K Ply Site

Remedial Investigation/ Feasibility Study Work Plan

Prepared for

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List of Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
Agreed Order	Agreed Order No. DE 9546
ARAR	Applicable or Relevant and Appropriate Requirement
AST	Aboveground storage tank
BMP	Best management practice
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CFR	Code of Federal Regulations
cm	Centimeters
cm/sec	Centimeters per second
COC	Contaminant of concern
CSM	Conceptual Site Model
CY	Cubic yard
DCA	Disproportionate cost analysis
DRO	Diesel-range organics
Ecology	Washington State Department of Ecology
EIM	Environmental Information Management
Freon 113	1,1,2-Trichloro-1,2,2-trifluoroethane
FS	Feasibility Study
GRO	Gasoline-range organics
Harbor	Port Angeles Harbor
HASP	Health and Safety Plan
HPAH	High molecular weight polycyclic aromatic hydrocarbon
IAWP	Interim Action Work Plan
ITT Rayonier	ITT Rayonier, Inc.
K Ply	K Ply Inc
LAET	Lowest Apparent Effects Threshold
Landau	Landau Associates
LEKT	Lower Elwha Klallam Tribe
LNAPL	Light non-aqueous phase liquid
LPAH	Low molecular weight polycyclic aromatic hydrocarbon
LUST	Leaky underground storage tank
MDI	Diphenylmethane diisocyanate
µg/kg	Micrograms per kilogram
µg/L	Micrograms per liter
mg/kg	Milligrams per kilogram
MLLW	Mean Lower Low Water
MTA	Marine Trades Area
MTCA	Model Toxics Control Act
NAVD 88	North American Vertical Datum of 1988
NPDES	National Pollutant Discharge Elimination System
ORCAA	Olympic Region Clean Air Agency
PAH	Polycyclic aromatic hydrocarbon

Acronym/ Abbreviation	Definition
PCB	Polychlorinated biphenyl
PCOC	Potential contaminant of concern
PCP	Pentachlorophenol
POL	Petroleum-based oils and lubricant
Port	Port of Port Angeles
POTW	Publicly owned treatment works
ppm	Parts per million
PSI	Puget Sound Initiative
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RCW	Revised Code of Washington
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
SAP	Sampling and Analysis Plan
Site	K Ply Site
SMS	Sediment Management Standards
SPC	State Pollution Commission
SQS	Sediment Quality Standards
SVOC	Semivolatile organic compound
TBT	Tributyltin
TEPH	Total extractable petroleum hydrocarbons
TPH	Total petroleum hydrocarbons
USEPA	U.S. Environmental Protection Agency
UST	Underground storage tank
UV	Ultraviolet
VOC	Volatile organic compound
WAC	Washington Administrative Code
Work Plan	RI/FS Work Plan
WPAH	Western Port Angeles Harbor
WSPCC	Washington State Pollution Control Commission

1.0 Introduction

1.1 BACKGROUND AND OVERVIEW

Beginning in the 1940s, the K Ply mill (formerly PenPly) produced plywood in a mill facility located on the industrial waterfront of Port Angeles. Environmental contamination under the mill was first documented in the late 1980s with partial cleanup actions undertaken by prior mill owners. The mill was permanently closed in 2011 and has recently been demolished by the Port of Port Angeles (Port) for redevelopment purposes. Demolition of the mill allows access for both investigation and cleanup purposes. The first step in the cleanup process is the development of a work plan to collect sufficient data to define the nature and extent of contamination and identify appropriate cleanup actions.

This work is being undertaken by the Port per the terms of Agreed Order No. DE 9546 (Agreed Order [1]) with the Washington State Department of Ecology (Ecology).

1.2 WORK PLAN PURPOSE AND ORGANIZATION

This document presents a work plan for the Remedial Investigation/Feasibility Study (RI/FS) of the former K Ply Site (Site) in Port Angeles, Washington. The RI/FS Work Plan (Work Plan) is a specific requirement of the Agreed Order between the Port and Ecology. This Work Plan is organized as follows:

- **Section 2.0—Site Description.** Presents a description of the Site including a comprehensive summary of the history of the Site, the surrounding properties, and the physical setting.
- **Section 3.0—Previous Investigations and Remedial Actions.** Presents previous soil, groundwater, and sediment investigations and remedial actions that have been conducted at the Site.
- **Section 4.0—Summary of Known Environmental Site Conditions.** Presents the current environmental site conditions based on the previous studies conducted at the Site.
- **Section 5.0—Preliminary Conceptual Site Model.** Presents the preliminary Conceptual Site Model (CSM) for the Site, including the preliminary contaminants of concern (COCs) and pathways.
- **Section 6.0—Screening Levels and Applicable or Relevant and Appropriate Requirements.** Discusses the basis for selection of preliminary screening levels proposed for the Remedial Investigation (RI).
- **Section 7.0—Data Needs and Sampling Plan.** Presents the identified data needs based on previous data and the Interim Action Work Plan, and details the data that will be collected from groundwater, soil, and sediment. Refers to the additional site investigation plans, including the Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), and Health and Safety Plan (HASP).
- **Section 8.0—Remedial Investigation/Feasibility Study Reports.** Defines the tasks that will be completed to complete the Feasibility Study (FS).
- **Section 9.0—Project Team and Responsibilities.** Describes technical consultants and Ecology's responsibilities for analysis and authorship of the RI/FS.

- **Section 10—Schedule.** Presents the schedule for implementing this Work Plan.
- **Section 11—References.** Presents the sources cited in this Work Plan.

2.0 Site Description

2.1 LOCATION, CURRENT OWNERSHIP, DEVELOPMENT, AND HISTORY

2.1.1 Site Ownership, Location, and Zoning

The Site is located at 439 Marine Drive, Port Angeles, Washington 98362 (Figure 2.1). In this document, the word "Site" is generally used to refer to the area under investigation. It is an objective of this RI/FS to determine the extent of contamination, which will define the "Site," per the Model Toxics Control Act (MTCA) definition.

Based on current information, the Site is bounded by Marine Drive to the south, Port Angeles Harbor (Harbor) to the north, the vacated Pine Street to the east, and the Marine Trades Area (MTA) Site to the west. To the north of the Site are approximately 4.7 acres of aquatic land (tidelands and filled tidelands) owned by Washington State Department of Natural Resources and is managed by the Port within the Port Management Agreement Parcel 2. The MTA Site is managed under a separate agreed order with Ecology.

Since the 1920s, the Site has been used to support the wood products industry (i.e., log storage, debarking, lumber, and plywood mills) but was primarily used for plywood manufacture. Various companies operated the plywood mill[1] between its years of operation (1941 and 2011), including PenPly; ITT Rayonier, Inc. (ITT Rayonier); K Ply Inc (K Ply); and Peninsula Plywood.

The Site is zoned as "Industrial Heavy" by the City of Port Angeles [2] and is approximately 18.6 acres in size and is owned by the Port.

2.1.2 Site Development History

The following paragraphs detail the history of the Site. Figure 2.2 shows the locations of some of the historical features described below. Figure 2.3 shows the historical locations of site operations.

2.1.2.1 Site Fill History

The Site was originally a tidal flat. The first development occurred when the Chicago, Milwaukee, St. Paul and Pacific Railroad built an elevated trestle and rail line along the current bulk head and riprap slope on the north side of the Site. Tidal water was able to flow to and from the Site underneath the trestle [3].

The Site was filled inland of the rail trestle around 1926 using hydraulic fill dredged from the Harbor for the development of Terminal 1. Approximately 5 to 10 feet of fill was placed on the tideland surface [3] after first constructing a bulkhead wall at the location of the railroad trestle and then placing the hydraulic fill material behind the bulkhead wall. The bulkhead wall extended east from the Port dock and then extended inland at the edge of what would be eventually the mill log pond [3]. A second bulkhead wall was constructed at the same time on the south side of the future mill building, along the alley between Cedar Street and Pine Street. The area in between the two bulkheads was filled to a new grade for development in this manner.

[1] Unless specifically referring to a particular mill owner, throughout this document "the mill" is referring to the K Ply mill.

2.1.2.2 Log Pond Fill

To the east of the filled area was a log pond that was built by the Port following signing of the lease with PenPly in 1941. Rock fill was placed along the rail trestle to create a tidally influenced pond. The pond had an entrance to receive rafted logs and was shared by PenPly and a local sawmill.

Between 1946 and 1988, periodic filling of the log pond occurred by the various mill operators. The fill primarily consisted of soil and rock material with some wood debris [4]. In 1988, the log pond was reduced to approximately 4.2 acres in size. Beginning in the early 1990s, the Port and K Ply began working together to acquire the permits necessary to fill in the remaining log pond and create additional upland industrial land. This change in land use was desired because K Ply adjusted their operations to use cottonwood logs, which primarily arrived via truck, instead of cedar logs, which primarily arrived via water. This change required on-site log storage and necessitated the filling of the log pond. To mitigate for the loss of habitat in the log pond, the Port and K Ply proposed to create the Valley Creek Estuary [5].

The log pond was filled in 1997 following several years of coordination between the Port, K Ply, and the regulatory agencies. A 1992 report by Shannon and Wilson detected several contaminants in the log pond, but none were detected at concentrations greater than Washington Sediment Quality Standards [6]. Additionally, the Shannon and Wilson study showed very high levels of total organic carbon, which they concluded acted to prevent contaminant leaching from soil [6].

In 1977, approval was given by the Port Angeles City Council to fill 30,700 square feet, or 14 percent, of the log pond. The final fill event was first approved by the Port Angeles City Council in 1991 and was revised in 1993 to require mitigation of Valley Creek Estuary Project. Project approval was granted in August 1996 to fill the 4.3-acre pond with approximately 130,000 cubic yard (CY) of fill. Fill sources included the excavated soil from the Valley Creek Estuary, the U.S. Coast Guard Station Runway Excavation, the Airport Industrial Park, dredged material from the City of Port Angeles Pier, the downtown sidewalk demolition, dredged material from the mouth of Tumwater Creek, and excavated soil from the Larry Doyle residence at East Front Street and North Race Street [7].

Additionally, boiler ash material from the mill was evaluated for suitability as fill material by Shannon and Wilson in 1993 [8]. The evaluation included the review of chemical analyses and a geotechnical evaluation. It was concluded that the ash material could be used as fill material because there were no metals exceedances greater than MTCA Method A cleanup levels, or toxicity characteristic leaching procedure (TCLP) failures. However, Clallam County required further testing to be done on the ash and K Ply instead disposed of the boiler ash at the Port Angeles landfill. It is understood that 6,000 CY of ash was disposed at the City of Port Angeles-operated landfill at 3501 W 18^{th} Street. This landfill closed in 2006 and is now the site of a City of Port Angeles-operated transfer station [9]

2.1.2.3 Estuary

The portion of land east of Valley Street was historically the location where Valley Creek discharged to the Harbor. In 1954, Valley Creek was routed into an 84-inch concrete culvert pipe [10] and the railroad trestle located between Valley Street and Oak Street was filled with "truck" fill, and the upland area was filled with hydraulic fill to support development as industrial use.

In 1996–1997, the portion of land between Valley Street and Cherry Street, and Marine Drive and the Harbor was excavated to mitigate for the loss of the log pond. This mitigation project removed the portion of land that was the historical location of a small lumber mill (Olympic Lumber Mill) and log storage operation east of Valley Street. The soil dug out of the estuary was used to fill the log pond. During the excavation, the Valley Creek culvert was removed north of Marine Drive and habitat was added [5].

2.1.3 Site Uses Prior to 1941

Between 1926, when the Site was first filled, and 1941, when the plywood mill was built, there was a small lumber mill that operated on the Site. Little or no information is known about this mill, other than references on Sanborn Maps. The "M.R. Alleman" mill was located directly south of the K Ply mill building. Its years of operation are not known. There are no other known operations that occurred at the Site prior to 1941.

2.1.3.1 Railroad Development

In 1915 the Milwaukee Road built railroad service between Port Angeles and Port Townsend. Various spur lines were built over the next several years to transport logs from the forest to the mills. The rail was later operated by Chicago, Milwaukee, and St. Paul Railway Company [11].

The main rail line that went through Port Angeles was historically located directly north of the mill on a pile supported trestle. When the Site was filled in 1926, riprap was placed on the waterward side of the constructed bulkhead. The piling and railroad trestle timbers were primarily creosote treated [12].

A rail spur from the main rail line extended across the Marine Trades Area (MTA) Site to the south side of the K Ply mill where wood products from the mill were loaded on rail cars. The rail cars were transported from Port Angeles to Port Townsend, where they were loaded on barges to be transported to Seattle [13].

2.1.4 Historical Operations and Site Use

The primary historical operation at the Site was plywood manufacture. Site-wide operations to support this included the mill operations itself, log storage in the log yard and log pond, log rafting in the Harbor, hog fuel burning, log debarking, log peeling, site maintenance, and other miscellaneous operations, including a retail store located across Marine Drive. The table below lists the mill owners and operators of the mill by year.

Mill Owners and Operators by Year

Date Range	Mill Owner/Operator
1941–1971	Peninsula Plywood Corporation (called PenPly)
1971–1989	ITT Rayonier (called PenPly)
1989–2007	K Ply Inc., a subsidiary of Klukwan, Inc. (called K Ply)
2010–2011	Peninsula Plywood Company (called PenPly)

Site operations began in 1941 when PenPly leased 7.5 acres of land (later extended to 12 acres) from the Port and constructed the PenPly mill building. PenPly was an employee-owned company that operated the mill from 1941 to 1971. Mill construction began on May 20, 1941. By late summer 1941 the machine shop and the main mill building were finished. The first plywood was transported off-site via rail on November 24, 1941. PenPly had an initial plywood production goal of 6 million square feet per month. Because the opening of the mill coincided with the United States entry to World War II, the mill was required to follow industry-wide controls for plywood production and distributions [14]. During the first year of production, 90 percent of the plywood produced was sold to the U.S. government.

In 1971, the mill was purchased by ITT Rayonier who operated the mill as the Peninsula Plywood Corporation from 1971 to 1989 [14]. In 1989 the mill was purchased by Klukwan, Inc., an Alaskan Native-owned village corporation, who operated the mill as K Ply from 1989 to 2007. The mill was closed from 2007 until 2010 when the mill was reopened by the Peninsula Plywood Company. The mill closed permanently in 2011.

2.1.4.1 Plywood Manufacturing Operations

Based on review of historical documents, the plywood operations appear to be essentially identical between the various owners, given that the majority of the Site operations were mechanical in nature and used existing large machinery. The most detailed summary of operations that occurred at the mill is provided in a 2011 Peninsula Plywood Group LLC Olympic Region Clean Air Agency (ORCAA) application [15]; the text below, which describes operations, is paraphrased from that ORCAA document.

The majority of the K Ply products were plywood but also included siding and paneling. Mill equipment operations included veneer equipment (i.e., lathes to peel logs), saws, hot presses, dryers, sanders, patching machines, chip equipment, conveyors and transfer equipment, and boiler equipment [16].

The first step in plywood manufacture was log pre-processing. This included receiving, sorting, storage, debarking, cutting, and green veneer peeling of logs in the log yard. This step also included chipping and hog fuel production. Logs historically arrived at the Site via truck and barge and were stored until use. Bark from logs was reduced to hog fuel and transported to a hog fuel pile via a belt conveyor.

Following debarking, logs were cut and peeled into continuous veneer using 1 of 3 lathes (10-foot lathe, Bamford/8-foot lathe, and the 4-foot lathe). The green veneer was transported to the main mill building on carts for drying in 1 of the 3 veneer dryers. The veneer dryers were either indirect steam-heated veneer dryers or Coe drying lines.

Dried veneer sheets were patched to remove knots using football-shaped biscuits, as necessary in the cureline area of the mill. Small sheets were assembled into larger sheets using the phenol-formaldehyde exterior grade glue in a veneer welder. Once transferred to the press area, resin-impregnated kraft paper sheets were stapled to veneers and placed in the presses. A phenolic resin-impregnated paper was used as the final surface for overlay plywood sheets. The plywood glue used at the mill comprised phenol- and formaldehyde-based resin, modal, soda ash, caustic soda, and flour. The resin components were purchased in bulk and mixed on-site. Raw resin was stored in a 10,000-gallon storage tank before being pumped to the mixing room to make the plywood resin. Final panels were typically 0.25 inch to 2 inches thick and consisted of nine layers.

The assembled sheets were heated and pressed in 1 of 3 steam-powered Lamb hot presses. The pressed applied 175 pounds per square inch at 280 °F. Following pressing, the sheets were cut to size. For some products, the plywood edges would be sealed by spaying edge sealing paint on the plywood in the paint spray room. Concrete form plywood required the application of form oil to the plywood surfaces. The application of form oil was done with the panel oiler.

Wood residuals were transported through the mill pneumatically using steam produced by the mill's two boilers.

2.1.4.1.1 Presses

Presses No. 1 and No. 3 were in operation from when the mill was constructed in 1941, and Press No. 2 was added in 1947. The original foundations for Presses No. 1 and No. 3 did not have an integral containment structure to catch and hold leaking hydraulic oil, but a containment structure was added to Press No. 1 when it was moved to a new location in 1974 [17]. Press No. 2 did have an integral containment system when initially constructed. In 1989, following the discovery of significant hydraulic oil on the groundwater table under the presses, the Press No. 1 containment system was planned to be upgraded to better control future releases [17]. The construction of a containment structure for Press No. 3 was underway in March 1989 and finished by 1991 [17]. An engineering study completed in 1991 by Rayonier of the adequacy of all three press containment structures concluded that the "oil containment pits were large enough to contain a complete leakage of all hydraulic oil from their respective oil delivery systems, provided that the source(s) of the leakage are from directly over, or are entirely directed to, the containment pits" [18].

2.1.4.1.2 Wood Types

Veneer used in the mill was sourced from a variety of wood types, including cottonwood, fir, hemlock, and cedar. Initially, Douglas fir was primarily used, and by 1952 hemlock was also used [13]. Cedar was introduced in 1962. By 1974, cedar represented 85 percent of production. The primary wood used was cedar until the late 1980s when logging regulations changed and a switch to cottonwood was made. In February 1992, K Ply consumed 2.1 million feet of cottonwood, 219,000 feet of cedar, and 131,000 feet of fir [19]. In 2010, Peninsula Plywood produced approximately 16- to 20-million board feet of plywood and veneer per year [20].

2.1.4.1.3 Other Nearby Mills

The Olympic Lumber Company sawmill was built in 1968 to the east of the Site, between the log pond and Cherry Street. Operations at the sawmill began with the manufacture of sliced veneer but then changed to the manufacture of dimensional lumber. The sawmill operated until 1986, when it was dismantled. The land where this sawmill was located was excavated to create the Valley Creek Estuary.

2.1.4.2 Log Pond

The log pond was located in the north central portion of the Site. The log pond was used to store logs that were used for the manufacture of plywood. A tide gate was built between the log pond and the Harbor in 1945 and was designed to hold the water elevation in the log pond at 6 feet during all tides. The tide gate also prevented the entry of seawater in and out of the pond when the gate was closed. Peninsula Plywood Corporation stopped bringing logs into the log pond through the tide gate in the 1980s, and by 1988 the gate was typically kept closed. As previously described, the log pond was progressively filled to make room for upland operations and by 1997 was completely filled in.

2.1.4.3 Log Rafting

The years that log rafting occurred along the shoreline in front of the Site are not well known. The log rafts are primarily shown in the aerial photographs taken in the 1950s and 1960s. During K Ply's operation of the mill, cottonwood was primarily used and was trucked in instead of rafted in, as described above. According to the Port, no log rafting occurred at the mill after the mill was closed by K Ply in 2007 [21]

In addition to log rafting, an over-water conveyor transported imported chip material from a barge to use as hog fuel (Figure 2.2). These were the only over-water activities at the mill (with the exception of activities in the log pond). If chips were spilled to the water, they were skimmed off [22].

2.1.4.4 Hog Fuel Boilers

The mill used two 1938 Riley hog fuel fired steam boilers that combusted hog fuel produced on-site, consisting primarily of bark, other wood waste, and wood dust. Hog fuel was also occasionally purchased for supplemental fuel. Only wood fuel was used. The boilers originally vented through the 175-foot stack, but later pollution controls were added and a smaller stack was used. By 2004, an air pollution control system consisting of a multiclone separator and baghouse was shared by the two boilers [15]. In 2011, Peninsula Plywood was purchasing approximately 33 percent of hog fuel consumed annually. The purchased fuel consisted of fir bark and sawdust from other local mills [15].

In the early 1990s, K Ply was having issues with opacity of the stack. The causes appeared to be collection equipment problems, poor fuel quality, and combustion problems. A series of recommendations were made by a consultant to reduce opacity. These recommendations included reducing the salts in the fuel supply [23].

When the mill reopened in 2010, only salt-free wood was used in the boilers because log rafting had stopped in 2007.

2.1.4.5 Products and Chemicals Used and Hazardous Waste Generated

Various products and chemicals were used at the Site during the manufacture of plywood. These primarily included glues, fillers, and wood preservatives, and a variety of other miscellaneous products such as caustics, oils, paints, and solvents. Some of these materials were classified as hazardous substances or required reporting on the Site (Spill Prevention Control and Countermeasures Plan [SPCCP]; [22]). In the 1980s, Ecology conducted multiple dangerous waste inspections and Peninsula Plywood Corporation subsequently completed multiple actions to come into compliance with the regulations (refer to Section 2.1.4.6.2 below). This included adding improvements to the chemical storage areas, labeling, and waste handling procedures [24]. Other than the small fuel reservoirs attached to equipment and underground storage tanks (USTs) or aboveground storage tanks (ASTs) located on-site, chemicals and lubricants were stored in the oil storage house into the 1970s.

