f-cS	Brown, fine to coarse sand with very few pebbles; wet.
HB-MW-1	558507.404	5315027.084	Fill	0	1.3	Asphalt	Asphalt.
				1.3	2	Sand	Brown, slightly silty, fine to coarse sand with few pebbles; moist.
				5	6	Sand	Brown, fine to coarse sand with few pebbles and brick fragments; moist.
			Holocene	6	8.5	f-cSg	Black, slightly silty, gravelly, fine to coarse sand; gravels are common, small to large pebbles; wet.
				10	12	f-cS	Dark gray, fine to coarse sand with few, small to large pebbles; wet.
				12	12.5	W	Wood.
				12.5	15	f-cS	Gray, fine to coarse sand with few, small to large pebbles; wet.
HW-B-2	558458.965	5315044.854	Fill	0	0.5	Wood	Wood chips.
				0.5	3.5	Sand	Gray, gravelly, fine to very coarse sand; gravels are few to common, very small to large pebbles; very moist.
				3.5	4	Silt	Dark brown, gravelly, sandy silt; moist.

Table B-1. Core Log Summary.

BORING	UTMs (Zone 10, NAD83) NORTHING	EASTING	STRATIGR-APHY	DEPTH (fbs) TOP	BOTTOM	LITHOLOGY	DESCRIPTION
				4	4.8	Sand	Gray, gravelly, fine to very coarse sand; gravels are common, very small to large pebbles; wet.
				4.8	5.5	Silt	Dark brown, sandy silt; wet.
				5.5	6.5	Sand	Gray, gravelly, fine to very coarse sand; gravels are common, very small to large pebbles; wet.
				6.5	15	Silt	Gray, gravelly, sandy silt with scattered wood and organic debris; wet; becomes slightly clayey below 9 fbs.
MW-1	558353.754	5314709.511	Fill	0	0.5	Asphalt	Asphalt with gravel.
				0.5	1.5	Gravel	Brown to gray, silty, sandy, subrounded, small to very large pebbles; very moist; 2-inch thick bed of organic debris at 1 fbs.
				1.5	4	Sand	Brown, gravelly, fine to coarse sand; gravels are common, small to very large pebbles; very moist.
				4	4.5	Sand	Brown, very silty, fine to medium sand; very moist.
				4.5	8	Sand	Brown, fine to coarse sand with fill debris (charred wood, nails, ceramic fragments, black, and orange debris) between 4.75 and 6 fbs; very moist.
				8	9	Gravel	Gray, very sandy, rounded, small to large pebbles; wet.
				9	12	Sand	Gray, fine to coarse sand; wet.
				12	13	Silt	Gray, sandy silt; wet.
				13	15	Sand	Gray, fine to coarse sand with common silt laminae; wet.
MW-2	558371.086	5314700.402	Fill	0	0.5	Asphalt	Asphalt.
				0.5	4	Sand	Gray to brown, gravelly, fine to coarse sand; very moist.
				4	4.5	Brick	Debris including brick, wood and plastic.
				4.5	15	Gravel	Brown to gray, slightly sandy, very silty, sub-rounded, small to very large pebbles with historic debris including brick, plastic, tile/ceramics, wood; wet; becomes black below12 fbs.
MW-3	558440.108	5314702.097	Fill	0	0.5	Asphalt	Asphalt.
				0.5	2	Gravel	Gray, sandy, silty, sub-rounded, small to very large pebbles; very moist.
				2	4.5	Sand	Gray, fine to coarse sand with few, small to very large pebbles; wet.
			Holocene	4.5	7.5	f-mSz	Dark gray, silty, fine to medium sand with many shell fragments; wet.
				7.5	13.5	f-cS	Gray, fine to coarse sand; wet.
				13.5	14	f-mSz	Gray, silty, fine to medium sand; wet.
				14	15	f-cS	Gray, fine to coarse sand with few, small to large pebbles; wet.
MW-5	558366.856	5315260.038	Fill	0	1	Sand	Grass over topsoil.
				1	3	Silt	Brown to gray, fine to medium sandy, silt; very moist.
				3	11	Silt	Dark gray, sandy, gravelly silt; very moist.

Table B-1. Core Log Summary.

BORING	UTMs (Zone 10, NAD83) NORTHING	EASTING	STRATIGR-APHY	DEPTH (fbs) TOP	BOTTOM	LITHOLOGY	DESCRIPTION
				11	13	Silt	Organic-rich silt with many woody and organic debris: wet.
				13	15	Sand	Dark gray, fine to coarse sand with many shells and woody debris; wet.
MW-6	558315.292	5315053.852	Fill	0	0.5	Asphalt	Asphalt.
				0.5	1	Concrete	Concrete.
				1	4	Gravel	Dark gray, sandy, sub-rounded to angular, small to very large pebbles; moist.
				4	8.5	Sand	Dark gray, fine to medium sand with few shell fragments; moist.
				8.5	9	Rubble	Concrete rubble.
				9	11	Silt	Gray, slightly sandy, silt with few, small to large pebbles; moist.
				11	12	Clay	Grayish green, clay; moist.
				12	20	Silt	Gray, fine to medium sandy, silt with few, small to very large pebbles; moist; becomes wet below 16 fbs; wood debris at 17.5 fbs.
				20	25	Silt	Gray to dark gray, gravelly silt; wet.
NRP-B-04	558370.987	5315238.504	Fill	0	0.5	Asphalt	Asphalt.
				0.5	10	Gravel	Gray, sandy, angular, small to very large pebbles; trace to slightly silty; moist.
				10	20	Gravel	Gray, silty, angular, small to very large pebbles; wet; faint petroleum-like odor; rainbow sheen between 15 and 20 fbs.
NRP-B-07	558376.979	5315237.88	Fill	0	0.5	Asphalt	Asphalt, post-holed to 1 fbs due to utilities.
				0.5	3.25	Gravel	Brown, silty, sandy, angular, small to large pebbles; moist.
				3.25	4	Rubble	Concrete rubble.
				4	7	Gravel	Very silty, very sandy, angular, small to very large pebbles; few small cobbles; moist.
				7	14	Sand	Gray, fine to coarse sand; very moist; strong petroleum-like odor; heavy rainbow and bleb sheen; many organic debris at 9 fbs.
				14	15	Sand	Dark gray, very silty, fine to medium sand; wet.
				15	17	Sand	Gray, fine to medium sand; trace organics; wet.
				17	20	Sand	Dark gray, very silty, fine to medium sand; wet; wood at 19.75 fbs.
NRP-B-09	558508.069	5315247.218	Fill	0	0.5	Asphalt	Asphalt.
				0.5	3	Gravel	Brownish gray, sandy, angular gravel; crushed rock; moist.
				3	8.5	Silt	Dark gray, fine to medium sandy, silt; moist.
				8.5	9.5	Wood	Wood.
				9.5	10	Sand	Dark gray, fine to coarse sand; wet.
NRP-B-15	558495.378	5315234.536	Fill	0	0.5	Asphalt	Asphalt.
				0.5	2.5	Gravel	Light gray, angular pebbles; crushed rock; moist.
				2.5	6	Sand	Dark gray, very silty, fine to medium sand; moist.

Table B-1. Core Log Summary.

BORING	UTMs (Zone 10, NAD83) NORTHING	EASTING	STRATIGR-APHY	DEPTH (fbs) TOP	BOTTOM	LITHOLOGY	DESCRIPTION
				6	9	Silt	Gray, sandy silt; wet.
				9	10	Peat	Dark brown, peat; wet; (may be sawdust from mill).
NRP-B-16	558486.855	5315239.941	Fill	0	2	Asphalt	Asphalt, crushed rock and gravel.
				2	6.5	Silt	Dark gray, slightly sandy, silt; moist.
				6.5	7.5	Clay	Dark gray, silty clay; wet.
				7.5	9	Wood	Wood.
				9	10	Sand	Gray, fine to coarse sand; wet.
NRP-B-19	558385.296	5315232.214	Fill	0	0.5	Asphalt	Asphalt.
				0.5	2.5	Gravel	Gray, silty, angular gravel; crushed rock; moist.
				2.5	3.5	Sand	Light brown to dark gray, fine to medium sand with silt beds; moist.
				5	7	Silt	Dark gray, sandy silt; very moist to wet.
				7	14.5	Sand	Dark gray, coarse sand with very few shells; wet; very thin interbeds of wood and organic silt at 9.5 fbs; trace silt between 11 and 13 fbs.
				14.5	15	Wood	Wood.
NRP-B-20	558370.404	5315222.238	Fill	0	0.5	Asphalt	Asphalt
				0.5	2	Sand	Gray, very gravelly, very silty, fine to medium sand; moist.
				2	3.5	Sand	Gray, slightly silty, fine to medium sand; moist; thin bed of silt near 3.5 fbs.
				5	12.5	Sand	Gray, fine to very coarse sand with very few shells; wet.
				12.5	13.5	Sand	Dark gray, very silty, fine to medium sand; many organic and woody debris; wet.
				13.5	15	Sand	Gray, fine to coarse sand with trace organics; wet.
NRP-B-22	558375.905	5315247.315	Fill	0	0.5	Asphalt	Asphalt.
				0.5	3	Gravel	Gray, silty, angular gravels; crushed rock; moist.
				5	8	Gravel	Gray, silty, angular gravels; crushed rock; moist.
				10	10.5	Sand	Gray, gravelly, silty, fine to medium sand; wet.
				10.5	12.5	Sand	Dark gray, fine to medium sand with trace of silt; wet; sheen and strong petroleum-like odor at 11-12 fbs.
				15	16.5	Sand	Dark gray, fine to medium sand with many organic debris; wet.
				16.5	17	Wood	Wood.
				17	17.5	Sand	Dark gray, fine to medium sand with many organic debris; wet.
NRP-MW-5	558483.792	5315247.692	Fill	0	3	Gravel	Gray, slightly silty, fine to coarse sandy, angular, very small to very large pebbles; crushed rock.
				3	4	Silt	Gray to dark gray, clayey silt; moist.
				4	5.5	Sand	Dark gray, fine to medium sand; moist to wet.
				5.5	6	Gravel	Gray, sandy, silty, gravel; moist.
				6	7	Clay	Dark gray, silty, clay; wet.

Table B-1. Core Log Summary.