2.1.4.5.1 Petroleum-based Oils Lubricants

Petroleum-based oils and lubricants (POLs) were used in the hydraulic presses, the panel oiler, the three lathes, and the ring barker. POL was also used for the panel oiler. The Bamford/8-foot lathe was located over a bermed concrete pad. There were two 150-gallon tanks associated with the Bamford/8-foot lathe. The ring barker had a 400-gallon and 50-gallon hydraulic oil tank. A pond saw with 2 gallons of hydraulic oil was built on a wooden float and used in the log pond through the 1970s. In 1987, kerosene cleaner was still used to clean parts in the maintenance department. The used kerosene was dumped on the hog fuel pile every 4 to 8 weeks. Waste oil and hydraulic fluid with too much water contamination was used for chain lubrication [25].

Hydraulic oil was used at the Site for multiple operations, but primarily for the operations of the presses. The presses were not initially designed to capture leaking hydraulic oil, as the two original hydraulic presses (Press No. 1 and Press No. 3), which were installed in 1941, did not have containment structures (refer to Section 2.1.4.1.1 above). It was estimated in 1989 by Landau Associates (Landau) that as much as 12,000 gallons of free petroleum product (mixed hydraulic oil and gasoline) was present in the soil above the groundwater surface [17]. A 1990 remedial order between ITT Rayonier and Ecology described the planned remedial action by ITT Rayonier for hydraulic oil recovery [26]. When K Ply purchased the mill in 1989, ITT Rayonier maintained responsibility for the hydraulic oil cleanup as described in the 1990 Remedial Action Order [26]. A blue dye was added to the hydraulic oil when Peninsula Plywood operated the mill between 2010 and 2011 to distinguish any leakage due to their operations.

2.1.4.5.2 Underground Storage Tanks and Aboveground Storage Tanks

USTs and ASTs were historically used at the Site for fuel storage, but most had been removed by 1985 (refer to Figure 2.2 for the historical locations). A 1,000-gallon gasoline UST and a 6,000-gallon fuel oil AST, both with concrete containment, were located near the 8-foot lathe building. The containment structure around the fuel oil tank historically did not have a concrete floor. A leak test performed by ITT Rayonier in 1970 showed that the 1,000-gallon gasoline UST did not leak [27]. The 1,000-gallon UST was removed in 1984, but it is not known when the 6,000-gallon AST was removed. A 500-gallon AST that contained diesel was historically located near the ring barker; it is not know when this AST was removed. There was a 300-gallon UST located near the tide gate along the bulk head that was used to hold diesel and gasoline before being removed in 1984 [4]. The petroleum form oil that was used for the panel oiler was stored in two USTs located west of the panel oiler.

2.1.4.5.3 Pentachlorophenol

Pentachlorophenol (PCP) was historically used on-site as a wood preservative or “form oil” for the manufacture of concrete forms and was associated with the panel oiler. The PCP was stored in an 8,000-gallon UST located on the west side of the Site, near the panel oiler. The tank was used from prior to 1952 through sometime between 1979 and 1984 [4]. Historical research indicates that PCP was discontinued for use as form oil and replaced by petroleum oils, as discussed above, but the date of the switch between products is not known.

2.1.4.5.4 Polychlorinated Biphenyls

Transformer oil containing polychlorinated biphenyls (PCBs) was detected in two transformers at the Site during the hazardous materials survey prior to demolition [28]. Additionally, containers labeled “transformer oil” were found in Room 14 and the Green Veneer Chipper

Room. There were no other operations at the Site that indicated the use of PCB-containing devices or oils.

2.1.4.5.5 Phenol-formaldehyde Resin

Phenol-formaldehyde resin was used at the K Ply mill as glue to adhere the layers of veneer together in plywood sheets. The primary components of the resin were caustic soda (sodium hydroxide solution) and uncured phenol-formaldehyde resin. Both were stored in ASTs located west of the mill building near the glue loft [4]. There were two 8,000-gallon resin tanks and one 8,000-gallon caustic soda tank. By the late 1980s, the tanks were all located over concrete subsurface vaults that were removed as part of mill demolition. Historically, (date not known), a 5,600-gallon steel caustic tank had been stored in an area without secondary containment, and the tank had some small leaks. When the tank was removed in the early 1980s, some soil and crystallized caustic soil were excavated and disposed of. There were also small spills of resin to soil, which was the subject a remedial action and small cleanup action by ITT Rayonier. A small amount of resin and resin-impregnated soil was excavated and disposed of. The waste resin was not properly designated by ITT Rayonier prior to disposal, and ITT Rayonier was fined $5,000 by Ecology in 1984 [29]. The waste was determined by Ecology to be corrosive and contained 0.16 percent formaldehyde. Spill prevention measures in the glue loft were employed in 1984.

2.1.4.5.6 Polyurethane

Polyurethane was used during manufacturing as knot filler. Beginning in the mid-1970s, diphenylmethane diisocyanate (MDI) was used to make polyurethane knot filler. The polyurethane was made by combining the MDI with an oily liquid called “Part A.” The Part A liquid contained lead up through 1986, and the materials were purchased and stored in drums. Spray guns and the mixer used to apply the polyurethane were typically cleaned with a solvent. Methylene chloride was used as the solvent from approximately 1977 to 1985 and 1,1,1-trichloroethane was used for 3 to 4 months in 1985. During this time, the waste solvent products were distilled for solvent recovery on-site in a simple homemade still made from 55-gallon drums and heated water [30]. The still bottoms; which included polyurethane, solvent, and the lead catalyst from the polyurethane, were incinerated on-site in the hog fuel boiler. By the end of 1985, Peninsula Plywood Corporation started to use water to flush the glue, and the use of methylene chloride and 1,1,1-trichloroethane ceased.

2.1.4.6 Environmental Processes

2.1.4.6.1 Historical Wastewater and Stormwater Control and Discharges

Wastewater discharges and stormwater control at the Site were permitted under various National Pollutant Discharge Elimination System (NPDES) waste discharge permits and stormwater permits from 1975 to present. Waste discharge permits were issued to the mill as early as 1958 by the Washington State Pollution Control Commission (WSPCC), but the details of the permits are not known. Wastewater and stormwater was discharged directly to the Harbor, the log pond, and the publicly owned treatment works (POTW).

Prior to the 1968 sewer interceptor connection, wastewater was discharged directly to the Harbor. For example, glues wastes were discharged to the Harbor at a rate of approximately 5 to 10 gallons per minute [31]. The heavy solids from a glue water settling tank were pumped from the large compartment and disposed on “waste land” one or two times per month. In 1966, the WSPCC requested PenPly use secondary treatment for the glue waste effluent. In a letter to SPC, PenPly stated that "primary treatment for glue waste is provided and the requirements of secondary treatment and additional outfall sewer are unnecessary because of the negligible amount of waste involved and the large body of water available for disposal" [32]. It is understood that wastes were later (at least by 1976) discharged to the POTW under the Waste Discharge Permit, but it is unknown if primary treatment was required.

During a 1989 site assessment of K Ply operations by Kennedy/Jenks/Chilton [25], it was identified that K Ply was discharging several sources of wastewater to the log pond that weren't specified in the NPDES permit. These included soluble oils from maintenance and metal grinding operations. Additionally, the same report identified that cleaning of vehicles and cleaning of parts with solvents (type unknown) was occurring over a sump outside the jitney shop. It was suspected that oil, solids, and solvents were discharged directly to the Harbor.

A 1993 Ecology inspection report noted that two major sources of wastewater from K Ply were boiler blowdown (greater than 80°C and with a pH of 12) and the air emission scrubber water (50°C, pH 7) [33]. The scrubber water contained 400 to 500 milligrams per liter of total suspended solids from the scrubbing of the black fly ash. Both wastewater streams traveled through a series of small detainment ponds for settling of solids and cooling prior to being discharged to the log pond. The inspection noted that the age of the mill and numerous additions of equipment and buildings contributed to accumulated debris and potentially to stormwater problems. The inspection noted that the mill had a lack of any best management practices (BMPs) and the log pond was used as a "catch all for debris from the mill area" and was not used for log storage. The inspection report noted that the Site was sloppy and accumulated debris may contribute to stormwater problems. It recommended that the leaking oils from multiple sources be resolved. Ecology did note that the log pond provided detainment of settleable and floatable solids, and oils and pH buffering. Prior to this 1993 inspection, stormwater was not included in the site permits but was included in future permits.

2.1.4.6.2 Known Spills and Releases

There are several documented spills to the log pond and Harbor from the Site, including the following:

- A 25- to 30-gallon hydraulic oil spill to the log pond occurred in September 1988 after a hydraulic seal on the veneer lath ruptured. Absorbent pads were used to contain the spill and mitigate the incident [34].
- An 80-gallon spill of hydraulic oil to the log pond in 1983 when a line on the hydraulic unit for the Bamford/8-foot lathe broke. The spill was contained with an absorbent boom and did not reach the Harbor [35].
- A 3-gallon release of phenol to the Harbor occurred in March 1990. The phenol reportedly dissolved in the water and no further action was taken [36].
- 50 gallons of phenol-formaldehyde resin was spilled to the ground and drained to the city sewer and the Harbor in June 1983 [37].
- A citizen faxed a complaint to Ecology in 1993 of unspecified "toxic waste" being discharged to the Harbor after which "ITT Rayonier hired a diving company to repair

the pipe"." No information on the type of discharge, extent, or location of the pipe was reported[2] [38].

Additionally, as discussed below in Section 3.0, there were three remedial actions completed by ITT Rayonier to cleanup resin-impregnated soil, soil contaminated with PCP and hydraulic oil.

According to anecdotal information, spills of methylene chloride and 1,1,1-trichloroethane may have occurred near the curelines where the knot filler was applied [4].

2.1.4.6.3 Manhole Explosion and City Sewer Interceptor

In June and July 1968, the City of Port Angeles began installing a sewer along Marine Drive that was to collect sewage that had formerly been discharged directly to the Harbor and divert it to a new municipal POTW. During the trench excavation in the area of Marine Drive and Tumwater Street, infiltration of gasoline into the excavation was noted [39]. Petroleum-impacted soil was excavated and removed [40].

The City of Port Angeles water treatment plant was built around the same time as the interceptor trench. Wastewater from PenPly was diverted to the interceptor sewer by sealing of certain manholes to reverse flow.

In 1969, there was a mild explosion from the ignition of fuel vapors in a sewer manhole in the PenPly machine shop [39].

Following the explosion, Peninsula Plywood blocked off two main incoming lines to the manhole. They also installed a vent system to carry any remaining vapors to a point above the roof. Around this time there were also vapors and visible diesel oil in the drains during heavy storm runoffs and at high tides. In 1970, diesel odors were still observed by Peninsula Plywood employees. That same year, the petroleum vapor problem was investigated by the Washington State Department of Labor & Industries, which found volatile vapors in hazardous quantities in the sewer manhole [39].

During investigation of the vapors, Labor & Industries reminded Peninsula Plywood that they had gasoline storage and dispensing facilities adjacent to the machine shop that may be the principal source of vapors. Peninsula Plywood completed a leak test on the gasoline storage tank by measuring the level of gasoline from the top of the tank over an 8-day period, and found it to not be leaking [39].

2.1.4.6.4 Air Emissions

In 1986, the Olympic Air Pollution Control Agency had Ecology perform particulate tests on the stack. The emissions were out of compliance, and the mill replaced the scrubber in 1987.

K Ply reported to ORCAA in the early 1990s that "the veneer drying process caused significant [air] emissions of particulate matter and volatile organic compounds." The particulate emissions were condensed volatile organic compounds (VOCs), including terpene compounds, phenol, and formaldehyde.

[2] Although the report indicates ITT Rayonier as the violator, the mill was operated by K Ply at that time.

2.1.5 Adjacent Properties

The Site is surrounded by other industrial activity. The Port's Terminal 1 is located to the northwest of the Site and MTA is located directly west of the Site. MTA was developed on land that formerly was developed with several former bulk petroleum tank farms. Additionally, there are current and historical gas stations and historical tank farms located adjacent to and upgradient of the former mill.

There are six properties located south and adjacent to the Site where petroleum fuels are currently stored or were historically stored. Based on the groundwater flow direction, these locations are considered upgradient and include a Conoco 76 gas station (formerly Jackpot Gasoline and Time Oil), a Chevron gas station (formerly the Exxon Marine Drive Mart and Tozzer Distributors), Ace Auto Repair (formerly Brian's Automotive Shop and the PenPly Retail Office), the Commercial Fueling Network gas station (formerly the Port Angeles Truck Stop Chevron and Kardlock Gas Station), the former Peninsula Fuel Company tank farm, and the D&D Distributors/Phillip 66 gas station and tank farm. These locations are shown on Figure 2.2. Ecology's online database was searched for information that was readily available for these properties.

2.1.5.1 Time Oil Property

The Time Oil property is located at 331 West 1st Street and is now occupied by a Conoco 76 gas station. The site was developed as a service station in 1971 and originally had three USTs. When the USTs were removed in 1991, there were apparently no holes in the tanks, but the soils were hydrocarbon stained [41]. Ecology was notified and groundwater and soil testing was completed at the UST location under the Voluntary Cleanup Program. Three new USTs were installed at the same time in a new location. Six groundwater wells were installed to monitor groundwater quality.

A soil vapor extraction remediation system was operated at the Site from 1996 to 1997 to address the petroleum contamination. Approximately 1,000 pounds of petroleum hydrocarbons were removed with the soil vapor extraction (SVE) system, which was estimated to be 90 percent of the petroleum hydrocarbons present prior to remediation [42, 43]. The Site was given a No Further Action letter on March 20, 2001. Based on this information, there does not appear to be any environmental concerns with this property.

2.1.5.2 Marine Drive Exxon

The Marine Drive Exxon Site is located at 402 Marine Drive. The site is the former Exxon Marine Drive Mart and Gas Station and is now operating as a Chevron Gas Station. The site is listed on Ecology's database as "cleanup started." The Ecology database indicates that contamination was discovered in 1994, and leaky underground storage tank (LUST) reports were submitted to Ecology in 1995 and 1996. An initial investigation was completed in 2011, but the scope and extent are not known. The Ecology database lists the site as having benzene and other non-halogenated organics in soil at concentrations greater than the cleanup level. The site is also suspected for having lead in soil and has been remediated to concentrations less than the cleanup level for diesel. Based on this information, there is the potential for contaminated groundwater to exist on this site.

2.1.5.3 Former PenPly Retail Office

The former PenPly Retail Office was located at 430 Marine Drive and is currently occupied by Ace Auto Repair. There were two USTs at the PenPly retail store as part of a service station that operated between 1961 and 1973 [4]. It is unclear if the service station and PenPly retail store operated at the same time. The tanks were 10,000- and 12,000-gallon USTs with a pump island directly above them. Soil samples were collected during UST removal for total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene, and xylenes (BTEX). BTEX was not detected, but TPH was detected at a concentration of 18 milligrams per kilogram (mg/kg) [44]. No environmental information on the PenPly Retail office, the USTs, or sampling data was available. Based on this information, there is the potential for contaminated groundwater to exist on this site.

2.1.5.4 Former Port Angeles Truck Stop Chevron

The former Port Angeles Truck Stop Chevron or Kardlock Gas Station is located at 501 Marine Drive, directly adjacent to the K Ply property. The site is now occupied by the Commercial Fueling Network station owned by Pettit Oil. In 1988, it was reported that seven USTs between 500 gallons and 6,000 gallons were present on the property [4]. The property is currently listed in Ecology's database as an independent cleanup site. A LUST notification and report was received by Ecology in April 1998 and soil samples concentrations were confirmed to be greater than cleanup levels. No other information on this property is known. A walk over of the site did not indicate the presence of groundwater monitoring wells. Based on this information, there is the potential for contaminated groundwater to exist on this site.

2.1.5.5 Peninsula Fuel Company

The Peninsula Fuel Company site was a bulk petroleum storage site, though few details are available concerning historical operations. Records indicate that the site was operated by the General Petroleum Corporation beginning in 1938. The site was apparently operated by Allen Distributing beginning in 1954, who apparently later became Peninsula Fuels in 1965. The site was apparently operated by Mobil Oil Corporation (Mobil) in the late 1960s, based on a 1967 Ryan and Hayworth map showing barge receiving lines and planned changes to pipeline routes. Mobil conveyed the property to the Peninsula Fuel Company in 1985, a family business. The Peninsula Fuel Company was sold in 1988 to Ralph Bauman [45], who continued the operation for a short time before closing and removing the ASTs, but the property was retained by the Peninsula Fuel Company.

Sanborn maps indicate that at least four ASTs were present while the site was operated by General Petroleum Corporation. The Peninsula Fuel Company site is assumed to have been serviced by Pipeline 8 from approximately 1938 until the apparent decommissioning of Pipeline 8 in approximately 1969. At this time, the petroleum pipeline[3] serving the site was transferred to a new east-west bearing pipeline, referred to as Pipeline 5 [46]. The historical Pipeline 8 ran underneath the K Ply mill from the Port's Terminal 1 to the former Peninsula Fuel facility directly south of the Site. The flanges for Pipeline 5 are still visible at the northwest corner of the site; however, most of Pipeline 5 has been removed except for a short section under Cedar Street, which was cleaned out, hydrotested, capped off, and left in place by the Chevron in 1989 [47].

[3] Use of the term Pipeline in this document is broad and may include a series of parallel individual pipes.

As described in Section 3.0, an investigation in 1988 identified petroleum-impacted soil and groundwater in the alley between Peninsula Fuel Company and K Ply, in the vicinity of both Pipeline 8 and Pipeline 5. The document record includes speculation that a possible unknown source of the gasoline beneath K Ply was associated with Peninsula Fuel Company. For example, the 1988 investigation report by ITT Rayonier notes that there was likely a petroleum release at Peninsula Fuel Company in the late 1960s that may have resulted in petroleum entering the storm sewer and causing the sewer manhole explosion at the Site [4]. Peninsula Fuel Company was evaluated as a potential source of the gasoline-range organics (GRO) and/or benzene beneath K Ply as part of the MTA RI as well as by Landau in 2009 [48, 49]. Both studies concluded that Peninsula Fuel Company was not a likely source of the Cedar Street Benzene Plume but could be contributing to the gasoline plume found in groundwater downgradient of this facility [50].

Sampling of soil has occurred on two occasions within Peninsula Fuel Company. The first sampling event occurred in 1989 by Mickelson's Construction Company after the six ASTs were removed. Three samples were collected at two locations from inside the tank farm and at one was collected near the pump house. Reported sample depths ranged from 10 to 16 feet, but the methodology as to how the samples were collected is not documented. Samples were tested for TPH by the older 418.1 methodology and also for BTEX using U.S. Environmental Protection Agency (USEPA) Method 8020. Results indicate no detectable BTEX and low levels of TPH.

A second set of samples were collected in 2010 after a late 2009 flooding event in which Tumwater Creek overflowed and flooded the Site [51]. It was estimated the 30 gallons of oil were released from either vehicles or drums. Nine surface samples were collected after the released oil was skimmed off and the flood waters had drained. Two samples showed oil-range hydrocarbons at concentrations greater than the MTCA A cleanup level. Minor amounts of diesel-range organics (DRO) and GRO were detected, but results were less than the cleanup levels. No BTEX compound was detected. It was reported that the oil detection were the releases of past spills and not from oils released during the flood event.

2.1.5.6 Former D&D Distributors/Phillip 66

Phillips Petroleum Company, and later D&D Distributors, operated a former bulk plant at 617 Marine Drive. The Port purchased the former D&D Distributors/Phillips 66 bulk plant by 1984. The property has since been redeveloped by Platypus Marine and is within the boundaries of the MTA Site.

2.2 PHYSICAL SETTING

The Site is located along the waterfront of the Harbor on flat land lying at an elevation of 15 feet North American Vertical Datum of 1988 (NAVD 88). The transition between the upland portion of the Site and the Harbor is defined by a buried wooden bulkhead. The upland portion of the Site lies to the south of the bulkhead, and to the north is a riprap slope that extends to below Mean Lower Low Water (MLLW). The riprap slope provides physical support and protective armoring for the bulkhead. A man-made drainage swale crosses the central portion of the Site and is used to drain stormwater from the debarking operation that occurs to the east of the swale. The tidal range in Port Angeles averages 4.6 feet with Mean High Water occurring at an elevation of approximately 7 feet NAVD 88.

2.2.1 Geology

The general geology in the vicinity of the Site is well established based on multiple prior investigations. Soil types primarily consist of hydraulic granular fill overlying native beach deposits. The beach deposits overlie deeper glacial deposits, which in turn overlie bedrock [8]. Hydraulic fill at the Site was emplaced from dredging activities in the Harbor, which occurred in multiple stages from about 1890 to 1940. Dredge spoils generally consists of silty sand and sandy silt with shell fragments and varying amounts of gravel. Sorting of the fill material has been observed in borings at the Site [48, 49], which is attributed to the method of fill placement. Fill thicknesses range from 6 feet in the inland portions of the Site, to 10 to 15 feet closer to the shoreline.

Based on borings in the vicinity of the hydraulic plywood presses [52], shallow soil in this area consists predominantly of gray, interbedded silty sand, sandy silt, and silt, with abundant shell fragments. Local lenses of gravelly sand are present. This silty soil layer varies from approximately 6 to 9 feet thick. The silty soil is underlain predominantly by gray fine to medium sand, with shell fragments and traces of gravel, which attains a thickness of at least 2 to 6 feet. Groundwater is located within this sand layer at a depth of approximately 10 feet from ground surface.

Native beach sands lying under the fill consist of fine to medium sand with varying silt content and shell fragments, and occasional gravel. According to previous investigations, beach deposits are approximately 30 feet thick and likely thin inland [53]. Borings in the alley south of the K Ply mill identified soil material that was more granular than the typical beach deposits, and consisted of medium to coarse sand and fine gravel [48, 49]. This material may be alluvial in origin, deposited by the ancestral Tumwater Creek, which lies to the west of the Site.

Boring logs from the entrance to the Port-owned Terminal 3, about 430 feet northwest of the Site, suggest that the fine to medium sand unit is present to a depth of approximately 30 to 45 feet. The logs indicate that below this depth the soil becomes more silty. These underlying glacial drift deposits consist of stratified sand, gravel, silt, clay, and till, and are present at a depth of about 45 feet [53]. The thickness of the glacial deposits ranges to 300 feet. The glacial deposits extend inland from the Site toward the bluff, where they are presumably overlain by glacio-fluvial sands.

Bedrock in the Port Angeles area is believed to be the upper member of the Twin River Formation (late Eocene to early Miocene). The Twin River Formation consists of olive to greenish gray; poorly indurated and poorly sorted massive claystone, mudstone, and siltstone; with thin beds of calcareous claystone and sandstone. The depth to the Twin River Formation in the vicinity of downtown Port Angeles is unknown [53] and is observed in the Ennis Creek and Morse Creek valleys east of Port Angeles.

2.2.2 Hydrogeology

As mentioned above, shallow groundwater occurs in the vicinity of the Site as an unconfined aquifer within the hydraulic fill, native beach sands, and granular material in the southern portions of the alley on the southern side of the K Ply facility. Recharge to the shallow aquifer in the site vicinity occurs from upgradient groundwater inflow and infiltration of precipitation. Recharge to the aquifer may also occur from reaches of Tumwater Creek upstream from the Harbor. The bottom depth of this unconfined aquifer is not known but may be the denser glacial drift deposits that underlie the beach sands. Results from water level elevation monitoring indicate a general groundwater flow direction to the north, toward the Harbor during periods of low tide. Significant tidal variations have been observed in the site vicinity as far as 600 feet inland, and temporary flow direction reversals are evident during high tides). Locally, groundwater flow in the vicinity of the Site may have been influenced by groundwater mounding in the vicinity of PP-15, PZ-9, PP-4, and PZ-2. Groundwater mounding may be associated with roof drain recharge from when the mill structure was still standing and an apparent groundwater low in the southern portion of the Site [48, 49]. Additionally, floating product on shallow groundwater in the vicinity of the hydraulic presses depresses the potentiometric surface in this area.

The overall horizontal gradient of the shallow unconfined aquifer is approximately 0.002 feet per foot [54, 52]. The maximum groundwater gradients in the northern portion of the Site, near the Harbor, have been measured at approximately 0.005 feet per foot in a northward direction, which decreases in magnitude (i.e., becomes flatter) to the south [48, 49]. Landau also surmised that a slight groundwater divide may exist as a result of the flatter groundwater gradient at the southern part of the Site.

The hydraulic conductivity for the shallow unconfined aquifer has been estimated based on several studies. The hydraulic conductivity of the upper unconfined aquifer was estimated to be 10^{-3} to 10^{-1} centimeters per second (cm/sec) based on the results of a slug test, laboratory permeability test, grain size analysis [52], and grain size analyses from borings beneath the mill [48, 49]. The lower end of these results is generally consistent with literature conductivity values for sandy silts and silty sands ranging from 3 to 30 feet per day [55]. This results in groundwater seepage velocities that have been estimated to be in the range of 0.01 to 0.4 feet per day [48, 49].

3.0 Previous Investigations and Remedial Actions

3.1 ENVIRONMENTAL INVESTIGATIONS

Prior environmental investigations in the area are summarized by media in this section based on a review of available records. Boring and well locations from prior investigations are shown on Figure 3.1. The current environmental condition of the Site and surrounding area is summarized in Section 4.0 based on the results of all of these investigations.

3.1.1 Prior Soil Investigations

In excess of 100 soil samples have been collected across the Site and tested for a variety of contaminants. These samples point to a variety of petroleum products being of primary concern in several areas of the Site.

3.1.1.1 Landau Associates 1988–1989

In 1988, ITT Rayonier conducted the first environmental evaluation on the mill site [4]. A limited number of soil and groundwater samples were collected from various locations throughout the facility as a part of that study and submitted for analysis for potential contaminants that were used in the plywood manufacturing process. Significant amounts of hydraulic fluid, gasoline, and diesel contamination were detected in subsurface soils beneath the facility. It was estimated that as much as 12,000 gallons of petroleum light non-aqueous phase liquid (LNAPL) were present in the soil above the water table surface in the area of the hydraulic presses, as a mixture of hydraulic oil spilled from the hydraulic presses and gasoline from an unknown source [17].

Also, GRO and DRO (diesel to heavy oil) were identified in soil near the former plywood panel oiler, beneath the southwest corner of the facility. PCP, phenol-formaldehyde, and methylene chloride were detected in soil near source areas for these materials, and were attributed to past spillage. Backhoe test pits were excavated to the water table near the southwest corner of the building and exposed fuel pipelines and soil containing common gasoline constituents (BTEX) and methylene chloride [4]. Fuel oil or diesel product was observed on the groundwater surface exposed by the test pits. Sampling near two former form oil tanks found hydrocarbons (measured by the total oil and grease methodology) in soil above the water table in this area at concentrations up to 1,300 mg/kg, and in the panel oiler area 4,300 mg/kg GRO was detected in soil above the water table.

GRO was also identified in soil beneath the mill. A soil sample from Well PP-3, located southeast of the hydraulic presses, contained 1,600 parts per million (ppm) GRO but also contained hydraulic oil.

Further sampling occurred in 1989 as part of a remedial action plan for the PCP-contaminated soils beneath the former panel oiler location. Results indicated that PCP was detected at concentrations up to 840 ppm in soil. Available records indicate that, following the 1991 remedial excavation (described in more detail in Section 3.2 below), soil was left in place with concentrations of PCP up to 840 mg/kg, and bis(2-ethylhexyl)phlatate of up to 310 mg/kg. Low concentrations (i.e., less than the MTCA Method C cleanup level of 2 mg/kg) of polycyclic aromatic hydrocarbons (PAHs; flouranthene, fluorene, 2-mehtylnapthalene, napthalene, phenanthrene, and chysene) were detected in samples of soil left in place on all four walls of the excavation [56].

3.1.1.2 Shannon and Wilson 1992

Three soil/sediment samples were collected from the log pond in 1992 and analyzed for TPH [6]. The sample with the highest levels of TPH was also analyzed for PAHs. TPH concentrations by method 418.1 and 8015 modified ranged from 210 to 21,000 mg/kg.

3.1.1.3 Floyd|Snider 2005–2006

As part of the MTA Site RI/FS, several soil borings were advanced at the Site to investigate specific data gaps and a benzene plume that was identified in 2005. The investigations, which included soil sampling in addition to collection of groundwater samples, were initially intended to determine the eastern extent of the benzene plume beneath the MTA Site, assess the potential for an upgradient source of benzene in groundwater at the Site, and assess contamination in the vicinity of the former D&D Distributors/Phillips 66 Bulk Plant. In October 2005, a soil sample was collected from the smear zone in a boring advanced at the southern edge of the Site, at the property boundary with Peninsula Fuel Company (SB-92). The results from this boring indicated GRO at 2,110 mg/kg, DRO at 11,800 mg/kg, and benzene at 0.279 mg/kg. Six soil samples from three nearby borings adjacent to the former D&D Distributors/Phillips 66 Bulk Plant did not result in elevated concentrations or exceedances of criteria.

Following the discovery of a distinct benzene plume extending from the Site into Cedar Street, referred to as the Cedar Street Benzene Plume, additional rounds of investigation borings were conducted. In November and December 2005, 18 soil samples were collected from direct-push boring locations along Cedar Street. Between May 30 and June 1, 2006, an additional phase of direct-push probe soil and groundwater investigation was conducted along both sides of Cedar Street (including on the K Ply facility) and along a section of the MTA and K Ply Bulkheads, during which four soil samples were collected. Soil results were non-detect for petroleum compounds, except for detections of 791 mg/kg GRO and 530 mg/kg DRO at a depth of 6 to 8 feet bgs in SB-210 near the K-Ply Bulkhead, and low-level detections of GRO (19.4 mg/kg) and DRO (46.7 mg/kg) near the former form oil tanks, adjacent to the former mill on the west side of the Site.

3.1.1.4 Landau Associates 2009

To address continuing uncertainty over the source of the Cedar Street Benzene Plume, additional investigation was undertaken by ITT Rayonier between January and February 2009 [48, 49]. The investigation included direct-push probing beneath the mill and through the raised concrete slab at the south end of the mill. A total of 75 soil samples were collected in areas of the Site where data gaps had been identified to assess concentrations of benzene, GRO, and DRO. In addition, test pit explorations with soil samples were completed near the former form oil USTs, between the mill building and Cedar Street, and shallow soil and catch basin samples were also collected underneath and near the paint shed. The investigation also included a records review to identify potential pathways and source areas. The results indicated a broad area of GRO and BTEX contamination in soil in the southern end of the former mill, including beneath the concrete slab, with shallow (vadose zone) contamination concentrated in the southwest corner of the building footprint and smear zone contamination extending further to the east and south into the alley. Very low concentrations of GRO and BTEX were detected in the area of the former form oil USTs. Landau stated that it was likely the Cedar Street Plume originated from multiple contaminant release events. Based on its findings, Landau noted that likely sources of the GRO and BTEX beneath the former mill were thought to be Pipeline 8, Peninsula Fuel Company, the abandoned storm sewer, or possibly other sources not identified in Landau's study.

3.1.1.5 Floyd|Snider 2013 Interim Action Work Plan

In November 2012 and February 2013, soil investigation activities were conducted at K Ply as part of an Interim Action Work Plan (IAWP) [57] related to mill demolition and required by the current Agreed Order. As part of this action, two soil samples were collected from each of three soil borings advanced along the shoreline as part of well installation activities. Field evidence of contamination was observed in soil at depths below the water table in PP-17 and PP-18. There were no detections of BTEX, GRO, DRO, or oil-range total petroleum hydrocarbons, with the exception of a sample collected below the water table in Soil Boring PP-18. This sample had a detection of benzene and GRO at levels slightly greater than the MTCA Method A cleanup levels.

Following mill demolition, a Site Assessment was conducted as part of the IAWP to evaluate the presence of surface contamination and evaluate the potential effect of increased stormwater infiltration [58]. A total of 18 surface soil samples were collected in specific areas of potential concern and in general characterization areas. Select samples were analyzed for GRO, DRO, BTEX, PCBs, metals, VOCs, semivolatile organic compounds (SVOCs), and formaldehyde. There were no detections of GRO, BTEX, or solvents in the surface soil samples collected. There were elevated concentrations of DRO and POL detected in soil in the area of the panel oiler, the glue loft (located next to the hydraulic presses), and under the cureline dryer concrete pad. Metals and PAHs were detected in select samples but not at levels of concern. Formaldehyde was detected in a sample of dried resin that was collected. PCBs were detected in a solids sample collected from the transformer pad, but the detections were less than action levels.

3.1.2 Groundwater

Releases of POLs (i.e., hydraulic oil) and gasoline to groundwater were originally identified beneath the K Ply mill in 1989 by Landau and confirmed via subsequent groundwater data collected as part of the MTA RI and other efforts. In sum, these prior investigations have confirmed that hydraulic oils, gasoline, and BTEX compounds in groundwater at the Site are persistent and extensive. The following paragraphs summarize the prior investigations of groundwater.

3.1.2.1 Landau Associates 1989

In 1989, 10 shallow groundwater wells were installed beneath the mill building to determine if the POL contamination found under the presses was present in recoverable amounts. Measurable quantities of hydraulic oil, ranging from 0.2 to 2.1 feet in thickness, were encountered. The hydraulic oil in Well PP-3, southeast of the hydraulic presses, contained a mixture of hydraulic oil and gasoline [55]. Groundwater samples were analyzed for a range of constituents, including GRO, VOCs, total oil and grease, phenolic compounds including PCP, and inorganics including metals and cyanide. In addition to measured free product in these wells, sample results from these wells indicated elevated levels of GRO and BTEX in groundwater under the K Ply facility. Other constituents detected include low levels of methylene chloride (which was attributed to laboratory contamination), and low concentrations of iron, manganese, zinc, lead, chromium, and copper. The volatile organic compound 1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113) was detected in groundwater at the southern property boundary. Total oil and grease, phenols, PCP, arsenic, cadmium, mercury, nickel, silver, and cyanide were tested for but not detected [59].

As part of sampling in 1989, which was completed as part of a remedial action plan for the PCP-contaminated soils beneath the former panel oiler location, it was concluded that PCP contamination had not reached the groundwater at concentrations exceeding regulatory cleanup levels.

3.1.2.2 Floyd|Snider 2005–2007

Groundwater investigative activities were conducted by Floyd|Snider in the vicinity of the Site as part of the MTA Site RI/FS. Groundwater screening samples were initially collected from three upgradient areas in 2005 to evaluate potential sources of gasoline and BTEX under the mill, including the area east of the Platypus Marine facility (to evaluate the former D&D Distributors/Phillips 66 Bulk Plant facility), along Cedar Street, and in front of Peninsula Fuel Company.

The results of this initial round of delineation samples confirmed the existence of a significant benzene plume along Cedar Street (refer to figures in Appendix A), with benzene concentrations most elevated immediately adjacent to the K Ply mill. An additional phase of direct-push probe investigation was conducted in 2006. The objectives of this additional site characterization were to define the full extent of the Cedar Street Benzene Plume; confirm the potential source area; and to define the extent of benzene contamination along the K Ply Bulkhead which lies downgradient of the area of hydraulic oil mixed with gasoline. A total of 24 groundwater screening samples were collected from locations along both sides of Cedar Street (including on the K Ply facility) and along a section of the MTA and K Ply Bulkheads that provided a very detailed picture of the plume extent outside the mill.

Additionally, Floyd|Snider sampled a limited number of K Ply wells as part of MTA Site RI/FS activities. Samples were submitted for analysis of GRO by NWTPH-G, DRO by NWTPH-Dx, and BTEX compounds by USEPA Method 8021B. Some wells were also sampled for formaldehyde at Ecology's request. However, no formaldehyde was detected.

3.1.2.3 Landau Associates 2009

Additional soil and groundwater investigation and piezometer installation activities were conducted to address the source of the Cedar Street Benzene Plume using a direct-push probe between January and February 2009 [48, 49]. Over 30 groundwater screening samples were collected in areas of the Site and tested for GRO/BTEX. A number of piezometers were installed within the mill building itself to better define groundwater flow direction. Results were inconclusive as to the specific source of the benzene plume, but a location within the mill building, under the raised concrete shipping platform (location B16), was identified as being near a "point of release" of gasoline. Peninsula Fuel Company was not considered to be a significant source of the benzene plume but may be contributing to the GRO detected in groundwater immediately downgradient of that facility.

3.1.2.4 Interim Action Work Plan Activities

As part of investigative activities conducted at the Site for the mill demolition interim action (refer to the IAWP; [57]), three new groundwater monitoring wells (PP-17, PP-18, and PP-19) were installed along the bulkhead at the northern edge of the Site in November 2012. The three new wells and five existing monitoring wells at the Site (PZ-6, PP-15, PP-13, PZ-12, and PZ-13) were sampled on a quarterly basis beginning in November 2012. Samples were submitted for analysis of BTEX, GRO, and DRO.

Approximately 0.45 foot of petroleum product similar to gasoline was measured using an interface probe in Well PZ-6 in November 2012, and 1.15 feet of product was measured in February 2013. Elevated concentrations of GRO (3,700 mg/kg) had been detected in soil samples collected during installation of the well by Landau, and highly elevated concentrations of GRO (53,000 micrograms per liter [µg/L]) were detected in the groundwater sample collected from the boring. Benzene was detected at a concentration of 2,800 µg/L in groundwater in PP-15 during the second quarterly monitoring event, which is greater than the historical maximum for that well. The benzene concentrations measured in groundwater in the other wells monitored as part of the IAWP are consistent with previous data.

3.1.3 Harbor Sediment

Several sediment samples have been collected between the K Ply Bulkhead and the south side of Terminal 1 beginning in 1991 by TetraTech [60]. Refer to Figure 3.1 for sediment sample locations. The TetraTech sample was found to exceed Washington Sediment Quality Standards (SQS) criteria for three low molecular weight PAHs (LPAHs; typically associated with POLs), six high molecular weight PAHs (HPAHs; typically derived from combustion byproducts), and 2-methylphenol. In addition, the sample was found to exceed the cleanup screening level criteria for phananthrene, 2-methylphenol, and total LPAHs. The report attributed the exceedances to shipping activities and nearby industrial activities. Metals concentrations were found not to be elevated the sediment sample.

Three additional samples (PA-SS2-002-SS-0, PA-SS1-001-SS-0, and PA-SS3-003-SS-0) were collected from surface sediments immediately offshore of the former K-Ply log pond also in 1991 in preparation for filling of the pond. The samples were submitted for TPH analyses by Method 418.1 and Total extractable petroleum hydrocarbons (TEPH) by Method 8015-modified. TEPH was measured at concentrations between 7 and 600 mg/kg, and TPH was measured at concentrations between 38 and 530 mg/kg [6].

The recent Port Angeles Harbor Sediment Characterization study [61] presents data for surface sediment grab samples (0 to 10 centimeters [cm]) and subsurface sediment core samples (maximum 12 feet) throughout the Harbor. Two of these samples were located in the vicinity of the Site: surface samples KP01 and KP02. Subsurface sediment core samples were also collected from location KP02 to depths of 66 inches. All surface samples were analyzed for a broad suite of contaminants including SVOCs, resin acids, pesticides, PCBs, dioxins/furans, DRO, metals, and bioassay. The motor oil fraction of TPH was also reported for all samples, but benzene and GRO were not analyzed. Subsurface samples from KPO2 were not analyzed for TPH.

There were no exceedances of any chemical sediment criteria in sediment samples collected by Ecology in the vicinity of the Site. Tributyltin (TBT) was detected less than the sediment criteria at 40 micrograms per kilogram (µg/kg) at Station KP-01. Larval bioassay results from both KP-01 and KP-02 exceeded the SQS/Lowest Apparent Effects Threshold (LAET) criteria for mean normal survivorship (%) relative to reference for *D. excentricus*.

Concentrations of DRO were less than a detection limit of 31 mg/kg dry weight in sediments in the two locations in the vicinity of the Site. TPH motor oil was detected in low concentrations in these sediments. Detected concentrations were 66 mg/kg and 97 mg/kg in KP-01 and KP-02, respectively. Although there are no cleanup criteria available for comparison for TPH in marine sediments, these concentrations are substantially less than MTCA Method A soil cleanup criteria. These concentrations are consistent with other detections of TPH motor oil throughout Harbor sediment, including locations far from potential near-shore petroleum sources.

The K Ply mill was identified in the study as a source of wood debris to the Harbor based on its historical log storage, and significant accumulations of wood debris, including wood chips and sawdust, are noted to be present on the sediment surface in the vicinity of the Site. The log-booming area near the Site was described as having low dissolved oxygen conditions, with generally stressed benthic communities, based on a 1999 SAIC wood debris study cited in the 2012 Ecology report. The Ecology report notes that K Ply "regularly discharged stormwater and wastewater, including boiler water treatment boiler blowdown, and non-contact cooling water, into the harbor." According to the Ecology report, in 2004, K Ply was cited for non-compliance for the discharge of boiler ash and ash-contaminated water to the storm system, and K Ply was required to implement BMPs to prevent exposure of ash, fiber, and petroleum products to stormwater [61]. Creosote-treated timber pilings and dolphins near K Ply were reported by Ecology in 2008.

It is worth noting that stormwater sampled at the site outfall for the NPDES Construction Stormwater General Permit in support of mill demolition was submitted for BTEX, NWTPH-G, and NWTPH-Dx analysis in November 2012 and February 2013. There were no detections of the tested analytes in the stormwater samples for either event.

3.1.4 Physical Investigations

A utility survey was conducted at the Site in June 2013 by Floyd|Snider to determine the locations of Pipeline 5 and Pipeline 8, to video the abandoned sanitary sewer line, and to investigate utilities on the Peninsula Fuel Company property [62]. Conductible steel, which is presumed to be Pipeline 8, was located using a radio frequency detector under the alleyway between Peninsula Fuel Company and K Ply. The signal was lost to the south of the alley, at the property line of Peninsula Fuel Company. The line was able to be traced to the northwest under the raised concrete slab and under the former mill until the signal was lost near the current fence line, just south of the concrete pavement of the travel lift near Terminal 1. Also, a 60-foot section of the pipeline is missing under the footprint of the old caustic/resin tank area.

Pipeline 5 was traced from its two visible flanges within the northwest corner Peninsula Fuel Company until it was found to terminate on the west side of Cedar Street, as discussed in Section 2.1.5.5.