BORING	UTMs (Zone 10, NAD83) NORTHING	EASTING	STRATIGR-APHY	DEPTH (fbs) TOP	BOTTOM	LITHOLOGY	DESCRIPTION
				7	8	Gravel	Dark gray, very (fine to coarse) sandy, small to large pebbles with charred wood debris.
				8	15	Sand	Gray, fine to coarse sand; wet; slightly silty layer at 12 fbs; scattered shells at 13 fbs.
OMS-MW-01	558327.129	5314721.098	Fill	0	0.5	Gravel	Gravel surface.
				0.5	1	Sand	Brown, fine to coarse sand; moist.
				1	2	Sand	Brown, gravelly, fine to very coarse sand; gravels are few to common, very small to very large pebbles; moist.
				2	8	Sand	Brown, fine to very coarse sand with very few to few, small to large pebbles; moist.
				8	10	Gravel	Brown, very sandy, sub-rounded, small to large pebbles; moist.
				10	15	Sand	Brown, fine to coarse sand; wet; becomes dark gray below 13.5 fbs; hydrogen sulfide smell near 15 fbs.
REC1-MW-1	558543.368	5314681.471	Fill	0	0.7	Concrete	Concrete.
				0.7	1.2	Void	Empty void.
				1.2	2.8	Sand	Gray, fine to coarse sand; moist.
				5	6	Sand	Gray, slightly silty, fine to coarse sand with very few, small to very large pebbles; wet.
				6	8	Sand	Gray, very gravelly, fine to coarse sand; wet.
				10	11	Sand	Gray, gravelly, fine to coarse sand; wet.
			Holocene	11	14	Zo	Organic-rich silt; woody; very moist to wet.
REC1-MW-2	558489.627	5314661.796	Fill	0	0.8	Concrete	Concrete.
				0.8	1.2	Void	Empty void.
				1.2	2	Sand	Brown, gravelly, fine to very coarse sand; gravels are common, very small to very large pebbles; moist.
				2	2.5	Wood	Wood.
			Holocene	2.5	3.8	f-cS	Brown, fine to medium sand with few, small to very large pebbles; moist.
				5	8	f-cS	Brown, fine to coarse sand with few, small to very large pebbles; moist.
				8	9	f-mSz	Gray, silty, fine to medium sand; we.
				10	20	f-cSg	Gray, fine to very coarse sand with few, small to large pebbles.
REC1-MW-3	558481.904	5314684.582	Fill	0	0.7	Concrete	Concrete.
				0.7	0.9	Void	Empty void.
				0.9	3.4	Sand	Brown, gravelly, fine to very coarse sand; moist.
			Holocene	5	6.5	f-mS	Brown, fine to medium sand with few, small to very large pebbles and scattered shells; moist.
				6.5	7	f-mSz	Gray, silty, fine to medium sand; wet.

Table B-1. Core Log Summary.

BORING	UTMs (Zone 10, NAD83) NORTHING	EASTING	STRATIGRAPHY	DEPTH (fbs) TOP	BOTTOM	LITHOLOGY	DESCRIPTION
				7	8.5	f-cSg	Gray, gravelly, fine to very coarse sand with many shells; gravels are few to common, very small pebbles; wet.
				10	17.5	f-cS	Gray, fine to coarse sand; wet.
				17.5	20	f-cSz	Gray, fine to coarse sand interbedded with silt in thin interbeds; many organic debris in silt beds.
				20	25	f-cS	Brown to gray, fine to coarse sand with very few, small to large pebbles; wet.
REC1-MW-5	558427.6	5314645.633	Fill	0	0.3	Asphalt	Asphalt.
				0.3	1	Concrete	Concrete.
				1	4	Sand	Brown, fine to very coarse sand; moist; pocket of fine to medium sand at 2 fbs.
				5	9	Sand	Brown, fine to very coarse sand; moist.
			Holocene	10	12	f-mS	Dark gray, fine to medium sand; sheen and petroleum-like odor; wet.
				12	15	cSg	Gravelly, coarse sand.
				15	23.5	f-cS	Fine to very coarse sand with very few, small to very large pebbles; trace silt; wood at 16.5 fbs; pocket of silt at 19 fbs.
				23.5	24	Z	Brown silt; wet.
				24	25	f-cS	Gray, fine to very coarse sand; wet.
REC1-MW-6	558488.544	5314615.306	Fill	0	0.7	Concrete	Concrete.
				0.7	7	Void	Void.
				7	7.5	Gravel	Dark brown, silty, sandy gravel; moist.
				7.5	8.5	Silt	Brown, fine to medium sandy, silt; becomes gravelly below 8 fbs.
				8.5	9	Sand	Gray, fine to very coarse sand with few, small to very large pebbles; wet.
				10	10.5	Sand	Gray, fine to very coarse sand with few, small to very large pebbles; wet.
				10.5	11.5	Silt	Mottled brown and gray, gravelly, fine to very coarse sandy, silt; gravels are common, angular, small to large pebbles; wet.
			Holocene	11.5	12.5	P	Brown, fibrous peat; wet.
				12.5	13.5	Gsz	Gray, sandy, silty, small to very large pebbles with many organic debris; wet.
				15	16.5	f-cSg	Gray, very gravelly, fine to very coarse sand; wet.
				16.5	18	P	Brown, fibrous peat; wet.
REC1-MW-7	558449.147	5314616.841	Fill	0	0.9	Concrete	Concrete.
				0.9	5.1	Void	Empty void.
				5.1	7.5	Sand	Brown, slightly silty, fine to medium sand with very few pebbles; moist.
				7.5	8.5	Sand	Gray, silty, sand with few, small to very large pebbles; wet.
			Holocene	10	12	Zs	Brown to gray, sandy silt with very few pebbles; wet; wood at 11.5 fbs.

Table B-1. Core Log Summary.

BORING	UTMs (Zone 10, NAD83) NORTHING	EASTING	STRATIGR-APHY	DEPTH (fbs) TOP	BOTTOM	LITHOLOGY	DESCRIPTION
				12	12.5	f-cS	Gray, fine to very coarse sand with very few pebbles; wet.
				12.5	13.5	Zc	Gray, clayey silt; wet.
				13.5	14	f-cS	Gray, fine to very coarse sand; wet.
				15	15.5	f-cS	Gray, fine to very coarse sand; wet.
				15.5	16.5	Zc	Brownish gray, clayey silt; numerous organics; wet.
				16.5	17.5	f-cS	Gray, fine to very coarse sand; wet.
REC1-MW-8	558405.958	5314644.789	Fill	0	0.5	Asphalt	Asphalt.
				0.5	2.5	Sand	Brown, gravelly, silty, fine to very coarse sand; moist.
				2.5	3.5	Sand	Brown, fine to very coarse sand with very few pebbles; brick debris; moist.
				3.5	4	Gravel	Black, silty, fine to medium sandy, small pebbles to cobbles; moist.
				5	6	Sand	Brown, gravelly, fine to very coarse sand; moist.
				6	7	Gravel	Black, silty, fine to medium sandy, small pebbles to cobbles; moist.
				7	8	Gravel	Brown, sandy gravel; wet.
				10	10.5	Sand	Brownish gray, gravelly, fine to very coarse sand; gravels are few to common, very small pebbles; wet.
				10.5	13.5	Gravel	Brown to black, sandy, small pebbles to cobbles; wet; becomes red at 13 fbs.
			Holocene	15	20	f-cS	Gray, fine to very coarse sand with very few, small to very large pebbles; wet.
REC1-MW-9	558384.153	5314653.126	Fill	0	0.5	Asphalt	Asphalt.
				0.5	1	Sand	Brown, slightly silty, fine to medium sand; moist.
				1	2	Gravel	Dark brown to dark gray, silty, sandy, sub-rounded, small to large pebbles; fill debris.
				2	3	Sand	Brown, very silty, fine to medium sand with fill debris and very few pebbles; very moist.
				5	8	Sand	Dark brown to black, silty, very gravelly, fine to medium sand with brick and other fill debris; very moist; gravels decrease below 6.5 fbs.
				8	9	Sand	Dark gray, gravelly sand; wet.
				10	11	Sand	Brown, gravelly sand; wet.
				11	12	Sand	Gray, silty, gravelly, fine to very coarse sand; wet.
				12	14.5	Sand	Black, gravelly, fine to very coarse sand; wet; becomes brown below 13.5 fbs.
			Holocene	14.5	15	f-cSzg	Dark brown, gravelly, very silty, fine to medium sand; wet.
REC2-B-1	558527.528	5314724.121	Fill	0	0.5	Concrete	Concrete.
				0.5	1.5	Void	Void.
				1.5	3	Sand	Brown, gravelly, fine to very coarse sand; gravels are common, very small to large pebbles.

Table B-1. Core Log Summary.

BORING	UTMs (Zone 10, NAD83) NORTHING	EASTING	STRATIGR-APHY	DEPTH (fbs) TOP	BOTTOM	LITHOLOGY	DESCRIPTION
				3	5.5	Sand	Brown, gravelly, fine to medium sand; gravels are common, small to large pebbles; moist.
				5.5	7.5	Sand	Brown, gravelly, fine to very coarse sand; gravels are common, very small to large pebbles; moist.
			Holocene	7.5	10	f-cS	Dark gray, fine to medium sand with scattered shells; wet.
REC2-MW-5	558519.469	5314763.228	Fill	0	0.5	Asphalt	Asphalt.
				0.5	3	Sand	Dark gray to black, very silty, fine to medium sand with few, small to very large pebbles; moist; petroleum-like odor; slight bleb sheen from 0-2 fbs.
			Holocene	3	8.7	f-cS	Gray, slightly silty, fine to very coarse sand with few, small to very large pebbles; wet.
				8.7	9	Z	Gray silt; wet.
				9	9.7	f-mS	Dark gray, fine to medium sand; wet.
				9.7	10	Z	Gray silt; wet.
				10	13	f-mS	Dark gray, slightly silty, fine to medium sand; wet; many shell fragments below 12.5 fbs.
REC3-MW-1	558263.503	5314851.458	Fill	0	0.7	Concrete	Concrete; 8 inches thick.
				0.7	15	Sand	Brown, fine to very coarse sand with very few pebbles; trace to slightly silty; moist; wet below 11 fbs; 1-inch thick lens of silt at 14 fbs.
REC5-MW-1	558322.16	5314909.506	Fill	0	1	Concrete	Concrete.
				1	6.5	Sand	Dark gray , fine to very coarse sand with very few pebbles; moist; fine to medium sand at 3 fbs; wood at 4 fbs.
				6.5	8.5	Sand	Gray, silty, fine to medium sand; wet.
				8.5	12	Sand	Gray, fine to very coarse sand with very few, very small pebbles; wet.
				12	14	Sand	Dark gray, very silty, fine to medium sand; wood at 12.5 fbs; wet.
				14	14.5	Silt	Gray silt with common, organic debris and shell fragments; wet.
				14.5	15	Sand	Gray, very silty, fine to medium sand; wet.
REC6-MW-1	558447.012	5315075.183	Fill	0	0.5	Concrete	Concrete.
				0.5	2.5	Gravel	Pea gravel; white liquid at bottom of pea gravel.
				2.5	3.5	Sand	Brown, fine to very coarse sand; wet.
				3.5	5	Gravel	Pea gravel.
				5	12.5	Silt	Dark gray, sandy silt with very few pebbles; strong sweet odor.
REC6-MW-2	558342.278	5315088.956	Fill	0	0.5	Asphalt	Asphalt.
				0.5	2	Wood	Wood chips; post-holed for utilities.
				2	4.5	Gravel	Dark gray, sandy, very silty, small to very large pebbles; moist.
				4.5	5	Wood	Wood chips.
				5	7.5	Gravel	Dark gray, very silty, sub-rounded, small to very large pebbles; wet.