The survey of the abandoned sewer line was conducted at the manhole in the former K Ply machine shop. The manhole is approximately 12 feet deep and of brick and mortar construction. Three pipes terminate or originate in the manhole. The first is a 12-inch concrete pipe that extends north to an outfall at the Harbor. The second pipe is an 8-inch line that enters the manhole from the southwest. The third pipe is a 4-inch line that enters the manhole from the southeast (refer to Figure 3.1). The manhole served as the point where waste waters from the 8-inch line and the 4-inch line combined to flow into the 12-inch discharge line. At the time of inspection, both these lines were observed to be plugged, whereas the 12-inch discharge line was unplugged. Following removal of the plug from the 4-inch line, a strong gasoline odor emanated from the water that was released behind the plug. The water flow gradually subsided and the plug was replaced. During the time the water was flowing, a green fluorescence dye was added to the discharge line. About 15–20 minutes after the dye was added, a small dye plume was seen emanating from the base of the riprap slope into the Harbor; however, the outfall could not be visibly located.

The 12-inch line was videotaped for approximately 100 feet until hitting an offset in one of the clay pipe segments. The 4-inch line was unable to be videotaped because the line was too small for the tractor camera, but a sonde cable was pushed into the line, allowing the line to be traced on the surface. The line was traced back to the southeast until encountering an obstruction 20 feet northwest of the existing public sewer manhole located between Commercial Fueling Network (CFN) and the K Ply office (Figure 2.2). The 8-inch line was not able to be videotaped because of a 6-inch reducer on the line right at the manhole. The sonde cable was able to be inserted and traced the 8-inch line back to what is likely a buried manhole located under the pavement in the alley. This manhole is potentially tied to a visible drain grate located adjacent to the concrete portion of the former K Ply mill (refer to Figure 3.1).

Subsurface pipes were also surveyed on the interior of the Peninsula Fuel Company property. Three pipes were identified at the southern end of the facility that may have been used to supply a small self-service area. A previously unknown pipe was found that originated at the valve box near the pump house and led northeast to the alley, where it terminated. Several supply lines were visible aboveground at the old fueling rack, and all were traced back to the piping inside the pump house.

3.2 REMEDIAL ACTIONS

Prior remedial actions undertaken at K Ply are summarized in this section. Refer to Figure 3.1 for locations of remedial actions, which are denoted as areas of potential concern.

3.2.1 Hydraulic Oil Recovery System

Ecology prepared a remedial action order (No. DE 90-S255) dated May 16, 1990 for ITT Rayonier to recover the spilled hydraulic oil and excavate the PCP soil contamination beneath the K Ply facility (discussed below). SEACOR was subcontracted by ITT Rayonier to install and operate a hydraulic oil recovery system. A hydraulic oil recovery system was installed in March 1992 and consisted of two 6-inch diameter, 30-foot deep extraction wells located beneath the mill floor in the approximate center of the plume. The system utilized a two-phase pumping system in which groundwater in each well was recovered to generate a cone of depression at the well, and a separate pneumatic pump was used to skim floating oil from the well [52]. The containment system consisted of individual concrete receptacles located beneath each press, with metal trays to direct leaks from hydraulic lines into the concrete receptacle. The containment system was evaluated by an independent engineer and that report determined that the system had sufficient volume for containing hydraulic oil leaking directly from the presses, but did not provide for pressurized or fugitive leaks from pumps or piping, and no operational procedures were in place to maintain the receptacles and clear them of debris or overflow from wash-down water [60].

No hydraulic oil was recovered in the first 2 years of operation, which was attributed to inconsistent pumping rates, high viscosity oil, and fine-grained soils [63]. Available records up through 2007 indicate that the system was successful in recovering only a limited quantity of hydraulic oil; instead, its primary purpose switched to one of containment—to maintain drawdown to prevent further migration downgradient of the oil. The hydraulic oil recovery system was operated until it was decommissioned in late 2012 as part of mill demolition. Extraction wells were capped and protected during demolition.

3.2.2 Pentachlorophenol Cleanup

Under the 1990 remedial action order (No. DE 90-S255), ITT Rayonier undertook cleanup of the PCP contamination of soils beneath the K Ply facility (refer to area of potential concern #3 in Figure 3.1). ITT Rayonier subcontracted SEACOR to excavate an estimated 150 tons of PCP-contaminated soils in the vicinity of the panel oiler location. The excavation and backfill of contaminated soils was completed by November 1991. Soils were excavated to a cleanup goal concentration of 25 mg/kg for PCP, resulting in an excavation approximately 25 feet wide by 40 feet long by 2 to 6 feet deep (approximately 150 tons of soil). However, to preserve the structural integrity of the building, with authorization from Ecology, the excavation was not completed to the cleanup goal in a narrow section adjacent to the raised concrete slab at the southern edge of the excavation as well as in a small area of the bottom of the excavation that extended to 2 feet below grade [56]. Composite samples collected from each of the remaining excavation sides and one composite taken from the bottom of the deeper portion of the excavation indicated that the cleanup goal was otherwise achieved. Available records indicate that the soil left in place has concentrations of PCP up to 840 mg/kg, and bis(2-ethylhexyl)phlatate of up to 310 mg/kg. Low concentrations (i.e., less than 2 mg/kg) of PAHs (flouranthene, fluorene, 2-mehtylnapthalene, napthalene, phenanthrene, and chysene) were detected in samples of soil left in place on all four walls of the excavation.

Approximately 130 CY of PCP-contaminated soil and construction debris was transferred off-site to Marine Shale Processors Inc., in Saint Rose, Louisiana [56]. The excavation was backfilled with clean imported soil and provided with surface drainage to minimize potential infiltration of water into the surface soils [56].

3.2.3 Resin Cleanup

Available records indicate that in approximately 1985, PenPly excavated a small quantity of soil from the area of the resin tank following a spill of glue (refer to area of potential concern #5 in Figure 3.1). The excavation was up to approximately 3 feet deep in places. Ecology issued an enforcement order (No. DE 85-753) compelling PenPly to properly characterize the resin-impacted material for off-site disposal. PenPly conducted the required testing, demonstrated that neither phenol nor formaldehyde was detected in the soil, and the order was closed in October 1986 [64].

4.0 Summary of Known Environmental Site Conditions

Environmental conditions that have been documented based on previous investigations at the Site, as described in Section 3.0, are summarized in this section. This summary provides the basis for a preliminary CSM and identification of data needs that underlie the planned RI/FS investigation. Known areas of contamination are best displayed on figures prepared as part of the MTA Site RI/FS. For reference, select figures illustrating characterization of site soil and groundwater contamination are included as Appendix A.

4.1 SOIL

Three major areas of concern have been identified based on prior investigations. These include the hydraulic oil area, the petroleum contamination beneath the southern end of the mill, and the panel oiler area (refer to Figures in Appendix A).

Hydraulic oil area. The area beneath the north end of the mill, in the vicinity of the hydraulic presses, is contaminated due to past releases of hydraulic oil from the former plywood presses. In addition to the visible staining of surface soils in this area, hydraulic oil is also currently present in measurable amounts as a separate phase product on the groundwater table. Gasoline has also apparently co-mingled with the hydraulic oil in the subsurface soils in this area. Available data indicate that although the hydraulic oil does not extend to the K Ply Bulkhead, its boundaries are not currently well defined.

Petroleum contamination beneath the south end of the mill. Petroleum constituents are present in soil beneath large portions of the mill, upgradient of and comingled with the hydraulic oil area. Available data indicate that soil contaminated with GRO and/or BTEX is generally present under the south end of the mill and in the alley south of the mill. The soil contamination is found most commonly on the water table but also occurs in limited areas at shallow, near-surface depths (e.g., in the vicinity of B-16). In limited areas, DRO is found comingled with the GRO.

Soil with GRO concentrations up to 2,110 mg/kg and DRO concentrations up to 11,800 mg/kg is present at the downgradient boundary of the Peninsula Fuel Company property, suggesting that additional GRO and DRO contamination is present on the Peninsula Fuel Company property. This contamination, which may be associated with Pipeline 8 and/or Pipeline 5, has been a contributing source to groundwater impacts at the Site including the LNAPL occasionally observed in the alley at Well PP-7.

Panel oiler. Soil in the area of the PCP release near the former plywood panel oiler and subsequent cleanup was left in place with concentrations of PCP up to 840 mg/kg, and bis(2-ethylhexyl)phlatate of up to 310 mg/kg. Impacted soil appears to extend beneath the raised concrete at the south end of the building, and may be co-located with GRO-impacted soil.

4.1.1 Surface Soil

There were elevated detections of DRO in many of the 18 surface soil samples collected during the IAWP Site Assessment [58]. GRO, BTEX, and other VOCs were not detected in any samples.

PCP was detected in one sample collected in the former panel oiler area at a concentration of 76 mg/kg. The sample was located in an area of stained soil along the concrete pad wall, and the stained soil indicates additional PCP contaminated soil is present. A sample from the transformer pad was collected and PCBs were not detected at a level of concern. Dried resin is present on the soil surface in the area immediately north of the hydraulic press area. The resin/glue samples contain hydrocarbons, formaldehyde, and low-level PAHs. It is not clear if the PAH content is due to the hydraulic oil contamination or is a part of the resin/glue. An oily sludge-like material is located on the concrete subsurface underneath the curelines/dryer pad, and the results indicate that it has a high concentration of heavy oil-range hydrocarbons and low-level detections of PAHs. The soil adjacent to the 4-foot lathe also had a detection of heavy oil-range hydrocarbons. A hardened black material was encountered on the soil surface in the gasoline contamination area. A sample of the material indicates it has high levels of DRO and heavy oil-range hydrocarbons along with low detections of metals and PAHs. Metals at low concentrations are generally present in the surface fill material but were not detected at a level of concern.

4.2 GROUNDWATER

Groundwater contamination at the Site is well defined based on prior investigations. Groundwater contaminants primarily include GRO and associated BTEX compounds with lesser amounts of DRO (including hydraulic oil). There have also been limited historical detections of formaldehyde, and Freon 113. PCP has been tested for but not detected in groundwater. Additionally, LNAPL has been observed at the water table surface in the area of PZ-6, the alleyway, and under the hydraulic presses. As shown in Appendix A, the GRO/benzene plumes are most extensive and infer comingling with the LNAPL in the hydraulic oil area. Additional details are given below.

Hydraulic oil area. As mentioned above, up to 2 feet of free-phase hydraulic oil LNAPL is present on the water table in the area under the presses. In addition to measured free product in these wells, and associated detections in DRO due to the hydraulic oil, sample results from these wells indicated persistent levels of GRO and BTEX in groundwater in this area.

K Ply/Cedar Street Benzene Plume. As shown in the figures in Appendix A, a plume of GRO and benzene is present beneath large areas of the mill in the upper 5 to 10 feet of groundwater (approximately 10 to 20 feet below ground surface). Other typical gasoline constituents (i.e., GRO, toluene, ethylbenzene, xylenes, trimethylbenzene, etc.) have also been detected in the plume but at substantially lower concentrations. The benzene plume has two lobes: a western lobe that extends across Cedar Street and terminates south of the Port's office on Terminal 1, and an eastern lobe under the former mill that extends to near the bulkhead north of the mill. The core of the plume with the highest concentrations appears to be located near PP-15 and PZ-6. Up to 1.2 feet of LNAPL, consisting of what appears to be a gasoline product, is present at PZ-6. The western lobe of the plume appears to be younger than the eastern lobe. Sampling conducted in the mid-1990s as part of the initial MTA site characterization did not identify elevated levels of benzene in the western lobe, but sampling in October 2005 identified concentrations of benzene in groundwater at approximately 1,000 µg/L at two locations between the K Ply mill and Platypus Marine.

Alley Area. An area of DRO groundwater contamination is present in the alley south of the mill, where a thin layer of diesel product has been measured intermittently in a well and also observed by Landau in the test pit dug in 1988. GRO groundwater contamination has also been detected in the alley at a concentration of 1,100 µg/L in PP-7 and at concentrations greater than 2,200 µg/L in direct-push grab samples.

4.2.1 Upgradient Groundwater Quality

Storage of petroleum products is currently occurring or has occurred in four locations upgradient of the mill property (current Chevron and Pettit Card Lock, former PenPly retail office and Peninsula Fuel Company). However, there has been little groundwater sampling conducted within any of these properties. Groundwater sampling was conducted on the Time Oil property, but groundwater sampling is not known to have been conducted at the other upgradient properties. Sampling has been conducted immediately downgradient of Peninsula Fuel Company where elevated GRO (up to 2,200 µg/L) was detected during the MTA RI in the alley south of the Site. Low concentrations of benzene (up to 35 µg/L) from unknown sources were also detected in the alley-way area.

4.3 AREAS OF POTENTIAL CONCERN

Areas of potential concern were identified during IAWP activities based on historical document review in locations of the Site where previous environmental investigations identified contamination, where historical operations were conducted that are typically associated with contamination, or where hazardous materials were found to be stored prior to mill demolition[4]. Table 4.1 lists the areas of potential concern that are numbered on Figure 4.1. As discussed below, many of these areas were assessed following mill demolition as part of the IAWP, and select surface soil samples were collected. As a result, some of the areas below do not necessarily warrant additional data collection. Areas of potential concern include the following:

1. **Historical Solvent Use and Distillation Areas.** These areas include two locations in the main mill building and one location at the southwest side of the old slicer building. One of the locations in the mill building is covered by the concrete slab, and the other location is in the mill building. These areas were sampled during the IAWP Site Assessment and solvents were not detected. Additional data will not be collected in this area.
2. **Green End Building.** This area is located along the west side of the Bamford/8-foot lathe building. The concrete slab that was the floor of the building is still in place. Oil and grease were detected in soil during the 1988 Landau environmental investigation in this area. Because no visual staining of oil or grease was observed on the concrete in this area during the IAWP Site Assessment and because this area is capped with concrete, this area was not identified to be of concern and additional data will not be collected.
3. **Panel Oiler.** This area is located on the west side of the Site, near the GRO plume and concrete slab. The PCP tanks have been removed. Some of this area is covered by the concrete slab, and some of this area has been covered by plastic sheeting installed as part of the IAWP.
4. **Caustic Tank Area.** This area is located on the northwest area of the Site, near the hot presses. The tanks and vaults that held the tanks were removed during mill demolition.

[4] Areas of Potential Concern were only identified for areas within the tentative site boundary.

5. **Resin Tank Area.** This area is located on the northwest area of the Site, just south of the caustic tank area. The tank and vault that held the tank were removed during mill demolition.
6. **Hydraulic Oil/Hot Press Area.** This area is located within the vicinity of the hot presses where hydraulic oil had historically leaked to the soil.
7. **Electrical Shop.** Several cleaners, solvents, oils, and other chemicals were historically used in this area. There were no known releases in this area. This area was not identified to be of concern during the IAWP Site Assessment after surface soil sampling for metals, TPH, PCBs and additional data will not be collected.
8. **Machine Shop.** Several cleaners, solvents, oils, and other chemicals were historically used in this area. There were no known releases in this area. A pipe survey of the abandoned sanitary sewer line will be conducted from this area, but additional analytical data will not be collected because the area is paved.
9. **Room 14.** Room 14 is a small room where an empty transformer oil bucket and other oil buckets were found during the hazardous materials survey. There were no known releases in this area. This area was not identified to be of concern during the IAWP Site Assessment because it is paved and additional data will not be collected.
10. **Green Veneer Chipper Room and the East Exterior of the Green Veneer Chipper Room.** During the hazardous materials survey, transformers and transformer oil containing PCBs were identified in this area. The transformers had a “contains PCBs” warning label and analytical testing confirmed the presence of PCBs in the transformer oil. There are no known releases in this area. This area was not identified to be of concern during the IAWP Site Assessment after sampling for PCBs and additional data will not be collected.
11. **Paper Station.** Unknown liquids were found during the hazardous materials survey in this location. There are no known releases in this area. This area was not identified to be of concern during the IAWP Site Assessment after visual inspection and analytical testing of surface soil for TPH and metals and additional data will not be collected.
12. **Glue Loft.** Several corrosive, toxic, and unknown materials were found in the glue loft areas during the hazardous materials survey. Dried resin and glue was found on the ground surface in this area during the IAWP Site Assessment, indicating historical discharge(s) of resin and glue. A visual inspection revealed that the hardened resin and glue is concentrated on the ground surface..
13. **Forklift Shop.** Drums containing glue and degreaser were found in the forklift shop during the hazardous materials survey. This area consists of a concrete pad with a grate/pressure wash area and sump area. The grate area drains to a catch basin located to the north of Area of Potential Concern 13, which contains a dry well. Further investigation will be conducted in the dry well area.
14. **Bamford/8-foot Lathe Building.** This area is located directly next to the Green End Building. A drum containing glue and pole-mounted electrical transformers containing PCBs were found during the hazardous materials survey. Because no visual staining of oil or grease was observed on the concrete in this area during the IAWP Site Assessment and because this area is capped with concrete, this area was not identified to be of concern and additional data will not be collected.

15. **Equipment/Storage Building #10.** A transformer, wastewater drum, gear lube drums, and other miscellaneous wastes were found in this area during the hazardous materials survey. This is in a paved area of the Site. The transformer contains PCBs. This area was not identified to be of concern during the IAWP Site Assessment following visual inspection and additional data will not be collected.
16. **Pipeline 8.** Pipeline 8 is a buried former petroleum pipeline that runs parallel to Cedar Street beneath the west side of the mill building. The location of Pipeline 8 is shown in Figure 4.1.
17. **Historical On-site UST and ASTs.** USTs and ASTs containing petroleum products were historically located near the Green End Building, the tide gate at the entrance to the log pond, near the ring barker, and on the west side of the mill building (refer to Figure 2.2)
18. **Abandoned Storm Sewer Line.** This is the sewer line with the machine shop manhole cover where petroleum vapors historically were observed (refer to Figure 2.2).
19. **Hog Fuel Pile.** Petroleum products and solvent still bottoms were historically dumped on the hog fuel pile to be burned.
20. **Former Log Pond**. Several small spills occurred in the former log pond (refer to Figure 2.2).
21. **Port Angeles Harbor.** There were select instances of spills and discharges (i.e., glue wastes) directly to the Harbor in front of the mill.
22. **Stack.** Elevated concentrations of dioxins/furans were detected in ash samples collected from inside the stack by the Port during stack demolition in March and April 2013 for disposal purposes. Dioxin/furan concentrations between 4 and 43,400 picograms per gram (pg/g) toxic equivalency quotient (TEQ) were detected in the ash and stack material samples and the data were provided to Ecology. Most of the ash that had been trapped in the stack was removed from the Site with the stack debris and disposed at a municipal landfill. It is possible; however, that residual dioxin/furan-containing ash could remain on-site where the stack fell following demolition.
23. **Wood Debris Pile.** There is a wood debris pile located southeast of the 10-foot lathe building and next to the stormwater conveyance ditch. The composition of this pile is not known.
24. **4-foot Lathe.** A 4-foot lathe was historically located in the main mill building, east of the hot presses. Oil staining was observed on the side of concrete structure that supported the lathe. A surface soil sample collected during the IAWP Site Assessment indicates localized surface petroleum contamination. Because surface samples have already been collected, additional data will not be collected.
25. **10-foot Lathe.** A 10-foot lathe was historically located in the 10-foot lathe building, located on the north side of the main mill building. Oil staining was observed on the concrete structure and treated piling that supported the lathe. This area was not identified to be of concern during the IAWP Site Assessment after sampling for TPH and additional data will not be collected.

5.0 Preliminary Conceptual Site Model

5.1 APPROACH

This preliminary CSM is presented based on the physical conditions at the Site, findings from the MTA Site RI/FS, IAWP Site Assessment and other site investigations. The CSM is used at this stage of the project to summarize the known and potential hazardous substances at the Site in order to define contaminant transport, possible migration pathways, and routes of exposure. Additionally, this preliminary CSM aids in defining data needs to support the RI.

5.1.1 History

The site development history and operational history are reasonably well defined. In summary, clean hydraulic fill material from the Harbor was used to create the Site in the 1920s. Following filling, the Site was used for sawmills and a plywood mill, as well as a transit area for a petroleum pipeline. No data gaps remain in the site history that would significantly influence the CSM. The site history is described in detail in Section 2.0.

5.1.2 Physical Setting, Geology, and Hydrogeology

Shallow groundwater occurs in the vicinity of the Site as an unconfined aquifer within the hydraulic fill and underlying native beach sands. The bottom depth of this unconfined aquifer is not known but is likely greater than 30 to 40 feet bgs. The general groundwater flow direction is to the north, toward the Harbor, at an average horizontal gradient of approximately 0.002 feet per foot and a hydraulic conductivity of approximately 10^{-3} to 10^{-1} cm/s, so that the overall seepage velocity is estimated to be in the range of 0.01 to 0.4 foot per day. The tidal range in Port Angeles averages 4.6 feet. Tidal variations have been observed in groundwater levels in wells as far as 600 feet inland.

Shallow groundwater is recharged from upgradient groundwater inflow from the south. Recharge through surface soils was formerly limited by the lack of uncovered ground. Currently, (i.e., following mill demolition) much of the Site is bare ground, with the exception of the raised concrete slab, those areas covered by plastic sheeting as an interim measure, and some minor areas of remaining concrete pavement. Groundwater discharges to the Harbor through a permeable buried wooden bulkhead and a riprap slope that extends to below MLLW. A man-made drainage swale crosses the central portion of the Site and is used to drain stormwater from a portion of the Site.