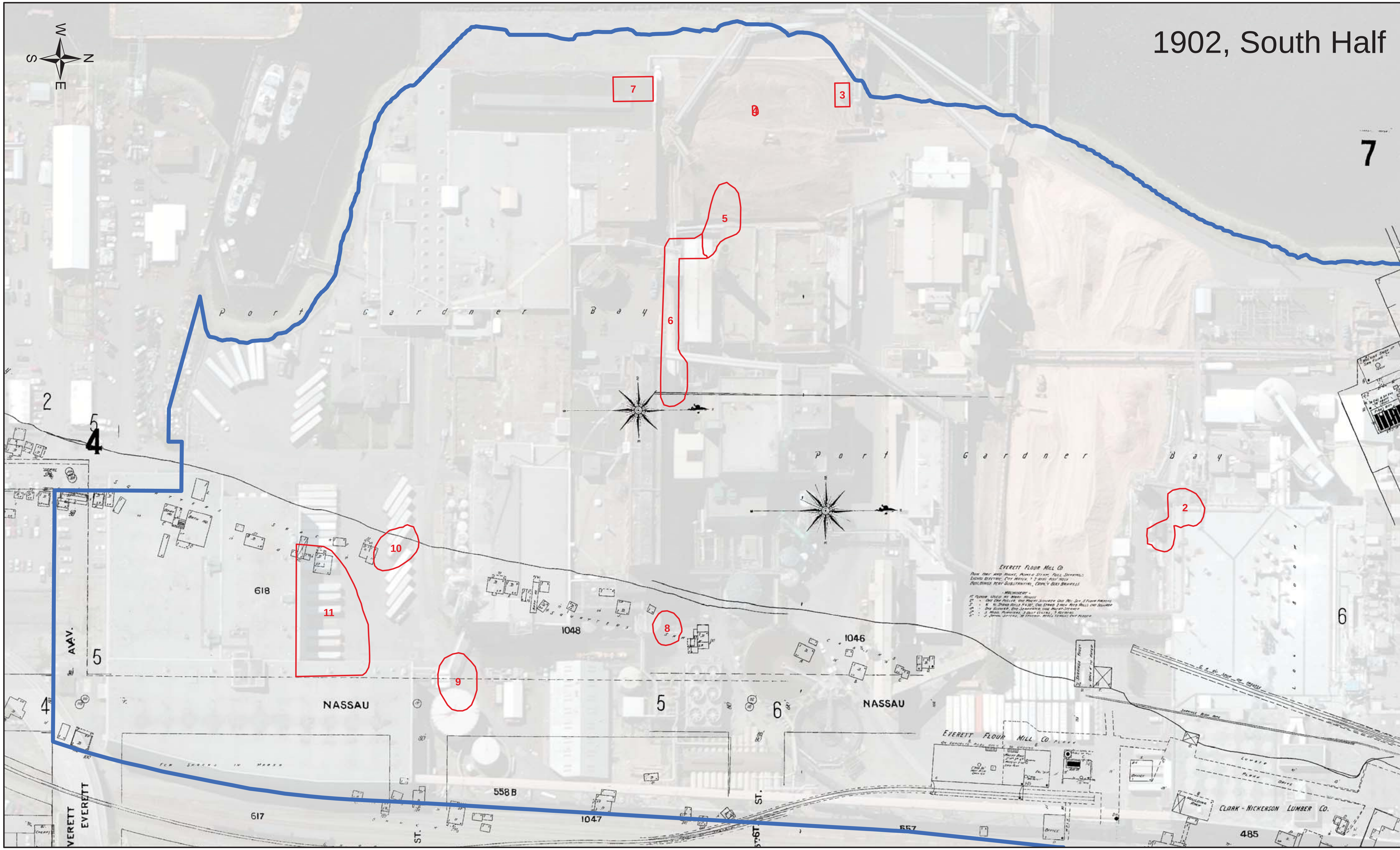
Table B-1. Core Log Summary.

BORING	UTMs (Zone 10, NAD83) NORTHING	EASTING	STRATIGR-APHY	DEPTH (fbs) TOP	BOTTOM	LITHOLOGY	DESCRIPTION
				7.5	10.5	Silt	Mottled gray and brown, slightly sandy, gravelly silt; wet.
				10.5	15	Gravel	Black to dark gray, very sandy, very silty, sub-rounded to sub-angular, small to very large pebbles; slight hydrogen sulfide odor.
REC7-MW-1	558393.286	5315329.502	Fill	0	2	Gravel	Gravel fill.
				2	3.5	Sand	Brown, silty, gravelly, fine to medium sand with iron staining.
				3.5	4.5	Silt	Gray silt; moist.
				4.5	6	Sand	Gray, fine to medium sand; moist.
				6	15	Sand	Brown to gray, coarse to very coarse sand; woody debris at 7 fbs; becomes wet with few shell fragments at 7.5 fbs; many organic debris between 11 and 15 fbs.
REC7-MW-2	558348.344	5315171.238	Fill	0	0.5	Asphalt	Asphalt.
				0.5	4.5	Silt	Brown, sandy, very gravelly, silt; gravels are many, sub-rounded, small to large pebbles.
				4.5	5	Cinders	Black, charred debris.
				5	7.5	Sand	Brown, silty, fine to medium sand; wet; becomes gray at 7 fbs.
				7.5	15	Sand	Dark gray, coarse to very coarse sand.
REC7-MW-3	558272.176	5314737.262	Fill	3	4	Rubble	Concrete rubble.
				4	5	Silt	Brown silt; moist; many woody organic debris at 4.5 fbs.
				5	8	Rubble	Concrete rubble.
				8	9	Sand	Brown, silty, fine to medium sand; wet.
				9	14.5	Sand	Brown, fine to medium sand, grading to coarse to very coarse sand below 10 fbs; wet.
				14.5	15	Sand	Brown, gravelly, coarse to very coarse sand.
UG-MW-1	558587.288	5315237.815	Fill	0	2.5	Gravel	Asphalt debris, crushed rock and gravel fill.
				2.5	5.5	Sand	Dark gray, fine to medium sand; wood debris at 4 fbs.
				5.5	12.5	Silt	Dark gray, slightly clayey, slightly sandy, silt with many wood and organic debris below 8 fbs, may be mill wood waste.
			Holocene	12.5	15	f-cSg	Gray, gravelly, fine to very coarse sand; gravels are few to common, very small to large pebbles; wet.
UG-MW-2	558557.778	5314939.763	Fill	0	1	Concrete	Concrete.
				1	2.5	Sand	Dark gray, sand with brick debris.
				2.5	7.5	Silt	Dark gray, silt with very few pebbles; moist to wet.
			Holocene	7.5	13.5	f-cSg	Dark gray, gravelly, fine to very coarse sand; gravels are few to common, very small to very large pebbles; wet; orangish gray color from 9-12.5 fbs.
				13.5	15	Zs	Dark gray, fine to medium sandy silt.

Table B-1. Core Log Summary.

BORING	UTMs (Zone 10, NAD83) NORTHING	EASTING	STRATIGR-APHY	DEPTH (fbs) TOP	BOTTOM	LITHOLOGY	DESCRIPTION
UST68-MW-1	558414.396	5314758.451	Fill	0	0.5	Asphalt	
				0.5	6	Sand	Brown, fine to medium sand; moist.
				6	6.5	Silt	Gray silt; very moist.
				6.5	14	Sand	Brown, fine to medium sand; wet; becomes gray below 8 fbs; 2-inch thick layer of silt at 9 fbs.
			Holocene	14	15	f-mSz	Gray, silty, fine to medium sand; wet.
UST69-MW-1	558410.753	5315082.183	Fill	0	0.5	Asphalt	Asphalt.
				2	11.75	Sand	Brown, fine to very coarse sand with few pebbles; moist.
				11.75	12	Silt	Silt lens, 4 inches thick.
				12	14.5	Sand	Dark gray, fine to medium sand.
				14.5	15	Wood	Wood debris.
UST70-B-2	558272.735	5314884.485	Fill	0	1	Wood	Wood chips - hogged fuel.
				1	4	Sand	Brown sand with few pebbles; moist.
				4	8	Sand	Dark brown, slightly silty, sand; moist.
				8	9	Rubble	Concrete rubble.
				9	15	Sand	Gray, slightly silty, gravelly, fine to very coarse sand; gravels are common, small to very large pebbles; wet.
UST71-B-4	558311.734	5314874.365	Fill	0	2.5	Wood	Wood chips - hogged fuel.
				2.5	5	Gravel	Gray, sandy, very silty, sub-rounded, small to large pebbles; moist;
				5	10.5	Gravel	Gray, small to very large pebbles.
				10.5	14	Sand	Dark brown, very silty, fine to medium sand; wet.
				14	30	Sand	Gray, fine to medium sand with a bed of coarse sand between 18 and 19 fbs.

APPENDIX C: SANBORN MAPS



Sanborn Map Company Insurance Map of Everett, Washington, 1902, Sheets 4, 5, & 6.