5.1.3 Hazardous Substances

The primary known COCs at the Site are GRO, DRO, BTEX, and PCP. Based on the historical review of site operations, several potential COCs (PCOCs) were identified and may be present at the Site. These include PCBs, VOCs (formaldehyde, methylene chloride, and 1,1,1-trichloroethane), metals, and dioxins/furans. Recent surface soil sampling conducted as part of the IAWP in specific areas where PCBs and VOCs were stored or used has indicated that PCBs and VOCs are not of concern in site soil. Likewise, surface soil samples analyzed for metals indicate that metals are not a COC.

5.1.4 Impacted Media

Based on prior investigations and IAWP data, GRO, DRO, hydraulic oil, BTEX, and PCP are confirmed present in site soil; and GRO, DRO, and BTEX are confirmed present in site groundwater. The extent and magnitude of groundwater impacts by these known COCs is well defined. However, PCOCs listed in the table below may also be present in soil, sediment, and groundwater. The table also identifies media in which COCs are not likely to be present. Analytical data have confirmed the presence of LNAPL in three areas of the Site.

Some of the COCs present a potential risk to future site use if structures are built over contaminated areas (i.e., indoor air). Other COCs present a potential risk to sediment quality in Port Angeles. Wood debris has been identified as an issue of concern in the offshore area adjacent to the Site but is not considered a COC.

Potentially Affected Media and Site COCs/PCOCs

	Media			
COC/PCOC Class	**Soil**	**Groundwater**	**Indoor Air (Future Potential Risk)**	**Nearshore Sediments**
GRO/BTEX	COC	COC	PCOC	Unlikely
DRO and hydraulic oil	COC	COC	Unlikely	Unlikely
PCP	COC	Unlikely	Unlikely	Unlikely
VOCs	Unlikely	PCOC	Unlikely	Unlikely
SVOCs	PCOC	Unlikely	Unlikely	PCOC
Metals	Unlikely	Unlikely	Unlikely	PCOC
Dioxins/furans	PCOC	Unlikely	Unlikely	PCOC

Abbreviations:
BTEX Benzene, toluene, ethylbenzene, and xylenes
COC Contaminant of concern
DRO Diesel-range organics
GRO Gasoline-range organics
PCOC Potential contaminant of concern
PCP Pentachlorophenol
SVOC Semivolatile organic compound
VOC Volatile organic compound

5.1.5 Potential Exposure Pathways/Receptors

For each affected media, the following potential exposure pathways and receptors are identified:

- *Soil*: The Site is zoned industrial heavy and is surrounded by industrial properties. The future use of the Site will be for industrial purposes. Therefore, future site workers are the primary receptors who could come into direct contact with contaminated site soil in the future. No risk is currently present to the general public because the Site is fenced and considered secure.

- *Groundwater*: Groundwater discharges to the Harbor and is considered the primary potential pathway for contaminants to reach receptors. The potential receptors would include fish/shellfish, recreational users of the water body, and humans who consume fish/shellfish from the Harbor. Groundwater is considered non-potable based on the proximity of the Site to the Harbor.
- *Indoor air*: Currently, there are no structures above areas of GRO-contaminated soil that could pose a risk of vapor intrusion. However, in the future it is possible that structures could be built over GRO-contaminated areas. The vapor pathway would be evaluated as part of the RI/FS.
- *Sediment*: The known COCs and PCOCs in groundwater (e.g., benzene) are primarily petroleum based and do not have a tendency to partition to sediments, aside from their SVOC content (primarily PAH). However, a portion of stormwater from the Site discharged to the harbor via the stormwater conveyance ditch/log pond. A historical sewer outfall also discharged waste waters to the harbor. It is possible that COCs and PCOCs present in site soil or the sewer were transported to the Harbor via these pathways. Erosion of contaminated soil to the Harbor sediments in areas other than the stormwater conveyance ditch is not considered a pathway because of the berm located along the length of the bulkhead that prevents sheet flow and because of the riprap slope that extends along the bulkhead from the Site to the Harbor.

5.1.6 Data Needs

Based on the CSM presented above and an evaluation of the existing data, the following questions were considered relevant in defining what data should be collected during the RI and how the data will be used.

1. *Have all of the COCs been tested for in all the locations where the COCs were potentially released?* Consistent with the MTCA requirement to define the nature and extent of the Site, if existing information is insufficient, COCs need to be analyzed for in areas where releases may have occurred (e.g., locations of former USTs or areas where solvents were used but which had not previously sampled).
2. *Are any of the PCOCs present in the identified media?* Defining the nature of contamination (e.g., are dioxins/furans present in site soil) is a basic MTCA data need.
3. *Is the vertical and horizontal extent of each COC well defined in each media in which it occurs?* Defining the extent of contamination (e.g., to bound the extent of hydraulic oil contamination to a reasonable certainty) is a basic MTCA data need.
4. *Are the sources for each COC identified?* Although several previous investigations have attempted to identify the source of the gasoline contamination, the original mechanism for how gasoline came to be located on the Site has not yet been identified with confidence. Each of the potential sources of gasoline can be more thoroughly investigated now that the mill has been demolished. Ultimately, the full extent of the source areas is the data gaps that need to be filled, in addition to identifying the specific source mechanism (such as a pipeline leak or surface spill).
5. *What is the potential for contaminated groundwater from upgradient properties to flow onto the Site?* The environmental condition of several upgradient properties is

uncertain. The cleanup of the Site may be affected by contamination discovered to flow onto the property from properties such as Peninsula Fuel Company.

6. *Is the existing information on the extent of each COC sufficient to identify remedies and estimate cleanup costs in the FS?* This data need is driven by FS considerations.
7. *Are groundwater flow direction and aquifer properties sufficiently well defined?* The placement of wells and interpretation of data are influenced by the proper understanding of groundwater flow direction and aquifer properties.
8. *Is the nearshore sediment quality significantly different than what sampling to date in this area has indicated? E*cology has requested further data regarding nearshore sediment quality relative to data already collected from further offshore of the Site.

6.0 Screening Levels and Applicable or Relevant and Appropriate Requirements

6.1 APPROACH

Screening levels are an appropriately conservative concentration of a constituent in a particular media for a particular pathway of exposure. They may be based on Applicable or Relevant and Appropriate Requirements (ARARs) or derived from the MTCA standard numerical calculations of risk. Screening levels are useful for several purposes, including establishing appropriate analytical detection limits and evaluating PCOCs. Analytical detection limits for the samples collected during the RI should be set low enough to allow evaluation of the results relative to screening levels. Data collected during the RI are compared to screening levels as a basis for determining which constituents should be retained as COCs. This chapter identifies the basis for choosing screening levels. Actual numerical values will be presented in the RI/FS report.

6.1.1 Groundwater Screening Levels

Groundwater screening levels are proposed at the lowest level that will accomplish the following:

- Protect adjacent marine water quality
- Protect nearshore sediment quality
- Protect workers from exposure in utility trenches
- Protect indoor air quality (due to vapor intrusion)

6.1.2 Soil Screening Levels

Soil screening levels are proposed at the lowest level that will accomplish the following:

- Protect workers from direct contact with soil in the upper 15 feet
- Protect groundwater from soil leaching at concentrations that exceed marine surface water quality standards
- Protect indoor air quality (due to vapor intrusion)

6.1.3 Sediment Screening Levels

Sediment screening levels are proposed at the lowest level that will accomplish the following:

- Protect aquatic species
- Protect human health affected by ingestion of bioaccumulative compounds in fish and shellfish
- Protect human health affected by recreational contact with sediment
- Sediment screening levels, as contained in “Preliminary Sediment Cleanup Objectives for Port Angeles Harbor” [65], will be considered.

6.2 APPLICABLE OR RELEVANT REQUIREMENTS USED FOR SCREENING LEVEL DEVELOPMENT

Standards or guidance established under state or federal law that will be used in the development of screening levels for this Site include:

- Surface Water—Aquatic Life Marine/Chronic; Washington Administrative Code (WAC) 173-201A
- Surface Water—Aquatic Life Marine/Chronic; National Recommended Water Quality Criteria, Clean Water Act, Section 304(a)
- Surface Water—Aquatic Life Marine/Chronic; National Toxics Rule 40 Code of Federal Regulations (CFR) 131
- Surface Water—Human Health Marine National Recommended Water Quality Criteria; Clean Water Act Section 304(a)
- Surface Water—Human Health Marine National Toxics Rule 40 CFR 131
- Surface Water—MTCA Section 173-340-730
- Soil Direct Contact—MTCA Section 173-340-745
- Soil Leaching to Groundwater—MTCA Section 173-340-747
- Soil and Groundwater Concentrations Protective of Indoor air—Ecology 2009 Vapor Intrusion Guidance
- Sediment Chemical Concentrations—Sediment Management Standards Chapter 173-204 WAC, Revised February 22, 2013

6.3 CONTAMINANTS OF CONCERNS AND DRAFT CLEANUP LEVELS

COCs will be identified in the RI based on the frequency and concentrations of the detected constituents. Draft cleanup levels will then be established for the COCs in soil, groundwater and sediment based on the standard MTCA and Sediment Management Standards (SMS) procedures.

7.0 Data Needs and Sampling Plan

In this section, the available historical information and existing environmental conditions based on previous investigations presented earlier in this work plan are used to identify areas in which further investigation is needed. Data collection activities are proposed to remedy these data gaps. Additional details regarding sampling and analytical methods and data management are provided in the SAP/QAPP (Appendix B), which was prepared to be consistent with WAC 173-340-820. A HASP was prepared to establish protection standards and mandatory safe practices and procedures for all personnel involved with investigation activities. The HASP is included in Appendix C.

7.1 SOIL

Soil data needs and data collection plans are divided into site-wide and focused areas of concern. Soil investigation information is summarized in Table 7.1 and illustrated on Figure 7.1.

7.1.1 Site-wide Soil Data Needs and Data Collection

Two data gaps have been identified relative to site-wide soil: impacts due to air deposition and the extent of surface solid waste. Additional data are needed to evaluate whether air deposition from the K Ply stack has impacted site soils with dioxins associated with the burning of chlorine-containing materials including saltwater-laden wood. Three representative surface soil samples (0–3 inches) will be collected from across the Site and analyzed for dioxins/furans to address this data gap. Because of air deposition, concentrations are expected to be greatest in locations of least disturbance and in areas closest to the stack in a dominantly downwind direction. Ideally, sample locations would be selected that would have received air deposition prior to 1989, when salt-laden wood was still being burned at the Site. Because meeting these location qualifications will be difficult, soil sample locations are not possible to identify with certainty at this time, and locations will be chosen in the field to select locations considered to be the least disturbed soil at the Site. If these samples indicate elevated concentrations of dioxins/furans, additional samples may be collected off-site to better understand the impact, if any, of the emissions from the former stack upon surface soils in the area near the mill.

The horizontal and vertical extent of dried resin/glue, observed in the glue loft area, and of the black solid material observed north of the concrete foundation slab, is needed for planning removal and off-site disposal of these materials. A visual survey will be conducted to determine the horizontal extent of solid waste. Limited scraping with standard hand tools will be used to establish the vertical extent of the material.

7.1.2 Focused Soil Areas of Concern and Data Collection

Several data gaps in soil quality are present in focused areas of the Site (refer to Table 7.1). These include the following:

- **Gasoline plume source.** Despite significant work that constrains the source area of the gasoline contamination beneath the mill, the actual source of the gasoline plume remains an important data gap. Soil sampling conducted in conjunction with the investigation of utilities, and from direct-push borings, will be used to address this data gap. Samples will be collected from direct-push borings in areas of gasoline contamination (refer to Figure 7.1) based on field indications of contamination in order to evaluate the possibility of a surface spill (i.e., near PZ-6) versus contamination that resulted from a historical pipeline or utility. Additional direct-push borings, as determined in the field, will be used to step out from the proposed borings and delineate the apparent source area(s). As determined in the field, each distinct area of gasoline contamination will be tested in accordance with MTCA Table 830-1.

- **Extent of gasoline contamination and LNAPL extent under the concrete slab.** The current extent of gasoline in soil (including its presence as LNAPL in PZ-6) is needed to estimate volume of contamination, assess fate and transport, and support evaluation of remedial alternatives. To address this gap, numerous direct-push borings will be advanced to robustly delineate the extent of LNAPL (refer to Figure 7.1) until field indications of LNAPL subside. Within the existing LNAPL-impacted area, a subset of samples will be submitted for analytes required by MTCA Table 830-1 as well as petrophysical properties of LNAPL such as the viscosity, degree of oil saturation in soil cores, and ultraviolet (UV) photographic analysis (refer to Appendix B for more detail).
  - **Soil condition associated with Pipeline 8.** Additional information is needed regarding the potential contribution of Pipeline 8 to contamination in site soil. A trench will be dug to inspect the accessible section of Pipeline 8 extending from in front of the concrete slab to the terminus near Pier 1. Analytical samples will be collected based on visual and olfactory observations in the exposed section of the pipeline. The remaining sections of the pipeline will be pressure tested with nitrogen. . Direct-push borings may be used to evaluate soil contamination and to collect analytical samples along the alignment of the inaccessible section of Pipeline 8, should the pipeline fail the pressure test. A subset of samples will be submitted for lead, Methyl Tertiary Butyl Ether (MTBE), and other analytes, as required by MTCA Table 830-1.
  - **Soil quality associated with the historical sanitary sewers.** Further investigation is needed to evaluate the potential impacts from the 4-inch and 8-inch sanitary sewer lines. A test pit/trench box will be used to physically examine the southeast terminus of the 4-inch pipe to determine the nature of the pipe termination and evaluate the sludge inside the line at the location. This information will help determine if the gasoline odor and gasoline-containing sludge detected within the 4-inch line was the result of fuel dumped into the line at, or upgradient of, its termination. The 4-inch line may also be pressure tested. If the sludge inside the terminus is free of gasoline odor, or if the pressure test indicates the pipe is not sealed, direct-push borings will be located at regular intervals along the entire length of the 4-inch line to examine the possibility that contamination lying outside of the line has historically migrated into the line.

    Regarding the 8-inch line, the asphalt covering the suspected manhole in the alley between the mill and Peninsula Fuel Company will be cut out in order to inspect the nature of the suspected manhole and determine if the 8-inch line enters the manhole. Samples may be collected based on field indications of contamination.
- **Soil quality in the panel oiler area.** Because soil containing PCP was left behind following the excavation in this area, the soil quality in the panel oiler area remains a data gap. In particular, the extent of PCP beneath the concrete foundation slab is not known. To address this gap, the horizontal and vertical extent of PCP contamination along and beneath the concrete slab in the panel oiler area will be delineated. Direct-

push borings co-located with LNAPL and gasoline plume source borings will be advanced in the area south of the panel oiler (refer to Figure 7.1) using field observations to determine vertical and southern extent; additional borings will be advanced as needed to delineate the extent. The data will be used to supplement previously collected sidewall data that delineates the north, east, and west extent.

- **Soil quality at the upgradient property Peninsula Fuel Company.** Additional information is needed regarding soil quality within the upgradient property, Peninsula Fuel Company to assess whether this area as a possible source for groundwater contamination on the Site. To fill this data gap, several direct-push borings will be advanced on the Peninsula Fuel Company property. Locations are based, in part, on general characterization needs in the former tank farm area and also on the results of a utility survey identifying subsurface pipelines and fill ports/vaults. Field observations of petroleum contamination will be recorded, and analytical samples will be collected in the zone of most visible contamination.
- **The extent of hydraulic oil contamination and LNAPL.** The current extent of hydraulic oil soil contamination and estimated volume of LNAPL near the hydraulic presses is needed to estimate volume, assess fate and transport, and support evaluation of remedial alternatives. To address this gap, direct-push borings will be advanced at the anticipated extent of the hydraulic oil and gasoline contamination to delineate the extent (refer to Figure 7.1). Field tests for LNAPL will be employed to identify the thickness of the LNAPL-saturated intervals in each soil core. Analytical samples will be collected as necessary from each boring to determine the extent of contamination greater than MTCA cleanup levels. A subset of samples will be submitted for lead and carcinogenic PAH analyses. Additional borings will be used as necessary to identify the LNAPL extent by stepping in or out from the proposed borings until field indications of contamination subside. Within the LNAPL-impacted area, a subset of samples will be submitted for analytes required by MTCA Table 830-1 as well as petrophysical properties of LNAPL, such as the viscosity, degree of oil saturation in soil cores, and UV photographic analysis (refer to Appendix B for more detail).
- **Soil quality in areas of former petroleum use/storage.** Three additional areas have been targeted for characterization of soil quality based on apparent data gaps related to their historical usages, including petroleum storage in USTs and ASTs and a historical fuel pile location. These areas will be characterized using direct-push borings (illustrated on Figure 7.1 using locations K-90, K-91, K-92) to assess soil conditions. Test pits will be employed in the area of the fuel pile to determine if shallow soil was impacted by historical dumping on the fuel pile (refer to location K-11). Representative samples will be collected for analysis of GRO, DRO, BTEX, and lead.
- **Soil quality in the area of an apparent dry well identified during demolition.** A data gap in soil quality exists in the location of an apparent dry well identified during demolition (refer to location KT-12 in Figure 7.1). This subsurface enclosure was found filled with oily sludge and may have received drainage from the forklift shop. The soil will be characterized for potential contamination in the location identified during demolition using test pits to determine the extent of impacts. Direct-push borings will be used to assess deeper soil conditions. Representative samples will be submitted for analysis for a range of constituents, including GRO, DRO, BTEX, SVOCs, VOCs, and MTCA metals.

- **Surface soil in the stack area.** Ash samples collected from the inside of the stack during mill demolition had elevated levels of dioxins/furans. The ash and the stack debris were hauled off-site for disposal as part of the mill demolition, but the soil quality in the area of the stack may have been affected as a result of demolition. Soil quality in the vicinity of the stack and an assessment of direct releases of ash during the stack demolition is a data gap. Three representative surface soil samples will be collected in the area where the stack fell and was demolished, and will be analyzed for dioxins/furans to address this data gap (refer to SS-4, SS-5, and SS-6).
- **Wood debris pile characterization.** A wood debris pile is located southeast of the 10-foot lathe building and next to the stormwater conveyance ditch. The composition and soil quality of this wood pile is not known and is a data gap. Test pits will be employed in two areas of the wood debris pile to determine the composition of the area and address the data gap (refer to locations KT-13 and KT-14). Representative samples will be collected for analysis of GRO, DRO, BTEX, or other constituents based on field observations and what is encountered in the wood debris piles.
- **Log pond fill.** Incremental and unpermitted filling of the log pond occurred between the 1940s and the early 1990s by various mill operators. The material that was used as fill during this time is not well documented and the quality of this fill remains a data gap. Soil sampling will be conducted in those parts of the log pond filled prior to 1985 to determine if there are impacts to soil from historical fill activities or if stack ash was used for fill (refer to locations K-100 and K-101). Soil samples will be continuously logged for signs of contamination and representative analytical samples will be collected and submitted for analysis of GRO, DRO, BTEX, PAHs, and metals.
- **Soil quality in the debarker area.** Soil quality in the debarker area remains a data gap. Soil sampling will be conducted to determine if there are impacts to soil from historical operations of the debarker and its UST. Direct-push borings will be advanced in the location of the former UST and stepped out from the ring barker. Soil samples will be continuously logged for signs of contamination and representative analytical samples will be collected and submitted for analysis of GRO, DRO, BTEX, and lead.

7.2 GROUNDWATER

Groundwater data needs and data collection plans are divided into general data objectives, focused groundwater areas of concern, and upgradient groundwater. Groundwater investigation information is summarized in Table 7.2 and illustrated on Figure 7.1.

7.2.1 General Groundwater Data Needs and Data Collection

Prior investigations have defined well the extent and magnitude of groundwater contamination within the mill footprint and also along Cedar Street and the adjacent alley. General groundwater data are more focused on overall site groundwater flow direction (water level data), LNAPL thickness, and well replacement.

Water level elevation information is needed throughout the Site to provide groundwater flow direction and horizontal hydraulic gradient information. Water level measurements at locations across the Site will be used to address this data need. Several new wells will be installed along the shoreline (PP-20, PP-21, and PP-22; refer to Figure 7.1) and on the upgradient side of the Site (PP-23, PP-24, and PP-25). A professional survey of monitoring well location, measuring point elevation, and ground surface elevation will be conducted for all monitoring wells and piezometers. This will be followed by water level elevation measurements from representative wells and piezometers during two monitoring events representative of seasonal variation. Water level measurements during each event will be collected within an approximately 1-hour-long period for an accurate representation of the potentiometric surface.

Better definition of the extent of LNAPL, including hydraulic oil, gasoline, and diesel is needed. To address this data need, LNAPL thickness will be measured in all wells with an oil-water interface probe during two monitoring events representative of seasonal variation.

The destruction of PP-15, PP-4, and PP-6 (refer to Figure 7.1) during demolition has resulted in the need for replacement of these wells. Well PP-15 was located in the high-concentration area of the GRO and benzene plume and will be replaced with PP-15R. Wells PP-6 and PP-4 were located east of the edge of the contamination beneath the mill and serve an important role in monitoring the eastern extent of contamination. PP-6 will be replaced with PP-6R, and PP-4 will be replaced with PP-4R.