0 50 100 150 200 Feet

0 10 20 30 40 50 Meters

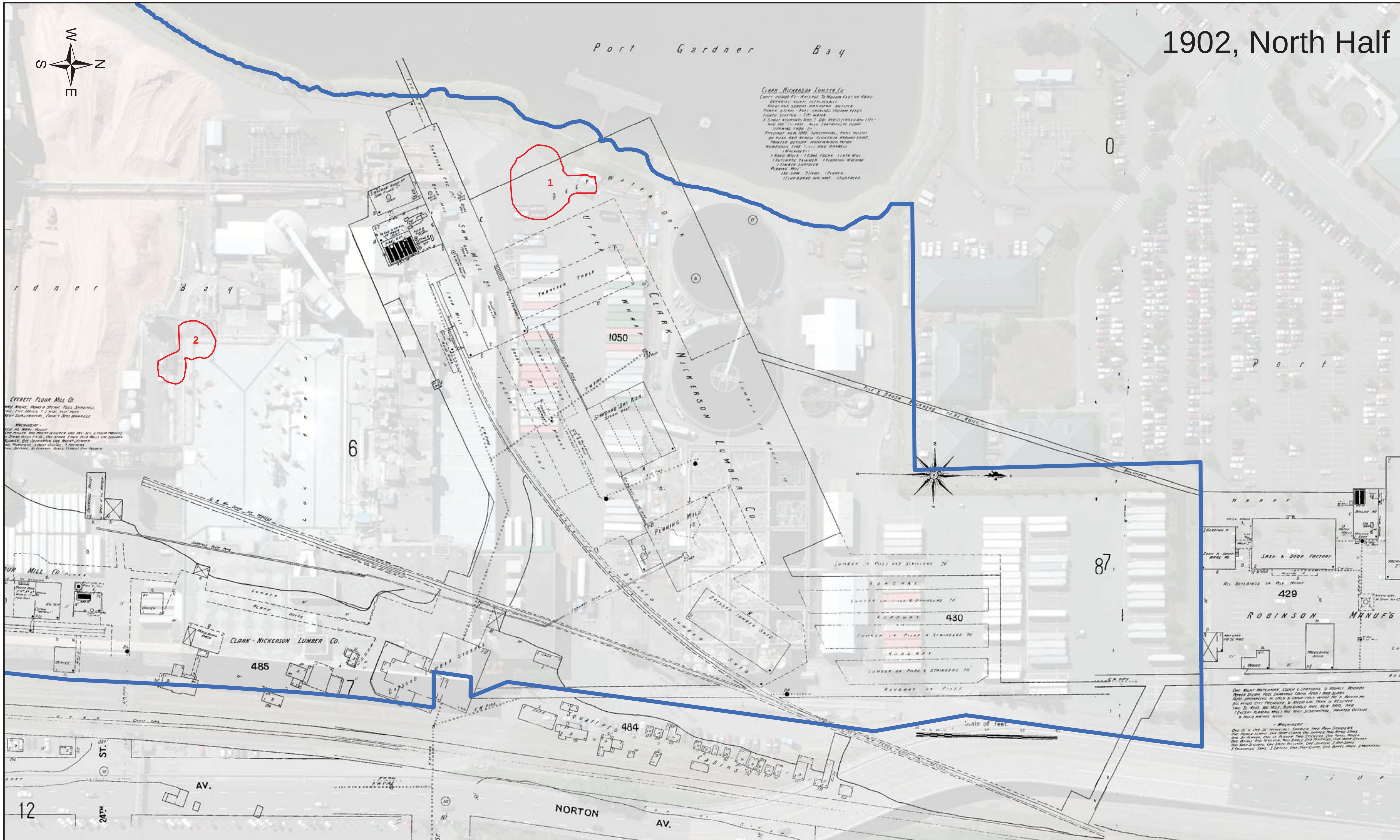
Legend

Proposed Cleanup Area

Project Boundary

Map 1 of 6

SWCA Environmental Consultants



Sanborn Map Company Insurance Map of Everett, Washington, 1902, Sheets 6, 7, & 8.

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0 10 20 30 40 50 Meters

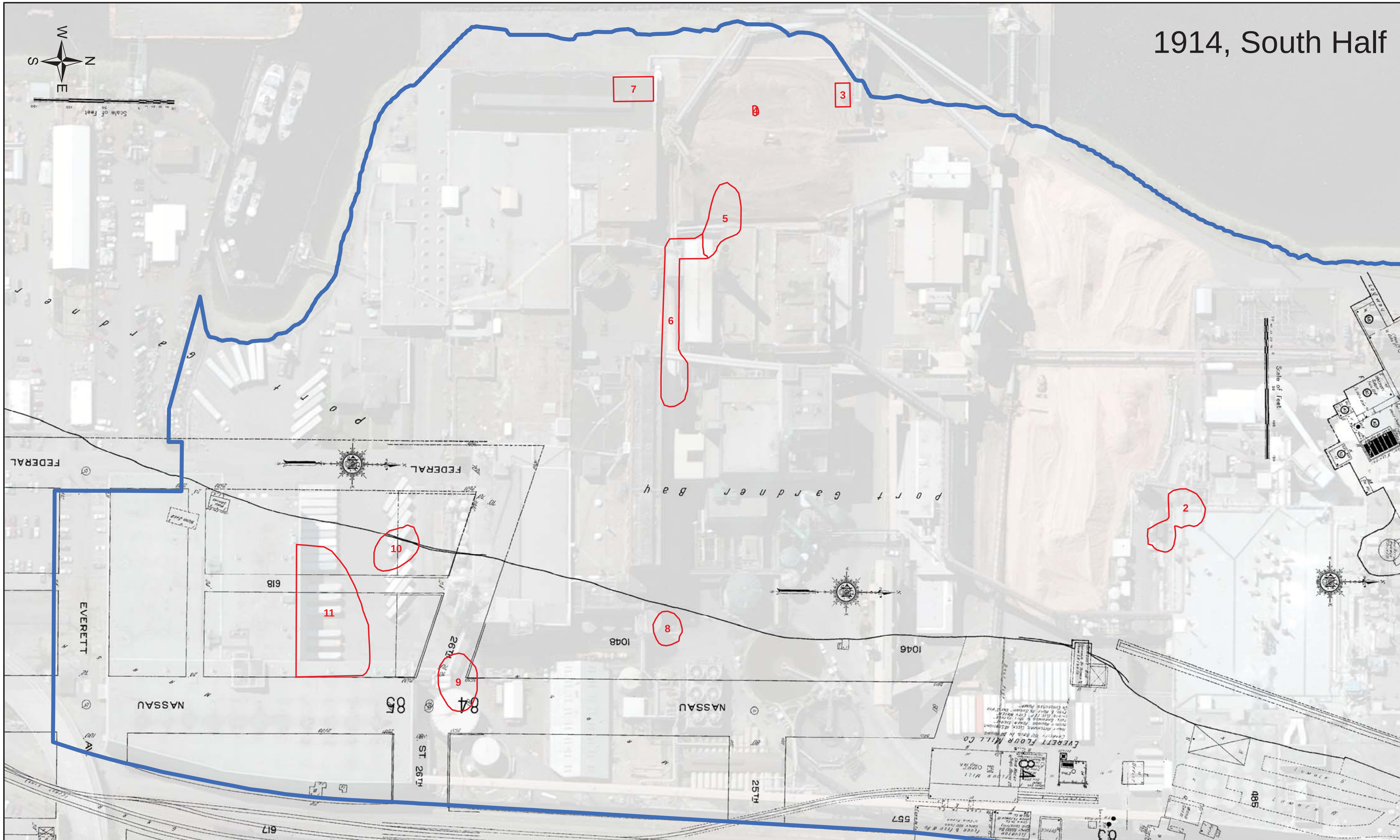
Legend

Proposed Cleanup Area

Project Boundary

Map 2 of 6

SWCA Environmental Consultants



Sanborn Map Company Insurance Maps of Everett, including Lowell, Washington, 1914, Sheets 83, 84, & 85.

0 50 100 150 200 Feet

0 10 20 30 40 50 Meters

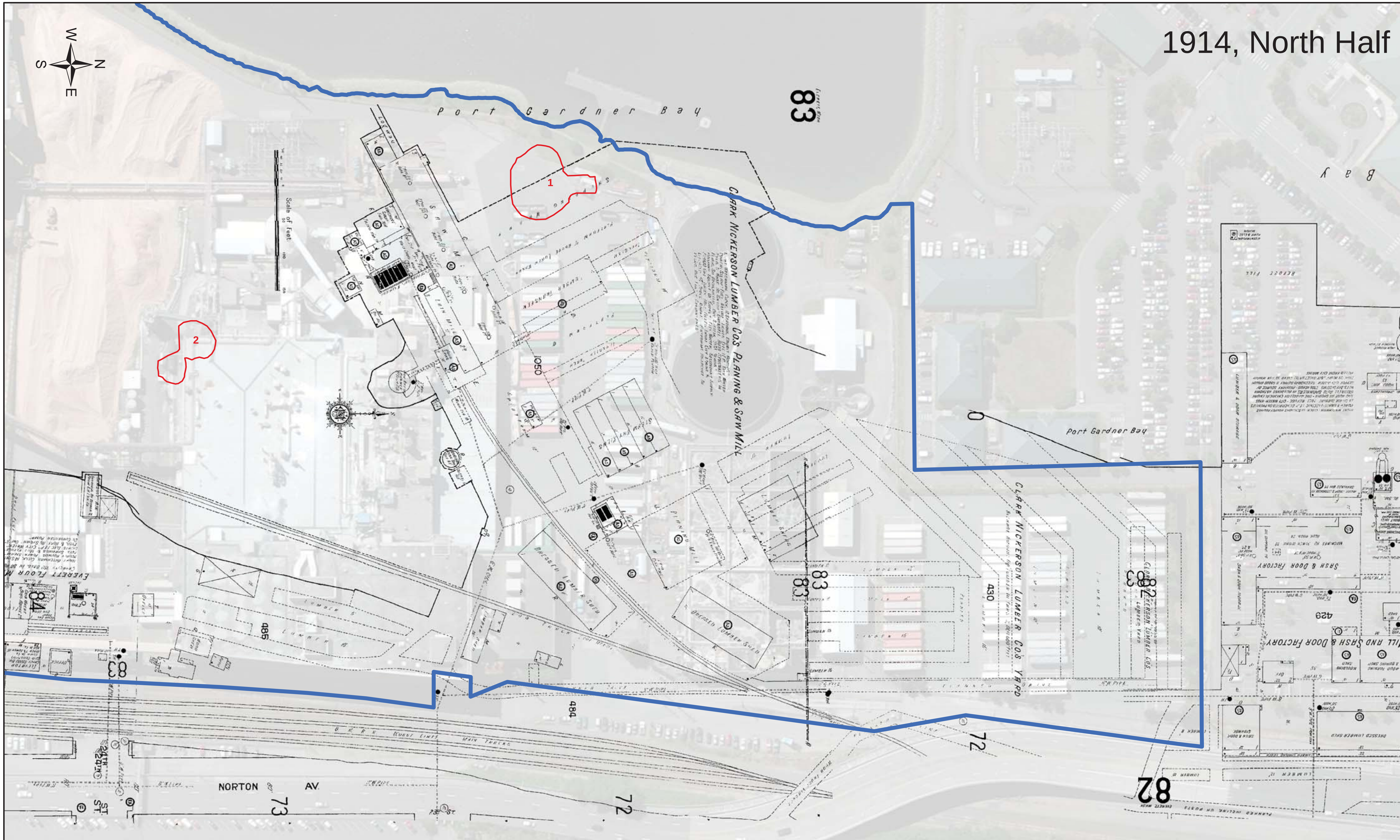
Legend

Proposed Cleanup Area

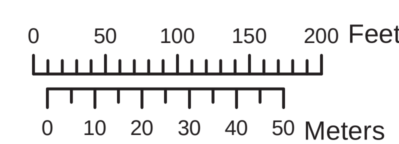
Project Boundary

Map 3 of 6

SWCA Environmental Consultants



Sanborn Map Company Insurance Maps of Everett, including Lowell, Washington, 1914, Sheets 82 & 83.



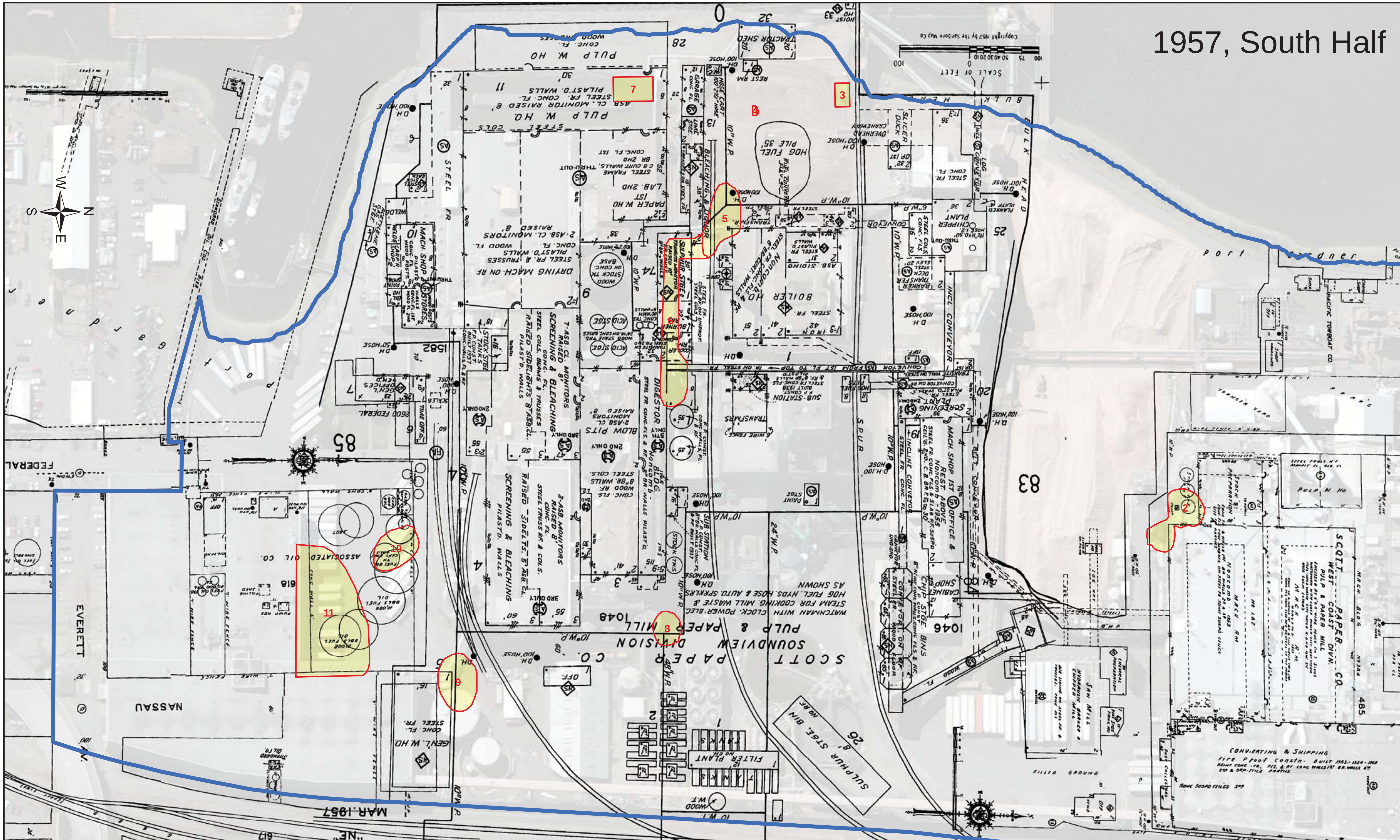
Legend

Proposed Cleanup Area

Project Boundary

Map 4 of 6

SWCA Environmental Consultants



Sanborn Map Company Insurance Maps of Everett, Washington, 1957, Volume 1, Sheets 83, 84, & 85.

0 50 100 150 200 Feet

0 10 20 30 40 50 Meters

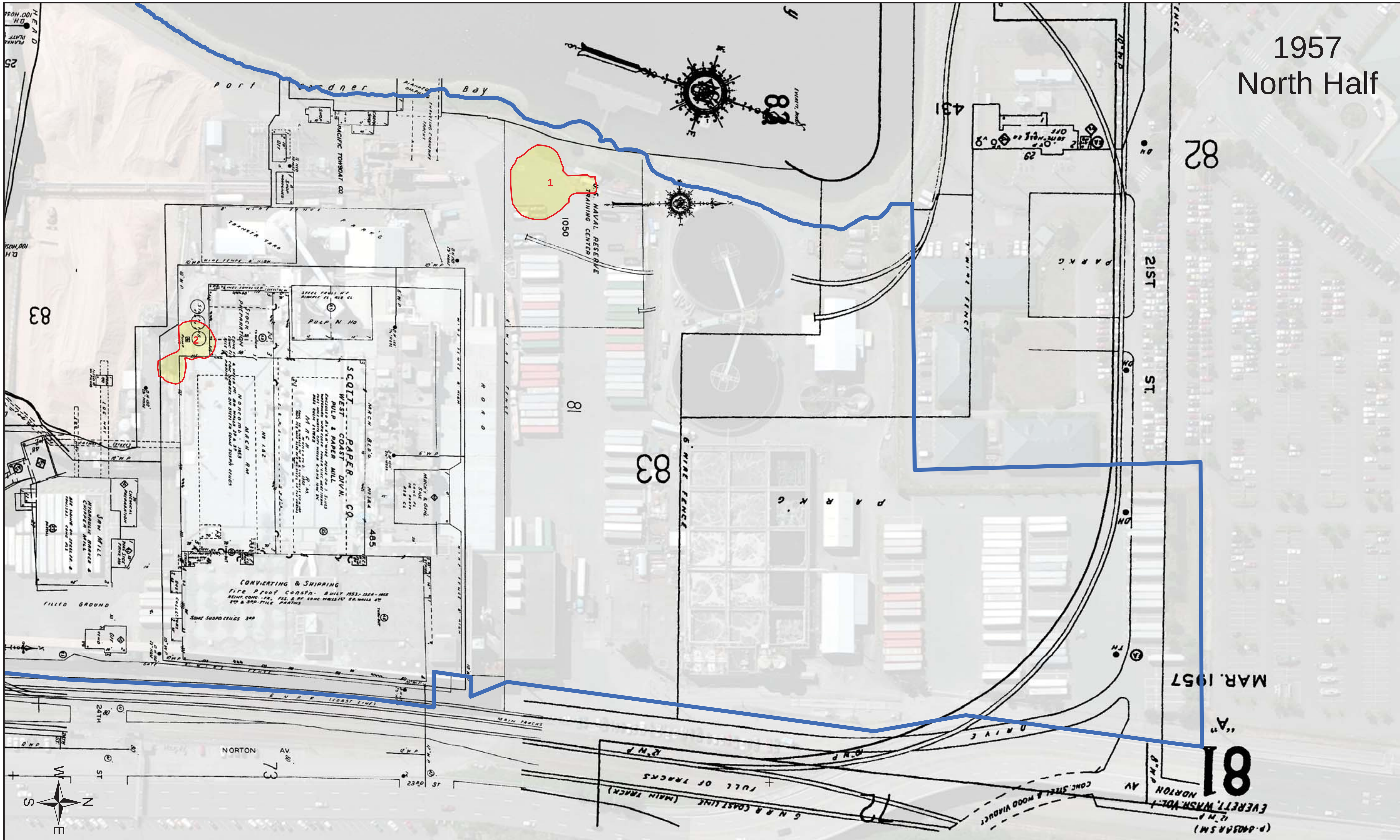
Legend

Proposed Cleanup Area

Project Boundary

Map 5 of 6

SWCA Environmental Consultants



Map 6 of 6

Sanborn Map Company Insurance Maps of Everett, Washington, 1957, Volume 1, Sheets 81 & 83.

SWCA Environmental Consultants

ATTACHMENT 8

Cultural Resources Monitoring and Discovery Plan

June 16, 2021

Port of Everett
P.O. Box 538
Everett, Washington 98206

Attn: Erik Gerking

Transmitted via email to: *erikg@portofeverett.com*

Re: Cultural Resources Monitoring and Discovery Plan
Kimberly-Clark Upland Site
Everett, Washington

Dear Erik:

As required for implementation of the Kimberly-Clark 3rd Interim Action, the Port of Everett shall implement a Cultural Resources Monitoring and Discovery Plan (M&D Plan) during intrusive activities at the former Kimberly-Clark Worldwide upland site (Site). An M&D Plan was prepared for the Site in 2013 by SWCA/Northwest Archaeological Associates; this document is provided as Attachment 1 to this letter. An updated Project Contact page has been prepared for this 3rd Interim Action and is provided as Attachment 2. Per requests from the Washington State Department of Ecology, this M&D Plan and updated Project Contact page shall be implemented during the 3rd Interim Action at the Site.

LANDAU ASSOCIATES, INC.

Dylan Frazer, LG
Associate Geologist

DHF/ljl
[P:\121\049\R\CULTURAL RESOURCES MDP\CULTURAL RESOURCES MONITORING AND DISCOVERY_COVER LETTER.DOCX]

Attachments

Attachment 1: Cultural Resources Monitoring and Discovery Plan
Attachment 2: 3rd Interim Action Project Contacts

ATTACHMENT 1

Cultural Resources Monitoring and Discovery Plan

CULTURAL RESOURCES MONITORING AND DISCOVERY PLAN FOR THE KIMBERLY-CLARK WORLDWIDE SITE UPLAND AREA, EVERETT, SNOHOMISH COUNTY, WASHINGTON

Report Prepared for

Aspect Consulting LLC
401 Second Avenue S., Suite 201
Seattle, WA 98104

By

Brandy A. Rinck

August 16, 2013

Report Number 24976.02

SWCA/Northwest Archaeological Associates
5418 - 20th Avenue NW, Suite 200
Seattle, Washington 98107

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LIST OF FIGURES

INTRODUCTION

The Kimberly-Clark Worldwide (K-C WW) upland area was developed for pulp and paper manufacturing and operated as the same for nearly a century. The Department of Ecology and K-C WW, Inc. have executed an Agreed Order to complete studies related to contamination on the property and future cleanup of the area as well as opportunistic interim action cleanup activities during demolition of the historic pulp and paper mill. A cultural resources assessment that included background information on the setting of the project area, expectations for buried cultural resources based on previous investigations in the vicinity, and a GIS-based probability map showing areas with low, medium, and high potential to harbor significant archaeological materials was prepared as required by the Interim Action Plan (Rinck et al. 2013). This monitoring and discovery plan was developed for use during opportunistic cleanup according to recommendations made in that assessment.