7.2.2 Focused Groundwater Areas of Concern and Data Collection

Focused groundwater areas of concern include the petroleum in the mill area, the caustic vault area, downgradient of the former log pond and shoreline area, and historical TPH-use areas noted above (refer to Section 7.1.2).

The current condition of multiple known constituents in groundwater in the mill vicinity is an important data need. The concentrations of GRO, BTEX, and DRO (including hydraulic oil in the mill and Cedar Street areas) will be monitored using several existing or replaced monitoring wells during two monitoring events representative of seasonal variation. A representative subset of groundwater samples during the first round of sampling will be submitted for fuel additive analysis to address this data need.

A data gap remains in the vicinity of the former caustic vault (area of potential concern #4; refer to Figure 7.1) because of the potential for leakage of caustic soda into groundwater and the potential for impacts from resin spills. To address this gap, groundwater in two downgradient monitoring wells will be monitored for pH, SVOCs, and formaldehyde. If elevated pH is identified as an issue, samples will be submitted for MTCA metals analysis to assess potential mobilization of metals.

The anticipated conditional point of compliance is at the shoreline, downgradient of the former log pond. Therefore, groundwater quality at the shoreline is an important data need. To assess the potential for contamination at the base of the former log pond to have impacted groundwater near the bulkhead, and to confirm that no elevated GRO, DRO, VOCs, SVOCs, or PAHs are present in shoreline monitoring wells, shoreline monitoring wells, including three new monitoring wells, will be sampled for two monitoring events.

As noted above in Section 7.1.2, an apparent dry well was identified during demolition (refer to location K-12 in Figure 7.1), which may have impacted groundwater. The groundwater will be characterized for potential contamination in the location identified during demolition using direct-push borings. Groundwater samples will be submitted for analysis of GRO, DRO, BTEX, and VOCs.

The three additional areas noted in Section 7.1.2 that are targeted for characterization based on their historical petroleum storage/usage will be characterized using direct-push borings (illustrated on Figure 7.1 using locations K-90, K-91, K-92) to assess groundwater conditions. Groundwater samples will be collected for analysis of GRO, DRO, and BTEX analysis.

7.2.3 Upgradient Groundwater Quality and Data Collection

Data gaps in groundwater flowing onto the Site from the upgradient (south) side are related primarily to Peninsula Fuel Company; however, the former Port Angeles Truck Stop Chevron, the former PenPly Retail Office, and the Marine Drive Exxon (refer to Figure 2.2.) present the potential for upgradient contamination as well.

To assess the effect of contamination at Peninsula Fuel Company on site groundwater, direct-push groundwater sampling will be conducted in conjunction with the soil borings advanced on the Peninsula Fuel Company site (refer to Section 7.1.2 above). Direct-push groundwater samples will be submitted for GRO and DRO using NWTPH-G and NWTPH-Dx analyses with silica gel cleanup, and BTEX analysis as well. In addition, a new monitoring well (PP-23) and two existing monitoring wells at the south edge of the mill will be monitored for NWTPH-G, NWTPH-Dx with silica gel cleanup, and BTEX for two monitoring events representative of seasonal variation..

The potential for petroleum constituents in groundwater in the vicinity of two active and one former upgradient fueling stations is a groundwater data need. To address the data need, one existing monitoring well (PP-9; refer to Figure 7.1) and two new monitoring wells (PP-24 and PP-25) will be monitored for GRO, DRO, and BTEX for two monitoring events representative of seasonal variation. In addition, as noted above, water level elevation data are needed in upgradient locations and will be collected for groundwater flow direction and gradient information.

7.3 SEDIMENT

Sediment investigation information is summarized in Table 7.3 and illustrated on Figure 7.2.

7.3.1 Sediment Data Needs and Data Collection

To fill the data gap of sediment chemistry in the area closer to shore with more recent data, three sediment sampling locations are proposed: KSS-1, KSS-2, and KSS-3 (refer to Figure 7.2). Sediment from these locations will be collected as grab samples from the 0 to 10 cm depth and submitted for a full suite of sediment analyses, including SMS chemicals (SVOCs, PCBs, arsenic, chromium, cadmium, copper, lead, mercury, silver, and zinc), dioxins/furans, butyl tins, grain size, total solids, total organic carbon, total volatile solids, ammonia, total sulfides, NWTPH-Dx (with silica gel cleanup), and qualitative percent of wood debris based on field observation. The KSS-1 and KSS-2 sample locations are in front of historical or current outfalls.

The offshore area adjacent to the K Ply mill that was designated a wood debris area is shown in Figure 7.2. To assess the local presence of wood debris in the nearshore area, sediment profile images will be collected from locations KSS-1, KSS-2, and KSS-3.

On July 7, 2013 the three K Ply sediment samples were collected immediately following the Western Port Angeles Harbor (WPAHG) RI/FS sampling. Data collection methods were in accordance with the WPAHG RI/FS Work Plan [66]. Refer to Table 7.3 for additional details.

7.4 CULTURAL RESOURCES PROTOCOL

The K Ply mill is located near Tumwater Creek and is in close proximity to one of the three documented Klallam villages in the Harbor area. The project area is approximately 1 mile from the Tse-whit-zen village site and another documented Klallam village site at the mouth of Ennis Creek. In accordance with the Agreed Order for this investigation and prior agreements with Ecology and the Port, cultural resource protocols for monitoring during all ground-disturbing activities will be implemented in compliance with federal, state, and local laws and regulations in accordance with Section VIII.P of the Agreed Order. In addition, the Port, the City of Port Angeles, and the Lower Elwha Klallam Tribe (LEKT) have an agreement that all ground-disturbing activities in the area between the bluff to the south and the shoreline behind which the K Ply mill is located require monitoring of site work by an archaeologist.

Prior to fieldwork, the Port, the City of Port Angeles archaeologist, and the LEKT will be provided the scope of work for review and comment, and will be notified of the field schedule. A subconsultant archaeologist will consult with the city archaeologist, the LEKT archaeologist, and the Department of Archaeology and Historic Preservation to determine if cultural resources have been previously recorded within the project area and if further review is needed. A subconsultant archaeologist with City/Tribal oversight and/or the city archaeologist or LEKT archaeologist, will monitor all ground-disturbing activities, including test pits and soil sampling at the K Ply mill. All soil sampling activities will be monitored for intact archaeological deposits. Soil from direct-push Geoprobe sampling, monitoring well installation, and test pit excavations will be carefully examined and logged during fieldwork. All field observations will be recorded in a field notebook, and photographs will be taken of each location and the general work area. A Cultural Resources Monitoring Report will be completed and included as an appendix to the RI/FS.

Of note, a Native American midden was uncovered in 2011 during the installation of a culvert into the Harbor in the Valley Creek stream bank, adjacent to the Valley Creek Estuary Park. The Valley Creek stream bank borders the K Ply log sorting yard on the east. Derek Beery from the City of Port Angeles was present at the time of the discovery and asked Bill White with the LEKT to confirm that the material was midden, which he did.

The Settlement Agreement and the LEKT Monitoring and Discovery Plan outline protocols in the event that human remains or other archaeological deposits are discovered. The LEKT Monitoring and Discovery Plan and Settlement Agreement are included in Appendix D.

8.0 Remedial Investigation/Feasibility Study Reports

This section describes the written reports that will be generated following collection of the data described in this document.

8.1 SUPPLEMENTAL DATA COLLECTION TECHNICAL MEMORANDUM

Per the requirements of the Agreed Order, a draft Supplemental Data Collection Technical Memorandum will be submitted to Ecology for review and comment. The purpose of the Technical Memorandum is to present the first round field data and identify if any data gaps remain to be filled. Specifically, the Technical Memorandum shall describe the work conducted to collect the data, including a summary of the sampling design, sampling methods, and sampling results. It is expected that the sampling results will be provided both on summary tables and on figures and that screening levels as previously described will be used to evaluate the concentrations of the chemicals detected.

8.2 REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT

Following approval of the Technical Memorandum, and completion of any additional data collection (a second round, if required), the Agency Review draft site-wide RI/FS Report will be prepared.

8.2.1 Remedial Investigation

Primary RI reporting tasks include presenting the data, both current and historical, in a comprehensive fashion in order to define the nature and extent of contamination at the Site; defining site-wide COCs and cleanup levels as well as points of compliance; and updating the CSM to reflect site-wide comprehensive information. Chemical and physical data collected will be presented on figures and tables per contaminant class and environmental media. A discussion of the how the data were collected and the significance of the results will be included.

If groundwater data indicate the presence of contaminants with the potential to partition to sediment, the site-wide RI/FS will evaluate upland-to-sediment contaminate transport pathways. To evaluate the groundwater migration pathway, two-dimensional groundwater transport modeling may be used to evaluate possible impacts to sediment and surface water endpoints.

The preliminary CSM developed from previous site investigations and chemical data will be refined throughout the site-wide RI/FS process as additional data are collected and comprehensive site conditions are better defined. The CSM will include a comprehensive understanding of contaminants and sources; nature and extent of contamination; fate and transport processes; and exposure pathways and receptors.

All chemical data collected during the field work will be submitted in Ecology's Environmental Information Management (EIM) format. The overall objective of the RI document is to sufficiently define site conditions necessary for the FS to define detailed remedial action objectives and remedial alternatives.

8.2.2 Feasibility Study

The purpose of the FS is to develop and evaluate cleanup action alternatives for the Site. The FS will include the following:

- Identify ARARs for site cleanup
- Identify media and locations where remedial action is needed
- Develop Remedial Action Objectives (RAOs)
- Develop, screen, and evaluate cleanup alternatives
- Identify a preferred alternative

The following sections provide additional discussion of details for each of the above bullets.

8.3 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

In accordance with MTCA, all cleanup actions must comply with applicable state and federal laws (WAC 173-340-710(1)). MTCA defines applicable state and federal laws to include legally applicable requirements and those requirements that are relevant and appropriate. Collectively, these requirements are referred to as ARARs. For the purposes of this work plan, only a preliminary list of ARARs can be identified at this early stage. Other ARARs related to the cleanup action itself will be identified in the FS report. The preliminary list of potential ARARs for this project will include the following:

- Washington State SMS (Chapter 173-204 WAC)
- State Water Pollution Control Act (Chapter 90.48 Revised Code of Washington [RCW])
- USEPA National Recommended Water Quality Criteria—Section 304 Clean Water Act
- USEPA Water Quality Standards (National Toxics Rule)—40 CFR 131
- Minimum Standards for Construction and Maintenance of Wells (Chapter 173-160 RCW)
- Washington Pollution Control Act and the implementing regulations, Water Quality Standards for Surface Waters of the State of Washington (Chapter 173-201A WAC)
- Washington Hazardous Waste Management Act and the implementing regulations, Dangerous Waste Regulations (Chapter 173-303 WAC), to the extent that any dangerous wastes are discovered or generated during the cleanup action
- The Federal Clean Water Act, with respect to in-water work associated with dredging or sediment capping
- Washington's Shoreline Management Act, with respect to construction activities conducted near the shoreline during the cleanup action
- Endangered Species Act, due to listing of Puget Sound chinook and the potential listing of Coastal/Puget Sound bull trout
- Washington Clean Air Act (Chapter 70.94 WAC)
- Occupational Safety and Health Act (OSHA), 29 CFR Subpart 1910.120

- Washington Industrial Safety and Health Act (WISHA)

In addition, the FS will identify permits likely required for implementation of the cleanup action.

8.4 DELINEATION OF MEDIA REQUIRING REMEDIAL ACTION

The RI process will determine if soil, groundwater, and/or sediment results exceed screening levels and, if so, it will identify the locations of the exceedances. Based on any exceedances and the established points of compliance, the FS will identify the areas that require remedial action.

8.5 DEVELOPMENT OF REMEDIAL ACTION OBJECTIVES

The RAOs identify the goals that must be achieved by a cleanup alternative in order to achieve cleanup levels and provide adequate protection of human health and environment. The RAOs must address all affected media, and a cleanup alternative must achieve all RAOs to be considered a viable cleanup action. RAOs will be developed for portions of the Site requiring remedial action.

The RAOs will be action-specific, media-specific, or both. Action-specific RAOs are based on actions required for environmental protection that are not intended to achieve a specific chemical criterion. Media-specific RAOs are based on the cleanup levels. The RAOs will specify the COCs, the potential exposure pathways and receptors, and acceptable contaminant levels or range of levels for each exposure pathway, as appropriate.

The extent to which each alternative meets the RAOs will be determined by applying the specific evaluation criteria identified in the MTCA and SMS regulations.

The Site is being overseen by Ecology, and the cleanup work is being conducted under the Governor's Puget Sound Initiative (PSI). Under the PSI, Ecology is striving to combine remediation and habitat restoration to maximize the synergy of the process. As a result, the FS will evaluate elements of the remedial alternatives for opportunities to coincidentally improve the value of habitat and/or provide for shoreline restoration in conjunction with remedial actions. However, given the presence of riprap and the bulkhead along the shoreline, it is unlikely that meaningful habitat restoration opportunities exist at the Site. Therefore, evaluation of on-site restoration opportunities will not constitute a significant part of the RI/FS process at this Site.

8.6 SCREENING OF CLEANUP ALTERNATIVES

Cleanup alternatives will be developed for portions of the Site that require remedial action. Initially, general remediation technologies will be identified for the purpose of meeting RAOs. General remediation technologies consist of specific remedial action technologies and process options. General remediation technologies will be considered and evaluated based on the properties of identified contaminant(s) and may include institutional controls, containment or other engineering controls, removal, in-situ treatment, and natural attenuation.

Specific remedial action technologies are the engineering components of a general remediation technology and process options are those specific processes within each specific technology. Specific remedial action technologies and representative process options will be selected for evaluation based on documented development or documented successful use for sediment. Cleanup alternatives will be developed from the general and specific remedial technologies and process options, consistent with Ecology's expectations identified in WAC 173-340-370, using professional judgment and guidance documents, as appropriate (e.g., *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* [67]).

During the development of cleanup alternatives, both the current and planned future land use will be considered.

8.7 EVALUATION OF CLEANUP ALTERNATIVES

MTCA requires that cleanup alternatives be compared to a number of criteria, as set forth in WAC 173-340-360, to evaluate the adequacy of each alternative in achieving the intent of the regulations, and as a basis for comparing the relative merits of the developed cleanup alternatives. Consistent with MTCA, the alternatives will be evaluated with respect to compliance with threshold requirements, permanence, and restoration timeframe; the results of the evaluation will be documented in the RI/FS reports.

8.7.1 Threshold Requirements

As specified in WAC 173-340-360(2)(a), all cleanup actions are required to meet the following threshold requirements:

- Protection of human health and the environment
- Compliance with cleanup levels specified under MTCA
- Compliance with applicable state and federal laws
- Provisions for compliance monitoring

8.7.2 Requirement for Permanent Solution to the Maximum Extent Practicable

WAC 173-340-200 defines a permanent solution as one in which cleanup levels can be met without further action being required at the original site or any other site involved with the cleanup action, other than the approved disposal site for any residue from the treatment of hazardous substances. Ecology recognizes that permanent solutions may not be practicable for all sites. To determine whether a cleanup action is permanent to the "maximum extent practicable," MTCA requires that disproportionate cost analysis (DCA; WAC 173-340-360(3)(b)) be used. In accordance with WAC 173-340-360(3)(f), the following criteria are used to evaluate and compare each cleanup action alternative when conducting a DCA:

- ***Overall protectiveness*** of human health and the environment, including the degree to which site risks are reduced, the risks during implementation, and the improvement of overall environmental quality.
- ***Long-term effectiveness*, including the degree of certainty that the alternative will be successful, the long-term reliability, the magnitude of residual risk, and the effectiveness of controls required to manage treatment residues and remaining waste.
- ***Management of short-term risks***, including the protection of human health and the environment during construction and implementation.
- ***Permanent reduction in toxicity, mobility, and volume of hazardous substances***, including the reduction or elimination of hazardous substance releases and sources of releases.

- ***Implementability***, including consideration of whether the alternative is technically possible; the availability of necessary off-site facilities, services, and materials; administrative and regulatory requirements; scheduling, size, and complexity of construction; monitoring requirements; access for construction, operations, and monitoring; and integration with existing facility operations.
- ***Cleanup costs,*** including capital costs and operation and maintenance costs.
- ***Consideration of public concerns,*** which will be addressed through public comment on the cleanup action plan.

Procedures that will be used for conducting a DCA are described in Section 8.8.

8.7.3 Requirement for a Reasonable Restoration Timeframe

WAC 173-340-360(4)(b) specifies that the following factors be considered in establishing a “reasonable” timeframe:

- Potential risks to human health and the environment
- Practicability of achieving a shorter restoration timeframe
- Current use of the Site, surrounding areas, and associated resources that are, or may be, affected by releases from the Site
- Potential future use of the Site, surrounding areas, and associated resources that are, or may be, affected by releases from the Site
- Availability of alternate water supplies
- Likely effectiveness and reliability of institutional controls
- Ability to control and monitor migration of hazardous substances from the Site
- Toxicity of the hazardous substances at the Site
- Natural processes that reduce concentrations of hazardous substances and have been documented to occur at the Site or under similar site conditions

8.7.4 Requirement for Consideration of Public Concerns

The draft RI/FS Report will be issued for public comment, which will provide the public an opportunity to express any concerns. Those concerns will be considered by Ecology and, if appropriate, a responsiveness summary may be prepared and the RI/FS Report modified in response to the public concerns.

8.8 DISPROPORTIONATE COST ANALYSIS PROCEDURES

MTCA requires that cleanup actions be permanent to the maximum extent practicable and requires that a DCA be used when the cleanup alternatives being considered are not permanent as defined under WAC 173-340-200. Evaluation of the practicability of a given alternative is a comparative evaluation of whether the incremental increase in cost associated with increasingly protective cleanup actions is substantial and disproportionate to the incremental increase in environmental benefit. In the DCA, cleanup alternatives are arranged from most to least permanent based on the criteria specified in WAC 173-340-360(f) and described in Section 9.5.2. Costs are disproportionate to benefits if the incremental costs of the more permanent alternative exceed the incremental benefits achieved by the lower cost alternative (WAC 173-340-360(3)(e)(i)). Alternatives that exhibit disproportionate costs are considered "impracticable." Where the benefits of two alternatives are equivalent, MTCA specifies that Ecology select the least costly alternative (WAC 173-340-360(e)(ii)(c)).

8.9 RECOMMENDATION OF REMEDIAL ACTION ALTERNATIVES

This section of the FS will recommend a remedial action alternative based on the results of the comparative evaluation. The recommended alternative will meet the minimum requirements for cleanup actions: protect human health and the environment, comply with cleanup levels, comply with applicable state and federal laws, provide for compliance monitoring, use permanent solutions to the extent practicable, provide for a reasonable timeframe, and consider public concerns.

9.0 Project Team and Responsibilities

9.1 WASHINGTON STATE DEPARTMENT OF ECOLOGY

Ecology is responsible for participation in the planning and scoping of the RI and reviewing and approving the draft RI/FS documents. Ms. Connie Groven is the Site Project Manager for Ecology. She will review and approve all work plans and reports for the site-wide RI/FS and will determine if all requirements of the Agreed Order have been met. She will also work to secure access at non-Port owned properties slated for investigative activities.

Ecology will have lead responsibility for all public involvement activities during the RI/FS process. Ecology will be responsible for public relations and outreach in coordination with the Port during the project, which may include participation at public meetings, project fact sheets, and direct community involvement.

9.2 PORT OF PORT ANGELES

The Port's responsibilities include overall project direction and oversight, site access, tenant coordination, and all tasks to support the planning and performance of the work. The Port is the land owner. Mr. Jesse Waknitz is the Port's manager for the project.

9.3 FLOYD|SNIDER

Floyd|Snider is the Port's technical consultant responsible for project planning, technical analysis, authorship, and Ecology coordination to produce the RI/FS in a manner consistent with the Agreed Order and Ecology requirements. Mr. Tom Colligan, L.H.G. is the Floyd|Snider Project Manager.

9.4 LABORATORY

An Ecology-accredited laboratory will conduct chemical testing of soil, groundwater, and sediment samples. The laboratory will be responsible for calculating method detection limits for each COC and meeting laboratory quality control requirements as specified in the SAP/QAPP.

9.5 OTHER SUBCONTRACTORS—GEOPHYSICAL, DRILLER, AND SURVEYOR

A professional utility locator will perform geophysical work including underground pipeline location. Geoprobe soil boring and monitoring well installation will be performed by licensed drillers with oversight by Floyd|Snider. Professional surveying of site features and monitoring well locations will be performed by licensed surveyors.

10.0 Schedule

The schedule for the RI/FS will proceed according to or, if feasible, ahead of the existing schedule set forth in the Agreed Order. Below are the dates of performance or completion for significant RI/FS tasks in general accordance with the Agreed Order schedule. Actual dates below are subject to change depending on Ecology review periods and subcontractor/field crew availability.

Task	Expected Duration	Date
Submit Draft RI/FS Work Plan to Ecology[1]	--	6/14/2013
Submit Draft Final RI/FS Work Plan to Ecology[1]	--	9/12/2013
Implement RI/FS Work Plan Field Work:		
Sediment Sampling	1 day	7/9/13
Soil and 1st Round Groundwater Sampling[2]	15 days	Mid October 2013–Early November 2013
2nd Round Groundwater Sampling	3 days	Late Spring 2014
Receive Data Reports from Laboratories, Complete Data Validation, Load Data to EIM[3]	--	January 2014–February 2014
Submit Draft Data Collection Technical Memorandum to Ecology	--	4/25/2014
Submit Agency Review Draft RI/FS Report[1]	--	8/23/2014
Submit Public Review Draft RI/FS Report[1]	--	12/21/2014

Notes:
1 Ecology review periods are assumed to be 60 days for draft documents and 30 days for draft final documents.
2 Subsurface utility location, including pipeline locating and sewer video work, will be performed prior to soil and groundwater sample collection.
3 Final laboratory data must be submitted to EIM within 180 days of receipt; this completion date may change based on the field data collection completion and data validation completion dates.

Abbreviations:
Ecology Washington State Department of Ecology
EIM Environmental Information Management
RI/FS Remedial Investigation/Feasibility Study

11.0 References

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K Ply Site

Remedial Investigation/ Feasibility Study Work Plan

Tables

FINAL

Table 4.1
Areas of Potential Concern for Reference on Figure 4.1[1,2]

Figure 4.1 Reference #	Area of Potential Concern
1	Historical Solvent Use and Distillation Areas
2	Green End Building
3	Panel Oiler
4	Caustic Tank Area
5	Resin Tank Area
6	Hydraulic Oil/Hot Press Area
7	Electrical Shop
8	Machine Shop
9	Room 14
10	Green Veneer Chipper Room and the East Exterior of the Green Veneer Chipper Room
11	Paper Station
12	Glue Loft
13	Forklift Shop
14	Bamford/8-foot Lathe Building
15	Equipment/Storage Building #10
16	Pipeline 8
17	Historical On-site Underground Storage Tanks and Aboveground Storage Tanks
18	Abandoned Storm Sewer
19	Hog Fuel Pile
20	Former Log Pond
21	Port Angeles Harbor
22	Stack
23	Wood Debris Pile
24	4-foot Lathe
25	10-foot Lathe

Note:

1 Sources for identifying the areas of potential concern include Landau Associate's 1988 *Environmental Evaluation: Peninsula Plywood Property, Port Angeles Washington* and Argus Pacific's 2012 *PenPly Mill Demolition and Abatement Project Hazardous Material Survey.*

2 Areas of Potential Concern were only identified for areas within the tentative site boundary.

Table 7.1
K Ply Soil Investigation Locations

Purpose	Location ID	Rationale	Data Collection	Soil Analyses
Site-wide Soil				
Air Deposition Related	Surface Sample Locations: SS-1, SS-2, and SS-3.	Characterize the potential air deposition contamination associated with stack emissions.	Surface soil sampling (0–3 inches; below surface duff or granular debris) with standard hand sampling tools from three representative locations on site.	Dioxins/Furans (USEPA Method 1613)
Resin and Other Surface Solid Waste Extent	Glue loft area and area north of the concrete slab.	Delineate the horizontal and vertical extent of the dried resin for solid waste disposal purposes. Analytical testing of the material was conducted as part of the IAWP.	Conduct a visual survey to determine the horizontal extent of solid waste. Use a professional site survey or handheld GPS unit to delineate and map the area. Use limited hand-tool scraping of the surface to determine depth of the material.	NA
Focused Soil Areas of Concern				
Gasoline Plume Source	Geoprobe locations: K-10 through K-32 as described in the LNAPL and utilities areas of concern below. Additional step out borings, if determined in the field to be needed.	Determine the source of the gasoline plume as described the rows below.	Use the geophysical tests described above to find the locations of historical Pipelines 8 and 5. Collect samples from the direct-push borings in areas of the gasoline plume as informed by signs of contamination. Use addtional direct-push borings, as determined in the field, to step out from the proposed borings and delineate apparent source area(s). A subset of samples will be submitted for lead, EDB, EDC and MTBE analysis, consistent with MTCA Table 830-1.	GRO and BTEX (NWTPH-Gx/USEPA 8021); lead (USEPA 200.7) plus one sample to comply with testing requirements of MTCA Table 830-1
	Geoprobe Locations: K-10 through K-32 plus additional Geoprobe locations as determined in the field.	**Extent of Gasoline LNAPL under concrete slab:** Delinate the approximate extent of LNAPL to estimate volume, assess fate and transport, and inform remedial evaluation.	Direct-push borings with field tests (i.e., PID) and LNAPL testing methods from the smear zone soil (8–12 feet bgs). Select samples will be submitted for laboratory analysis. Additional borings may be used stepping in or out from the proposed borings to identify the extent of the LNAPL as determined in the field. Select co-located borings may be advanced for petrophysical testing in intervals with field evidence of LNAPL contamination.	Analytical: GRO and BTEX (NWTPH-Gx/USEPA 8021) and TPH-Dx (NWTPH-Dx with silica gel cleanup) Petrophysical: pore fluid saturation (API RP40) and ultraviolet core photography
	Trench Location: KT-2 and Test Pit Location: KT-1	**Pipeline 8:** Assess the condition of Pipeline 8 and the potential contribution of contamination from Pipeline 8 due to deterioated condition.	Trench perpendicular to Pipeline 8, in front of the concrete slab, to locate the pipeline. Then trench along the lenth of Pipeline 8 to the terminus near Pier 1. Investigate whether the pipeline is full or empty and remove the pipeline to assess the condition and whether leaks occured. Analytical samples will be collected based on visual and olefactory observations in the smear zone and shallower. A subset of samples will be submitted for lead analysis. Conduct a presure test on Pipeline 8 from where the line is cut on the north side of the concrete slab to the terminus of the pipeline on the Peninsula Fuel Company property to determine the integrity of the pipe and evaluate if it has leaked.	GRO and BTEX (NWTPH-Gx/USEPA 8021) and DRO (NWTPH-Dx with silica gel cleanup) plus one sample to comply with testing requirements of MTCA Table 830-1
	Contingency only; to be determined at the time of sampling.	**8-inch Sanitary Sewer Line:** Determine if the 8-inch sanitary sewer line terminates in the burried manhole and if there are any environmental impacts.	The asphalt covering the manhole in the alley between the mill and Peninsula Fuel will be cut to expose the manhole. The manhole will be evaluated to confirm that the 8-inch sanitary sewer pipe terminates in the manhole and to evaluate if there are any environmental impacts. Contingency geoprobes could be advanced in this area, if determined to be necessary in the field following this initial inspection.	None

Table 7.1
K Ply Soil Investigation Locations

Purpose	Location ID	Rationale	Data Collection	Soil Analyses
Focused Soil Areas of Concern (continued)				
	Test Pit Location: KT-20. Contingency Geoprobe Locations: K-200, K-201, K-202, K-203.	**4-inch Sanitary Sewer Line:** Because of the gasoline odor detected during the utility survey, characterize the soil at the terminus of the 4-inch historical sanitary sewer line to evaluate if gasoline was historically dumped into the pipe. If the results indicate material was not dumped, evaluated the potential for contamination to have migrated into the pipe.	A test pit in the area where the 4-inch sanitary sewer terminus was found will be used to determine if the line was historically cut or abandoned and to evaluate the material at the terminus to determine if gasoline was dumped. Representative samples for analysis will be collected based on what material is encountered. An elbow will be installed on the pipe and run to the ground surface to allow for cleaning and pressure testing of the pipe. If it is determined at the time of sampling that material was not likely dumped, contingency direct-push borings will be advanced along the 4-inch pipe between the terminus and the manhole in the machine shop.	GRO and BTEX (NWTPH-Gx/USEPA 8021) and DRO (NWTPH-Dx with silica gel cleanup).
Panel Oiler	Geoprobe Locations: K-29 and K-30 plus step out borings through the concrete slab, if determined in the field to be necessary.	Characterize the horizontal and vertical extent of pentachlorophenol (PCP) contamination along the concrete slab in the panel oiler area. Evaluate if the PCP contamination extends under the concrete wall. The data will suplement previous sidewall data collected that delineates the north, east, and west extent.	Direct-push borings co-located with LNAPL and gasoline plume source borings in the area south of the panel oiler with field observations to determine vertical and southern extent. K-28 should be located approximately 5 feet south of the edge of the slab. If K-28 has PCP contamination, analyze samples from boring K-28 located further under the concrete pad.	SVOCs (USEPA Method 8270)
Peninsula Fuel Company	Geoprobe Locations: PF-1 through PF-8.	Characterize potential TPH contamination on the Peninsula Fuel property and assess source relationship with groundwater contamination on the K Ply Site.	Direct-push borings and field monitoring. Analytical samples will be collected in the smear zone or above. A subset of samples will be submitted for lead analysis. Ecology to establish property access.	GRO and BTEX (NWTPH-Gx/USEPA 8021) and DRO (NWTPH-Dx with silica gel cleanup); lead (USEPA 200.7) plus one sample to comply with testing requirements of MTCA Table 830-1
Hydraulic Oil Area	Geoprobe locations: K-50 through K-66 plus additional Geoprobe locations as determined in the field.	Delineate the edges of the hydraulic oil contamination and gasoline contamination near the hydraulic presses. Delineate the extent of LNAPL to estimate volume, assess fate and transport, and inform remedial evaluation.	Direct-push borings at the anticipated extent of the hydraulic oil and gasline contamination. Use LNAPL field testing methods (i.e., paper towel test and bowl test) to determine if LNAPL is present. Analytical samples will be collected to determine the separation between the gasoline and hydraulic oil plumes and in areas where contamination is thought to be near the cleanup level, as determined at the time of sampling. A subset of samples will be submitted for lead and carcinogenic PAH analyses. Additional borings will be used to identify the LNAPL extent by stepping in or out from the proposed borings. Select co-located borings may be advanced for petrophysical testing in intervals with field evidence of LNAPL contamination.	Analytical: GRO and BTEX (NWTPH-Gx/USEPA 8021) and DRO (NWTPH-Dx with silica gel cleanup); lead (USEPA 200.7); cPAHs (USEPA 8270D) plus one sample to comply with testing requirements of MTCA Table 830-1 Petrophysical: pore fluid saturation (API RP40) and UV core photography
Other TPH Use Areas	Test Pit Locations: KT-10 and KT-11. Geoprobe Locations: K-90 through K-92.	Characterize the soil for potential contamination in the locations of the former UST/AST locations on-site and in the fuel pile location associated with historical dumping.	Use direct-push borings in the locations of the historical USTs and ASTs to assess soil conditions. Use test pits in the area of the fuel pile to determine if shallow soil was impacted by historical dumping on the fuel pile. Collect representative samples for analysis. A subset of samples will be submitted for lead analysis.	GRO and BTEX (NWTPH-Gx/USEPA 8021), DRO (NWTPH-Dx with silica gel cleanup); lead (USEPA 200.7)

Table 7.1
K Ply Soil Investigation Locations

Purpose	Location ID	Rationale	Data Collection	Soil Analyses
Focused Soil Areas of Concern (continued)				
Dry Well Area	Test Pit Location KT-12. Geoprobe Locations: K-98 and K-99.	Characterize the soil for potential contamination in the location of the apparent dry well identified during demolition.	Use test pits to determine extent of impacts in the apparent dry well. Use direct-push borings to assess deeper soil conditions. Collect representative samples for analysis.	GRO and BTEX (NWTPH-Gx/USEPA 8021), DRO (NWTPH-Dx with silica gel cleanup), RCRA metals (arsenic, barium, cadmium, chromium, lead, selenium, silver, mercury; USEPA 6020, 7470A/7471A for Mercury); VOCs (USEPA 8260), SVOCs (USEPA 8270)
Surface Soil in the Stack Footprint	Surface Sample Locations: SS-4, SS-5, and SS-6.	Characterize the potential air deposition contamination associated with stack emissions and fly ash that could have been deposited during the stack demo.	Surface soil sampling (0–3 inches; below surface duff or granular debris) with standard hand sampling tools from three representative locations near where the historical stack fell.	Dioxins/Furans (USEPA Method 1613)
Wood Debris Pile Characterization	Test Pit Location: KT-13	Characterize the material placed in the wood debris pile located southeast of the historical 10-foot lathe building.	Use test pits in the area of the wood debris pile to determine the composition of the pile. Collect representative samples for analysis based on what material is encountered.	Dependent on what is encountered in the wood pile
Focused Soil Areas of Concern (continued)				
Debarker Operations	Geoprobe Locations: K-93 through K-97.	Soil sampling will be conducted to determine if there are impacts to soil from historical operations.	Direct-push borings will be advanced in the location of the historical UST and stepped out from the ring barker. Soil samples will be continuosly logged for signs of contamination and representative analytical samples will be collected.	GRO and BTEX (NWTPH-Gx/USEPA 8021) and DRO (NWTPH-Dx with silica gel cleanup)
Log Pond Fill	Geoprobe Locations: K-100 and K-101.	Characterize the quality of log pond fill material that was incrementaly placed in the log pond between 1940 and1985.	Direct-push borings will be advanced in two locations of the former log pond that were determined with aerial photographs to be representative of the fill material that was incrementaly placed and not permitted. Soil samples will be continuosly logged for signs of contamination and for the presence of stack ash, and representative analytical samples will be collected.	GRO and BTEX (NWTPH-Gx/USEPA 8021), DRO (NWTPH-Dx with silica gel cleanup), RCRA metals (arsenic, barium, cadmium, chromium, lead, selenium, silver, mercury; USEPA 6020, 7470A/7471A for Mercury), and cPAHs (USEPA 8270D)

Abbreviations:

API American Petroleum Institute
AST Aboveground storage tank
bgs Below ground surface
BTEX Benzene, toluene, ethylbenzene, and xylenes
cPAH Carcinogenic polycyclic aromatic hydrocarbon
DRO Diesel-range organics
Ecology Washington State Department of Ecology
EDB Ethylene dibromide
EDC Ethylene dichloride
GRO Gasoline-range organics
GPS Global Positioning System
Harbor Port Angeles Harbor
IAWP Interim Action Work Plan
MTBE Methyl tert-butyl ether
MTCA Model Toxics Control Act
LNAPL Light non-aqueious phase liquid
NA Not applicable
PAH Polycyclic aromatic hydrocarbon
PID Photoionization detector
RCRA Resource Conservation and Recovery Act
SVOC Semivolatile organic compound
TPH Total petroleum hydrocarbons
UST Underground storage tank
USEPA U.S. Environmental Protection Agency
VOC Volatile organic compound

Table 7.2
K Ply Groundwater Investigation Locations

Purpose	Location ID	Rationale	Data Collection	Direct-push Groundwater Analyses	Monitoring Well Analyses
General Groundwater Data Objectives					
Water Level Data	Existing Monitoring Wells: PP-13, PP-18, PP-19, PZ-13, PZ-12, PP-17, PZ-7, PZ-8, PZ-4, MW-23, MW-8, PZ-1, PP-9 New/Replacement Monitoring Wells: PP-20, PP-21, PP-22, PP-23, PP-24, PP-25, PP-15R, PP-6R, PP-4R	Water level elevation data are needed for groundwater flow direction and gradient information.	Professional survey of monitoring well location, measuring point elevation, and ground surface elevation. Water level elevation measurement from all listed wells within approximately 1 hour during two monitoring events representative of seasonal variation.	NA	NA
LNAPL Thickness	Existing Monitoring Wells: PZ-6, PP-7, PP-11, PP-12, PP-10, PP-1, PP-14, PP-2, other wells in which LNAPL is identified	Monitor current LNAPL thickness.	Measure LNAPL thickness with oil-water interface probe during two monitoring events representative of seasonal variation.	NA	NA
Well Replacement	PP-15R, PP-6R, PP-4R	Replace three wells destroyed during demolition needed for further data collection. PP-15, PP-6, and PP-4 will be replaced.	Soil will be logged in accordance with standard practice and new well logs produced.	NA	NA
Focused Groundwater Areas of Concern					
Mill Area Petroleum	Existing/Replacement Monitoring Wells: PP-15R, PP-13, PP-18, PP-19, PZ-13, PZ-12, PP-17, PZ-7, PZ-8, PZ-4	Monitor current conditions of GRO, benzene, and hydraulic oil plumes in mill area and Cedar Street.	Two monitoring events representative of seasonal variation. Standard low-flow groundwater sampling methods. A representative subset of groundwater samples will be submitted for fuel additive analysis.	NA	GRO and BTEX (NWTPH-Gx/USEPA 8021), DRO (NWTPH-Dx with silica gel cleanup), and samples to comply with testing requirements of MTCA Table 830-1.
Caustic Vault Area	Existing Monitoring Wells: PP-13, PZ-12	Assess the potential for leakage of caustic soda into groundwater and for impacts related to resin spill.	One monitoring event. Standard low-flow groundwater sampling methods.	NA	pH (field measurement), SVOCs (USEPA 8270), and formaldehyde (USEPA 8315A). MTCA metals (arsenic, cadmium, chromium, lead, mercury; Methods 200.8, 245.1/245.5, 7470A) to be added if elevated pH issue identifed
Downgradient of Former Log Pond/Shoreline Groundwater Quality	Existing Monitoring Wells: PP-19, PP-17, PP-18 New Monitoring Wells: PP-20, PP-21 , PP-22	Assess the potential for contamination at the base of the former log pond to have impacted groundwater near the bulkhead. Confirm no VOCs, SVOCs, or PAHs in shoreline monitoring wells.	Two monitoring events representative of seasonal variation. Standard low-flow groundwater sampling methods.	NA	GRO (NWTPH-G), DRO (NWTPH-Dx with silica gel cleanup), VOCs (USEPA 8260), and SVOCs (USEPA 8270)
Other TPH Use Areas	Geoprobe Locations: K-90, K-91, K-92, K-93	Investigate data gap in groundwater quality in specific areas of historic TPH usage.	Direct-push probe groundwater sampling in conjunction with soil sampling.	GRO and BTEX (NWTPH-Gx/USEPA 8021) and DRO (NWTPH-Dx with silica gel cleanup)	NA
Dry Well Area	Geoprobe Locations: K-98 and K-99	Investigate groundwater for potential contamination beneath and downgradient of the location of the apparent dry well identified during demolition.	Direct-push probe groundwater sampling in conjunction with soil sampling.	GRO (NWTPH-G), DRO (NWTPH-Dx with silica gel cleanup), and VOCs (USEPA 8260)	NA
Upgradient Groundwater					
Peninsula Fuel Company	Existing Monitoring Wells: PZ-1, PP-07 New Monitoring Well: PP-23 Geoprobe Locations: PF-1, PF-2, PF-3, PF-4, PF-5, PF-6, PF-7, PF-8	Assess the effect of contamination at Peninsula Fuel Company to Site groundwater.	Direct-push probe groundwater sampling in conjunction with soil sampling. For monitoring well sampling, two monitoring events representative of seasonal variation. Standard low-flow groundwater sampling methods.	GRO and BTEX 8021) and DRO (NWTPH-Dx with silica gel cleanup)	GRO and BTEX (NWTPH-Gx/USEPA 8021) and DRO (NWTPH-Dx with silica gel cleanup) plus one sample to comply with testing requirements of MTCA Table 830-1.
Former Port Angeles Truck Stop Chevron	Existing Monitoring Well: PP-9	Assess petroleum constituents in upgradient groundwater in the vicinity of former service station.	Two monitoring events representative of seasonal variation. Standard low-flow groundwater sampling methods.	NA	GRO and BTEX (NWTPH-Gx/USEPA 8021) and DRO (NWTPH-Dx with silica gel cleanup)
Former PenPly Retail Office	New Monitoring Well: PP-24	Assess petroleum constituents in upgradient groundwater in the vicinity of former service station.	Two monitoring events representative of seasonal variation. Standard low-flow groundwater sampling methods.	NA	GRO and BTEX (NWTPH-Gx/USEPA 8021) and DRO (NWTPH-Dx with silica gel cleanup)
Marine Drive Exxon	New Monitoring Well: PP-25	Assess petroleum constituents in upgradient groundwater in the vicinity of former service station.	Two monitoring events representative of seasonal variation. Standard low-flow groundwater sampling methods.	NA	GRO and BTEX (NWTPH-Gx/USEPA 8021) and DRO (NWTPH-Dx with silica gel cleanup)

Abbreviations:
BTEX Benzene, toluene, ethylbenzene, and xylenes
DRO Diesel-range organics
EBD Ethylene dibromide
EDC Ethylene dichloride
GRO Gasoline-range organics
LNAPL Light non-aqueious phase liquid
MTBE Methyl Tertiary Butyl Ether
MTCA Model Toxics Control Act
NA Not applicable
PAH Polycyclic aromatic hydrocarbon
SVOC Semivolatile organic compound
TPH Total petroleum hydrocarbons
USEPA U.S. Environmental Protection Agency
VOC Volatile organic compound

Table 7.3
K Ply Sediment Investigation Locations

Purpose	Location ID	Rationale	Data Collection[1]	Sediment Analyses[2]
Nearshore Surface Sediment Chemistry	KSS-1, KSS-2, KSS-3	Assess surface sediment chemistry in the nearshore area based on prior investigation results. Locations based on the locations of current or historical outfalls.	Surface sediment grab samples, 0–10 centimeters	SMS chemicals (SVOCs, PCBs, arsenic, chromium, cadmium, copper, lead, mercury, silver, and zinc), dixons/furans, butyl tins, grain size, total solids, total organic carbon, total volatile solids, ammonia, total sulfides, TPH-Dx (with silica gel cleanup) qualitative percent wood debris (field observation)
Nearshore Wood Debris Evaluation	KSS-1, KSS-2, KSS-3	Confirm local presence and amount of wood debris identified in the K Ply vicinity in previous investigations.	Sediment profile images	NA

Notes:

1 Data collection will be in conjunction with Western Port Angeles Harbor Group Remedial Investigation/Feasibility Study (WPAHG RI/FS) sampling. Data collection methods and quality assurance will be in accordance with the WPAHG RI/FS Work Plan (Floyd|Snider et al. 2013).