Project Location and Description

The project is in Section 19 of Township 29 North, Range 5 East, Willamette Meridian (Figure 1). The K-C WW property includes about 56 acres of uplands and 12 acres of adjacent tidelands. The west property boundary is adjacent to the East Waterway in Port Gardner Bay of Possession Sound and the east property boundary is at the BNSF Railroad right-of-way. The north project boundary is at the foot of 21st Street and the south project boundary is at the foot of Everett Avenue.

Most of the contamination to be cleaned up is within historical fill, but some cleanup excavations may penetrate into underlying naturally deposited sediment. Because all the contaminated areas to be targeted during interim action are not currently known, excavation quantities and dimensions cannot yet be estimated. No vegetation removal or in-water work, including dredging, drilling, dumping, filling, mining, bulk-heading, pile driving, or piling removal will occur during the opportunistic interim action cleanup efforts. At the time of the cultural resources assessment, 11 specific areas were identified where opportunistic cleanup will occur, including the Naval Reserve Parcel UST area (1), Xylene UST 29/Latex Spill (2), Rail Car Dumper Hydraulic System Building (3), Diesel UST 70 (4), Bunker C USTs71/72/73 (5), Boiler/Baghouse Area (6), Heavy Duty Shop sump (7), GF 11 (8), Diesel AST Area (9), Bunker C ASTa (10), Bunker C ASTb (11) (Figure 2). Additional areas may be identified for opportunistic cleanup as demolition proceeds.

Regulatory Setting

The project is subject to the Washington State Environmental Policy Act (SEPA) that requires the project proponent to identify any places or objects listed on, or eligible for national, state, or local preservation registers in the vicinity of the project. The regulation also requires proponents to describe evidence for sites of historic, archaeological, scientific, or cultural importance in the vicinity of a project, and describe proposed measures to reduce or control impacts to those sites. Agencies are encouraged by SEPA to consult with others to find acceptable ways to avoid or mitigate any adverse impacts that may be caused by the project.

The project is also subject to several Washington state laws pertaining to archaeological cultural resources. For example, the Archaeological Sites and Resources Act [RCW 27.53] prohibits knowingly excavating or disturbing prehistoric and historic archaeological sites on public or private land. The Indian Graves and Records Act [RCW 27.44] prohibits knowingly destroying American Indian graves and provides that inadvertent disturbance through construction or other activities requires re-interment under supervision of the appropriate Indian tribe. In order to prevent the looting or depredation of

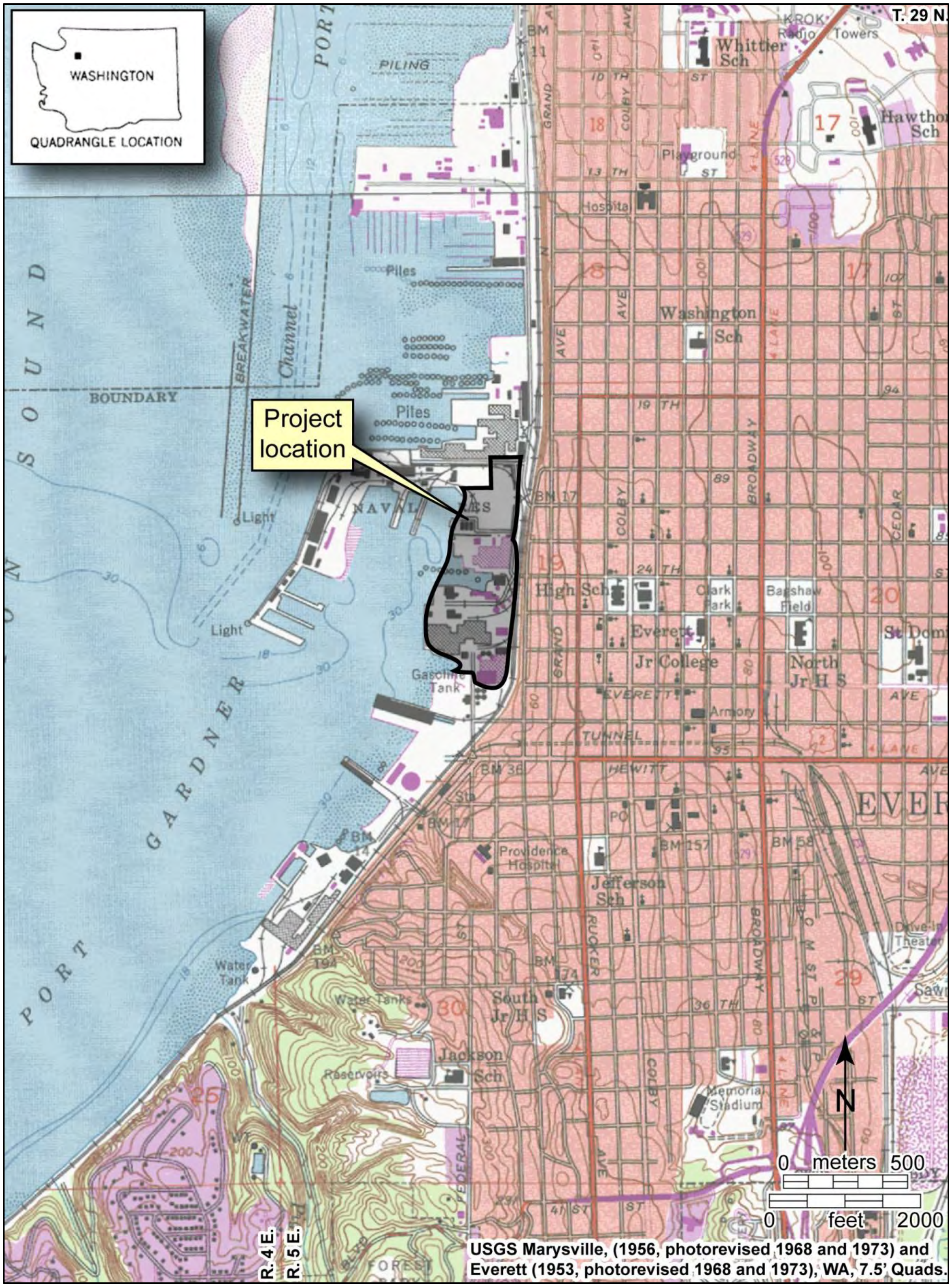

Figure 1. Project location.

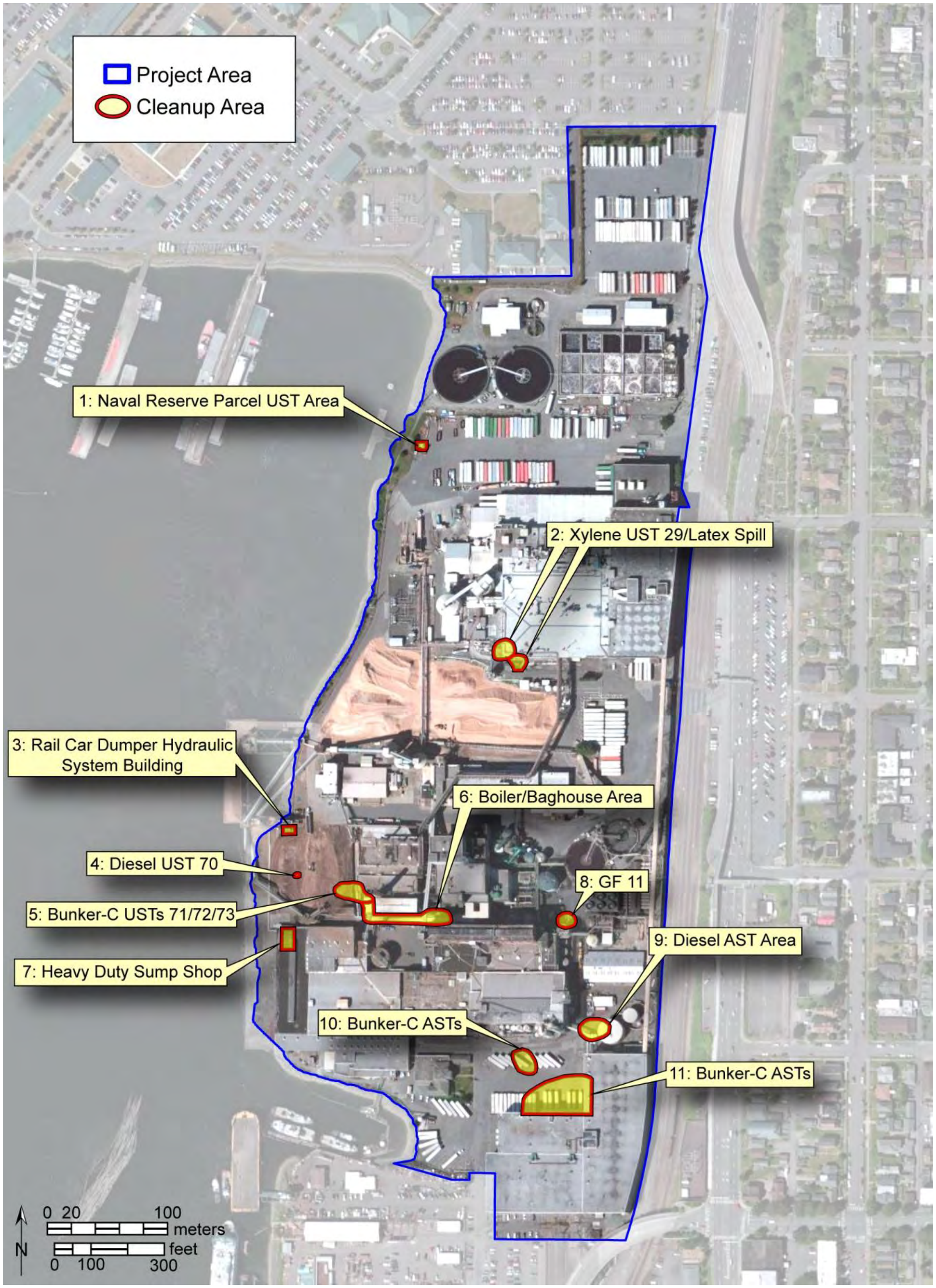

Figure 2. Proposed opportunistic cleanup locations in the K-C WW upland area.

sites, any maps, records, or other information identifying the location of archaeological sites, historic sites, artifacts, or the site of traditional ceremonial, or social uses and activities of Indian Tribes are also exempt from disclosure [RCW 42.56.300].

The Tulalip Tribes have communicated to Ecology that the Everett waterfront is a very culturally sensitive area. The previous cultural resources assessment was completed due to the Tribe's and other interested parties' concern for cultural resources in the K-C WW upland vicinity.

Archaeological Background

The K-C WW upland area is on the east side of the East Waterway, which was historically dredged between the mainland shoreline and the Snohomish River estuary (Eldridge and Orlob 1951). Variable amounts of fill are present across the entire surface of the K-C WW upland area. Some of the fill came from dredging the East Waterway or other dredging that took place on the Snohomish River delta. Fill in the project area also originated as mill waste and was dumped directly into Port Gardner from the shoreline (Orlob and Eldridge 1954). Natural deposits below the fill include sediments deposited in backshore, beach, foreshore, marsh, and sub-tidal deltaic environments. There is potential for pre-contact and early historical cultural materials to be buried deeply below the fill along the historical shoreline where beach alluvium, backshore alluvium, and glacial soils are below the urban land. There, the fill is slightly thinner and cultural materials, if present, would not be as deeply buried compared to the west half of the project area where fill was deposited on the foreshore and into the marsh and Port Gardner. The fill could harbor stable surfaces with potential for historical cultural materials, as well.

People have lived on the accessible shores of Port Gardner Bay for thousands of years. Native people used the Everett shoreline for shellfish collection, hunting, plant gathering and fishing and several ethnographic villages and camps were near the project area (Baenen 1981; Haeberlin and Gunther 1930; Smith 1940, 1941; Swanton 1968; Twedell 1974; Waterman et al 2001). The shorelines were developed quickly after the Euroamericans arrived to the region and then converted their interests from exploration to settlement. Land in the project area transferred hands from early settlers, such as Dennis Brigham, Erskine Kromer, John King, and Wyatt Rucker, to larger companies, such as the Clark-Nickerson Lumber Company and the Everett Flour Mill. Around 1929, the Puget Sound Pulp and Timber Company consolidated holdings across most of the project area and they expanded the piers and wharves greatly. Later, the Soundview Pulp Company took over the property and they continued to expand the mill site. The Soundview Pulp Company merged with the Scott Paper Company around 1950 and Scott merged with the Kimberly Clark Corporation in 1995. Mill operations ended in April 2012 and the last of the Everett waterfront mills shut down permanently. For more information about the setting of the project, please review the initial cultural resources assessment (Rinck et al. 2013).

Potential for Discovery of Cultural Resources

Although the K-C WW upland area has been altered by filling, diking, pile driving, wharf building, and more recent shoreline development, there is still some risk of discovering buried cultural resources. Background research summarized above indicates that the project vicinity was used intensively by Native Americans prior to Euroamerican settlement. However, most of the project area was at least partially inundated on the delta front prior to historic development. Pre-contact archaeological deposits in the project area would most likely be related to hunting, fishing, or other resource procurement activities that would have occurred in a marshy environment and sites, if present, would be buried under fine-grained intertidal alluvium that historically accumulated on top of any buried pre-contact surfaces. Pre-contact archaeological materials or ethnographic deposits in this setting would probably exhibit signs of tidal reworking or rapid burial as a result of alluvial processes on the delta front or subsidence. More substantial pre-contact and ethnographic period archaeological sites associated with cooking, camping, and habitation would probably be on elevated landforms, if present, near the former shoreline along the east margin of the property where a beach was once present. Natural deposits are expected to be rare above 20 feet below the surface (fbs). Holocene-age deposits below the fill are expected to grade from coarser to finer from northeast to southwest across the project area, as one moves from more proximal to distal along the delta shoreline.

The project area also may contain historical archaeological resources. Although a number of Euroamerican explorers and traders visited Port Gardner between the 1820s and 1850s, the permanent Euroamerican presence along Port Gardner's southeast shoreline dates to the early 1860s. Archaeological evidence of Euroamerican visitors may be found in archaeological sites in the vicinity and would consist of artifacts like glass beads, metal tools and pots, guns, buttons and other new materials and technologies. Historical cultural materials dating after 1862 are more clearly attributed to Euroamericans and could include architectural, industrial, domestic and other assemblages. Cultural materials associated with nineteenth-century homesteading, mills and railroads, early industry, and residential occupation may be in the project area. Euroamerican entrepreneurs significantly altered and filled the shoreline and old beach surfaces are certainly present below the fill. The fill itself might contain historical archaeological deposits or objects in the form of artifact dumps or scatters and possibly stable surfaces that could have been occupied between fill events. Maps of the project area show docks and wharves expanding at a great pace, especially between 1900 and 1910 and between 1929 and 1936. The top 10 feet of fill is expected to be highly disturbed by repeated mill construction cycles and utility installation and upgrades. Deeper fill may be less disturbed and its stratification may reflect the historic context.

Bathymetric data from early historic maps was used to determine which portions of the project area were sub-tidal, intertidal, and sub-aerial (Rinck et al. 2013). Sub-aerial landforms identified in the project area include the upland, beach, and backshore. Intertidal landforms in the project area are the foreshore and marsh. Finally, the delta front is the only sub-tidal landform identified in the K-C WW upland area. The horizontal extent of the six historical landforms results in a model of the sensitivity for cultural resources in the project area. Figure 3 depicts areas of high, medium, and low risk for finding archaeological sites. Highest risk areas are along the historic beach and sub-aerial landforms and the lowest potential for identification of sites is in areas that were historically inundated, like the sub-tidal delta. Moderate levels of risk for identification of archaeological sites is assigned to the intertidal zone, including the foreshore and marsh landforms, where human use was limited and sites are generally ephemeral in type. About half of the 11 opportunistic cleanup areas demarcated so far are on landforms with high sensitivity for buried resources.

Excavation work associated with the interim cleanup actions will primarily occur in fill. It has already been determined that the cleanup actions will be observed by a geologist who will ensure the excavation does not extend below the fill and that a professional archaeologist will only be contacted to assess the find if a potential archaeological object is observed by the geologist. SWCA recommended an archaeological monitor be present to view any excavation below the fill in areas assigned moderate potential for buried cultural resources and that an archaeologist be present to monitor interim actions at the base of the fill and below in areas assigned high risk for buried cultural resources. This boundary is very important to archaeologists, as it harbors very high potential for cultural resources.

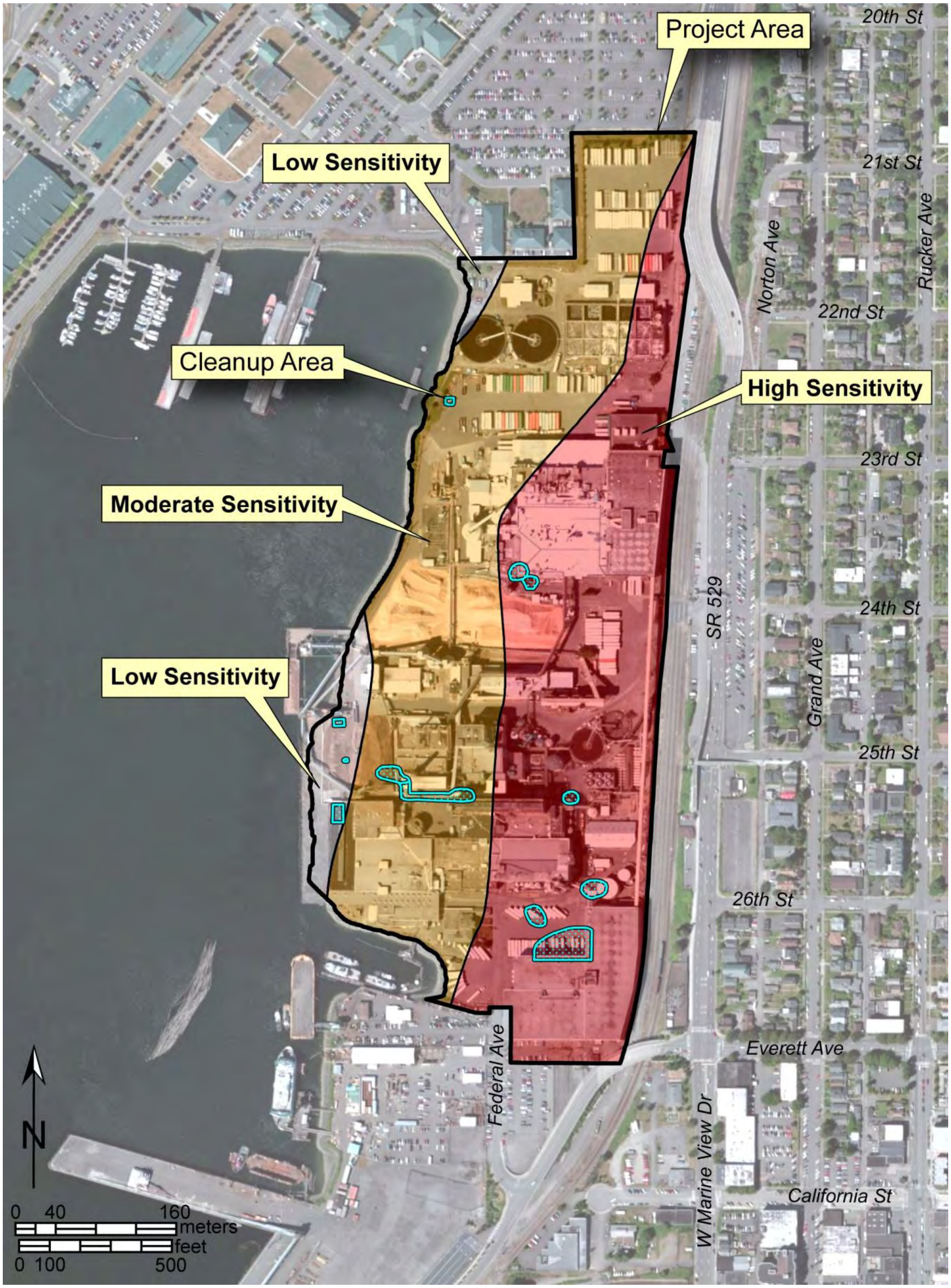

Figure 3. Areas of risk for finding pre-contact, early historical period Native American and early historical period archaeological sites, based on landforms and the historical shoreline.

Briefing

Briefing of construction personnel on expectations for cultural resources can be arranged, if needed. A briefing is especially important if unmonitored excavations in areas with potential for cultural resources will occur. If archaeologically monitored excavations occur, the briefing provides an opportunity for machinery operators and the archaeological monitor to discuss communication protocols and a plan of action in case cultural materials are identified. The briefing will include information on the legal context of cultural resources protection. In most cases, this briefing would be informal and would occur before work the first morning of interim action excavations. The briefing will be conducted by a qualified archaeologist.

UNMONITORED DISCOVERY

An archaeological monitor that has completed 40 hours of Hazardous Waste Operations and Emergency Response (HAZWOPER) training will be on site during the excavation of naturally deposited sediment below the fill in areas assigned moderate potential for buried cultural resources. An archaeologist that has completed 40 hours of Hazardous Waste Operations and Emergency Response (HAZWOPER) training will also be present to monitor interim actions at the base of the fill and below in areas assigned high risk for buried cultural resources. It is the responsibility of K-C WW, Inc., or their representatives at Aspect, to notify SWCA when the base of the fill is encountered, or suspected in the moderate and highly sensitive portions of the project area. In the event that archaeological deposits, human remains, or isolated artifacts are discovered when a monitor is *not* present it will be the responsibility of the K-C WW Upland Site Area Project Manager (or designated representative) to stop construction work in the vicinity of any potential discovery, and keep work stopped while contacting the archaeological Monitoring Supervisor to inform him of the potential cultural materials. Collection of the cultural materials by employees, construction personnel or others with access to the project is prohibited by State law.

Typical markers of pre-contact human activity include: fire-modified rock (FMR), animal bone, concentrations of shell, ground and flaked stone tools and flaked stone tool-making debris, burned earth, cordage or fiber, organically stained sediments, charcoal, ash, and exotic rocks and minerals.

Typical markers of significant historic-period human activity may include: significant deposits of domestic refuse such as bottles, ceramics and cans, and intact structural remains such as building foundations, boardwalks, or other structural elements.

MONITORED DISCOVERY

Communication Protocol

The Archaeological Monitor will communicate with the Construction Superintendent via Aspect to make general requests, or inquiries pertaining to equipment movement, placement of back dirt for examination, or excavation scheduling. The Archaeological Monitor also may need to communicate with excavation equipment operators to understand the timing and procedures of construction excavation at the start of each day. Construction spoils will almost certainly be contaminated with petroleum, heavy metals, and/or volatile organic compounds, so Aspect and the Construction Superintendent will find the best way for the Archaeological Monitor to make their necessary observations within the limits of safety wherever feasible. Excavation trenches without shoring would only be directly accessed if deemed safe by Aspect and if less than 4 feet in depth. Aspect will communicate excavation procedures directly to the equipment operator in a fashion agreed upon by the Construction Superintendant.

Aspect will direct equipment operators and the Archaeological Monitor may ask the Aspect representative to temporarily pause excavation for observation. Temporary pauses would be on the order of one minute, to take a photograph or collect a depth measurement, for example. If the Archaeological Monitor determines that archaeological materials may be exposed in a particular area based on visual evidence, the Archaeological Monitor may ask the K-C WW Upland Area Project Manager and the Construction Superintendent to request that equipment operators modify construction excavation procedures to provide exposures of subsurface stratigraphy, in order to confirm the presence of any such resources in that area. For example, the Archaeological Monitor may request that Aspect direct the equipment operators to remove thin lifts of fill or sterile sediment to provide more extensive horizontal exposures of a potential cultural resource. Some areas may be cordoned off to allow more time to examine possible archaeological deposits. If needed, work may be stopped in an area sufficient to assess resources that may be significant and time will be provided for additional evaluation by field archaeologists. If the Archaeological Monitor determines a potentially significant archaeological resource is present, then no excavation will take place in the site without an excavation permit.

Work Stoppage

If any archaeological resources are discovered during monitored or unmonitored cleanup investigation activities, work will be stopped immediately and Ecology, the Department of Archaeology and Historic Preservation (DAHP), the City of Everett Planning and Community Development Department, and the Tulalip and Suquamish Tribes Cultural Resources Departments will be notified that day if possible, and no later than the close of the next business day (see contact list). An archeologist will be retained for an onsite inspection of the archaeological resource and the parties mentioned above will be invited to participate. The archaeologist will document the discovery and provide a professionally documented site form and report to the above-listed parties. Ground disturbing construction activities will be halted in the area of discovery large enough to ensure that integrity of the find is not compromised, although construction activities may continue elsewhere in the project area. In the event of discovery of human remains, work will be immediately halted in the discovery area and the remains will be covered and secured against further disturbance. The Everett Police Department and Snohomish County Medical Examiner will be immediately contacted, along with the DAHP Physical Anthropologist and authorized Tribal representatives.

Discovery Procedures

The following outlines the steps that will occur if cultural resources are discovered during construction. If the discovery occurs when the Archaeological Monitor is not present, the Project Manager (or designated representative) will ensure that construction does not continue in the vicinity of the discovery and will notify the Archaeological Monitor. If the discovery occurs during monitoring, the Archaeological Monitor will request work stoppage at the spot where possible cultural resources are identified and the following protocol will occur:

1. When cultural resources are discovered, the Archaeological Monitor will a) identify the nature of the discovery, and b) conduct preliminary evaluation. The Project Manager will assure

cessation of work at the location of the discovery. If possible, work would be redirected elsewhere by Aspect while evaluation is undertaken, but dewatering makes this scenario unlikely. Preliminary evaluation is usually a relatively quick process, but may require the assistance of the archaeological Monitoring Supervisor.

2. If the identified cultural resource appears relatively intact or relates to Native American occupation, the Archaeological Monitor or Monitoring Supervisor will request that the Project Manager (or the designated representative) notify the affected Tribes and the DAHP of the discovery.
3. The Archaeological Monitor will record, on standard forms, all pre-contact and/or intact historical cultural material. Initial efforts will focus on establishing the nature, provenience, and integrity of any discovery. Documentation methods may include photographs, sketches, scaled drawings, and written descriptions. During the work stoppage, the Project Manager will grant sufficient time to evaluate the discovery and will communicate with the Construction Superintendent. The Archaeological Monitor will ensure that the Monitoring Supervisor and Project Manager are fully briefed on the discovery.
4. Preliminary evaluation will not include excavation into an archaeological site without an excavation permit. If excavation into an archaeological site is needed to evaluate the resource, the Monitoring Supervisor will apply for an emergency excavation permit from the DAHP. The application process may require consultation with K-C WW, Inc., Ecology, the DAHP, the City of Everett Planning and Community Development Department, and/or the Tulalip and Suquamish Tribes Cultural Resources Departments. Any artifacts inadvertently removed from the resource prior to it being recorded as an archaeological site will be turned over to K-C WW, Inc. for curation arrangements.
5. Documentation of the discovery will be assembled and forwarded to K-C WW, Inc. via Aspect. K-C WW, Inc. will consult with the DAHP and affected Tribes. Project activity will be prohibited in the vicinity of the discovery and may not proceed until consultation with the DAHP and all affected Tribes have concluded that a) the resource is not eligible for listing in the National Register of Historic Places (NRHP), or any state or local registers, or b) that the resource is determined eligible for listing in the NRHP, but further activities beyond a determined buffer will not negatively impact the resource.
6. If consultation between K-C WW, Inc., Ecology, the DAHP, and affected Tribes determines that the archaeological resource is eligible for listing in the NRHP and that cleanup activities will have a negative impact on the archaeological resource, then it will be recommended that K-C WW, Inc. alter their cleanup plans avoid the site. If K-C WW, Inc. wishes to continue cleanup within the register eligible archaeological site as planned, additional archaeological investigations will be required prior to cleanup. Any archaeological site investigation would be conducted under a research design and discussed as part of an excavation permit application.
6. A letter report including the results of monitoring will be submitted by SWCA to Aspect for K-C WW, Inc. review at the conclusion of the project. If archaeological resources are identified and additional archaeological investigations take place, their methods and results may be summarized in supplemental documents after any necessary analysis is complete.

Human Remains

At the time that any bone that may be human is discovered, construction activity in the vicinity of the discovery will cease immediately to allow the Archaeological Monitor to conduct preliminary analysis of the bone to determine if the remains are human. If the Archaeological Monitor is not present and bone is discovered, work will be stopped and the Project Manager will contact the archaeological Monitoring Supervisor. No additional earth moving or stockpiling of materials will occur within 30 feet of the bone and the area of discovery will be avoided until the Archaeological Monitor and/or Monitoring Supervisor arrive. The bone is not to be handled or photographed by anyone other than a professional archaeologist, law enforcement official, medical examiner, or tribal member.

If the remains are determined to be human, or possibly human:

1. The Archaeological Monitor or Monitoring Supervisor will immediately notify the Project Manager.
2. Upon receiving notice, the Project Manager, shall immediately notify the Everett Police Department and Snohomish County Medical Examiner (ME) and request that the ME determine if the remains are forensic or non-forensic. Contemporaneous with notifying local law enforcement and ME, the Project Manager (or designated representative) shall also notify the affected tribes and DAHP of the discovery.
3. If the ME determines the remains are non-forensic, the DAHP will take jurisdiction over the discovery. If the ME determines the remains are forensic, the Everett Police Department will take jurisdiction over the discovery.
4. If the ME determines the remains are non-forensic, the State Physical Anthropologist with the DAHP will make a determination if the remains are Indian or non-Indian and report that finding to the affected parties.
5. The DAHP will handle all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains. The consultation process will help to determine if, when, and how project construction will resume.
6. SWCA will prepare a final report that describes the discovery, notification of affected parties, steps taken in response to the discovery, and the final disposition of the non-forensic human remains.

CONFIDENTIALITY

Archaeological properties are of a sensitive nature, and sites where cultural resources are discovered can become targets of vandalism and illegal removal activities. All parties shall keep and maintain as confidential all information regarding any discovered cultural resources, particularly the location of known or suspected archaeological property, and exempt all such information from public disclosure consistent with the National Historic Preservation Act (NHPA) and State Law RCW 42.56.300. K-C WW Inc. and Aspect shall limit access to any project related cultural resources records to authorized persons with a need to know the information. Project personnel and contractors should especially keep the discovery of any found or suspected human remains confidential, including refraining from contacting the media or sharing information regarding the discovery with the public.

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ATTACHMENT 2

3rd Interim Action Project Contacts

3rd INTERIM ACTION PROJECT CONTACTS

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