2 Sufficient sediment volume will be collected from each sampling station and will be submitted to the analytical laboratory for bioassay testing, consistent with the procedures described in the WPAHG RI/FS Work Plan. The decision to conduct the bioassay testing will be made by Floyd|Snider, the Port of Port Angeles, and Washington State Department of Ecology following reciept of the analytical data.

Abbreviations:

NA Not applicable
PCB Polychlorinated biphenyl
SMS Sediment Management Standards
SVOC Semivolatile organic compound

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Figures

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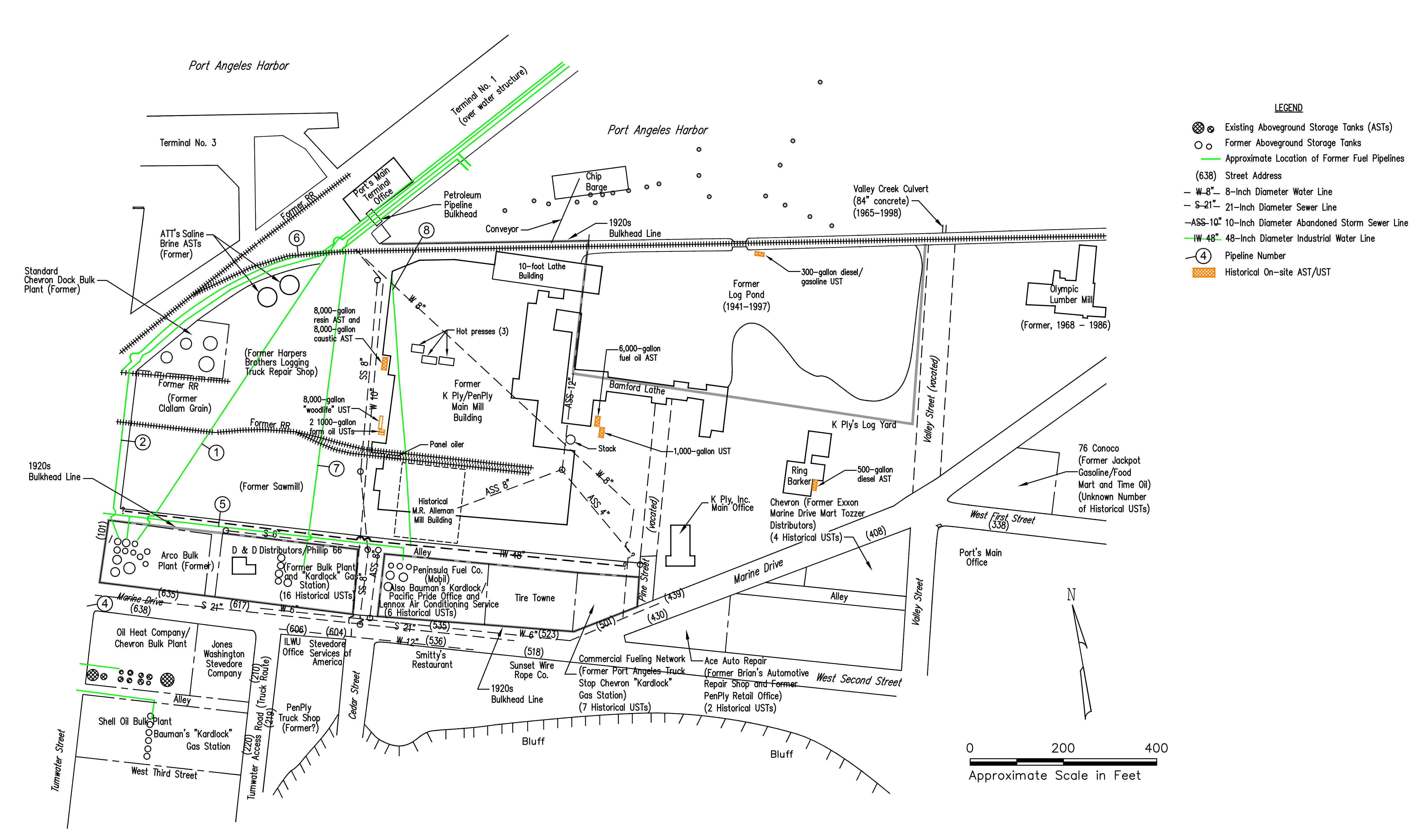
N

0 3000 6000

Approximate Scale in Feet

FLOYD | SNIDER strategy ▪ science ▪ engineering	**Remedial Investigation/ Feasibility Study Work Plan K Ply Site Port Angeles, Washington**	Figure 2.1 Vicinity Map

G:Project\Clients\Floyd Snider\PPA-OMW\Corel\Figure 2.1



Source: Shannon & Wilson 1996; Landau Associates Inc. 1988; Ryan and Haworth 1967

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Remedial Investigation/Feasibility Study Work Plan
K Ply Site
Port Angeles, Washington

Figure 2.2
Historical Land Use Map through 1996

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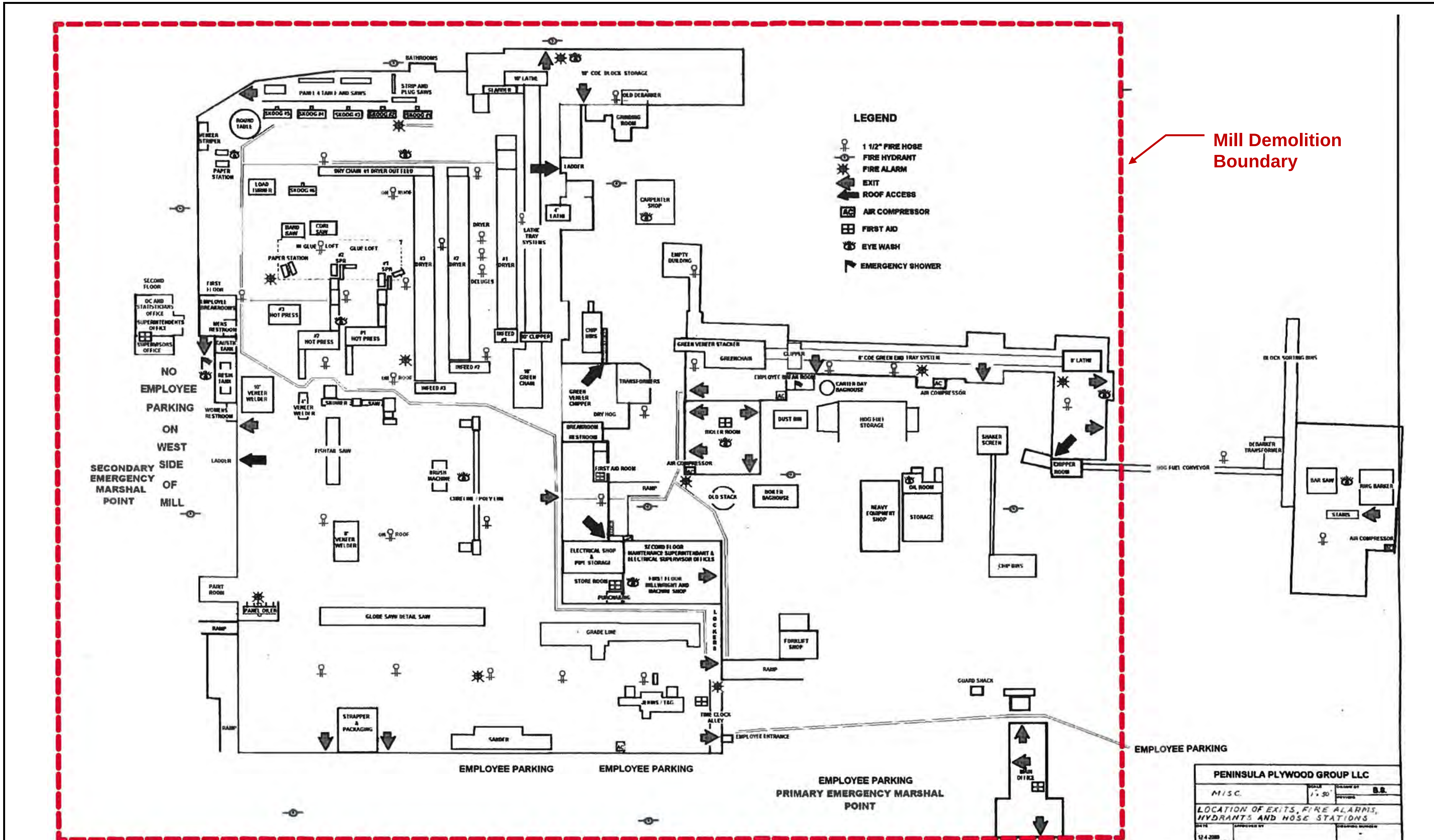

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Remedial Investigation/Feasibility Study Work Plan
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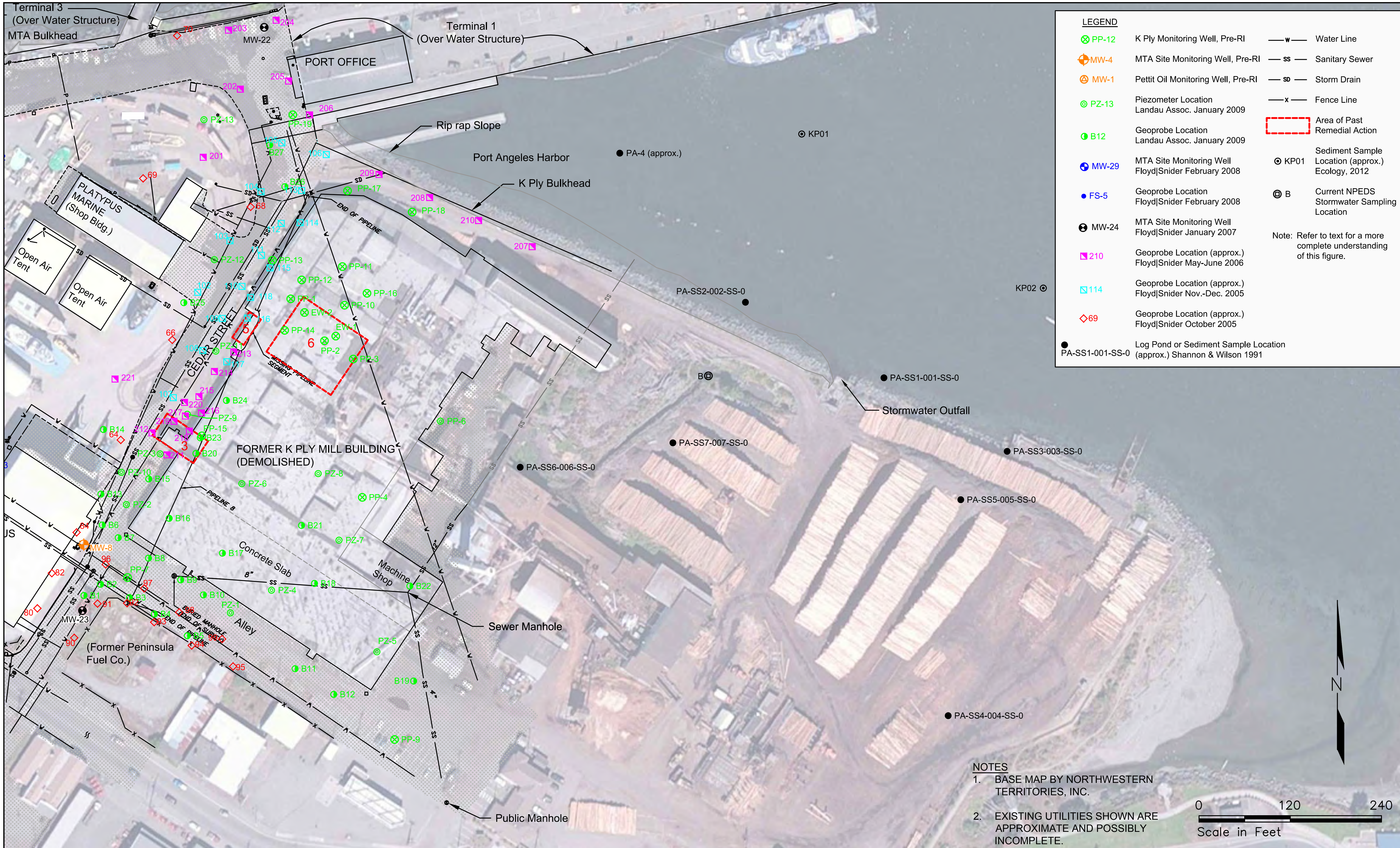
Figure 2.3
Former PenPly Mill Building Layout



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Remedial Investigation/Feasibility Study Work Plan
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Figure 3.1
Site Map Showing Prior Investigations, Locations, and Remedial Actions

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Figure 4.1
Areas of Potential Concern

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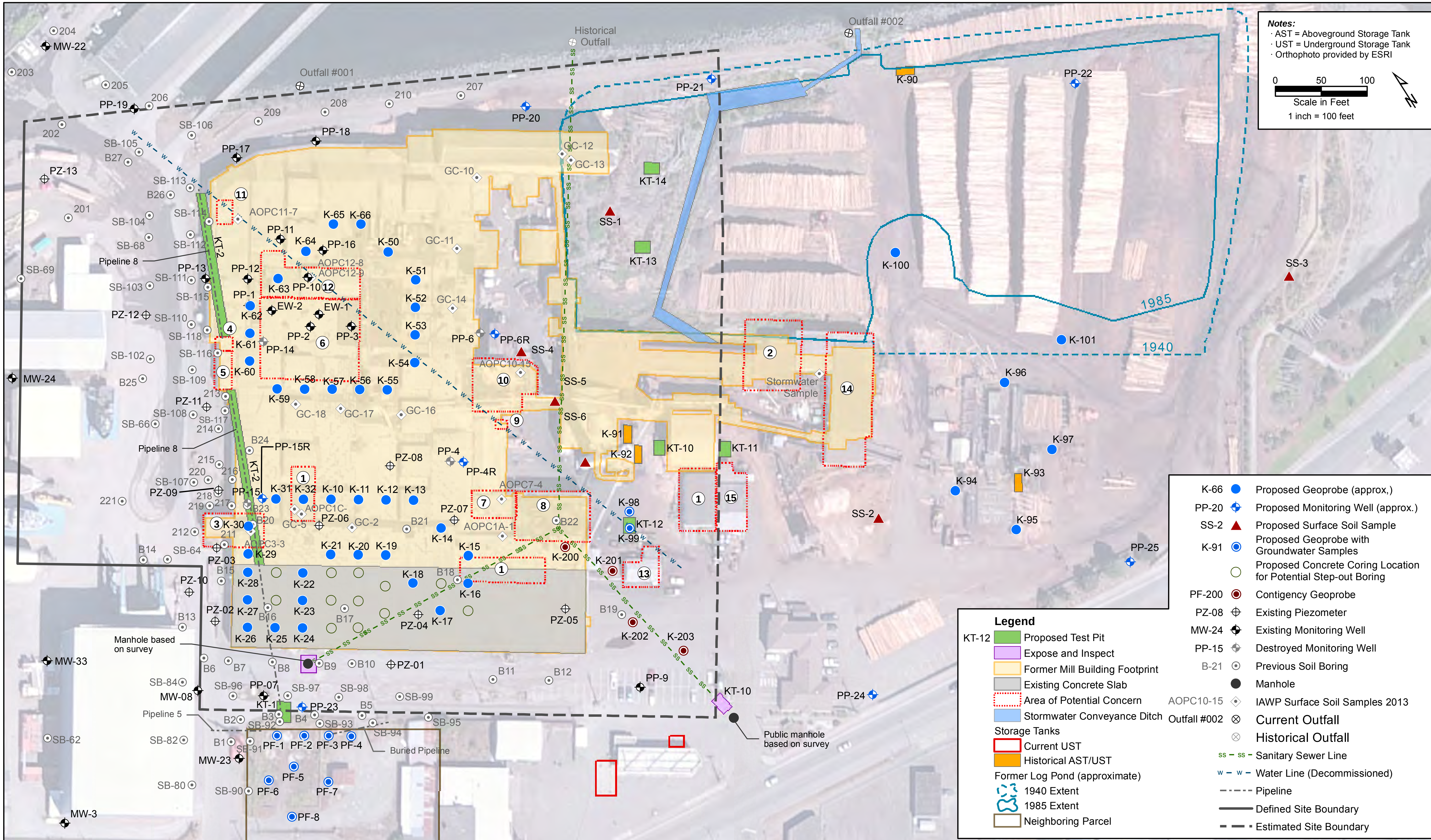

Remedial Investigation/Feasibility Study Work Plan
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Figure 7.1
Proposed Soil and Groundwater Investigation Locations

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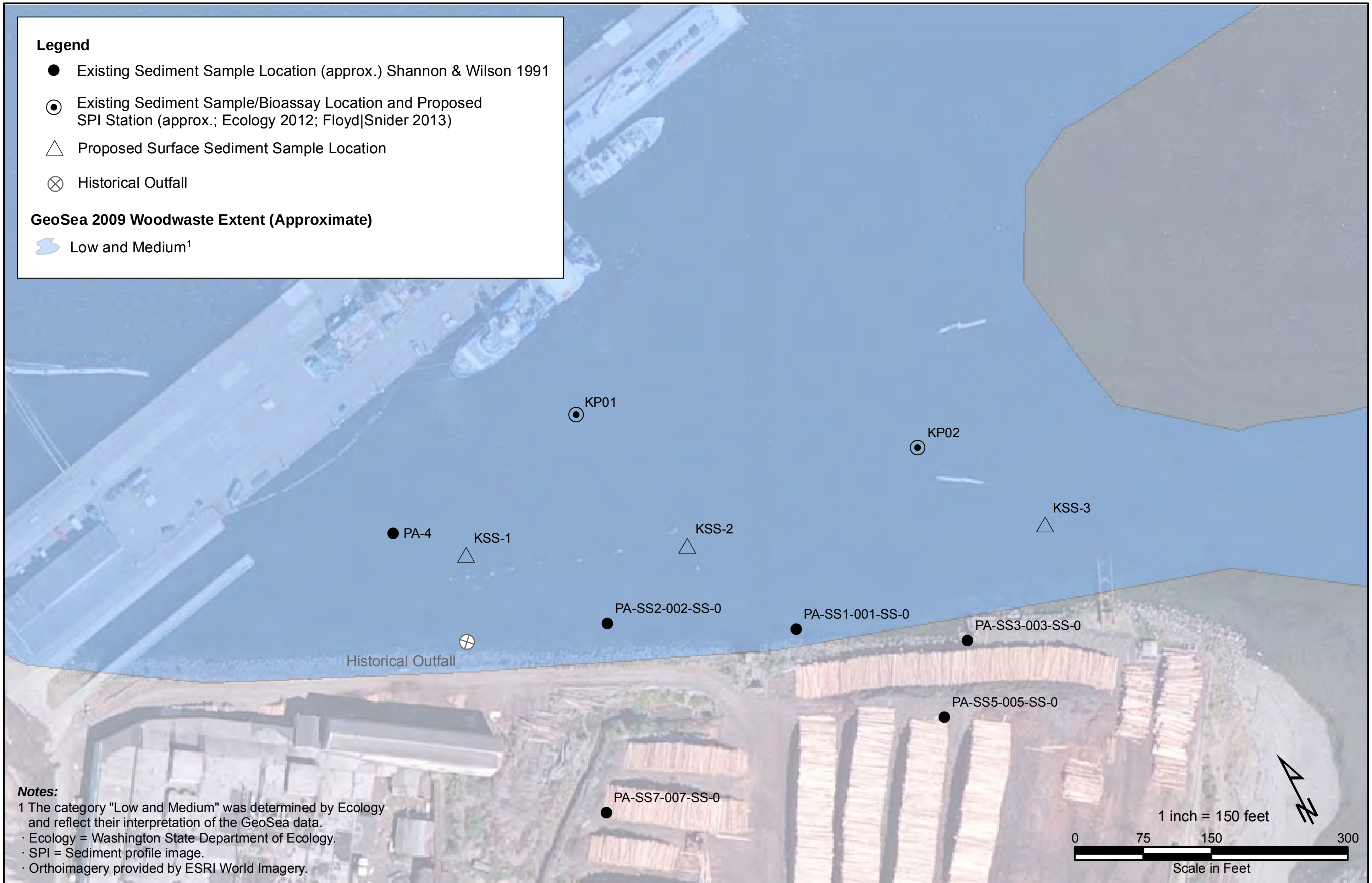
7/18/2013



Notes:

1 The category "Low and Medium" was determined by Ecology and reflect their interpretation of the GeoSea data.

· Ecology = Washington State Department of Ecology.

· SPI = Sediment profile image.

· Orthoimagery provided by ESRI World Imagery.

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Remedial Investigation/Feasibility Study Work Plan
K Ply Site
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Figure 7.2
Proposed Sediment Characterization Locations

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7/17/2013

K Ply Site

Remedial Investigation/ Feasibility Study Work Plan

Appendix A
Marine Trades Area
Remedial Investigation/ Feasibility Study Figures

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Appendix A
Marine Trades Area Remedial Investigation/ Feasibility Study Figures

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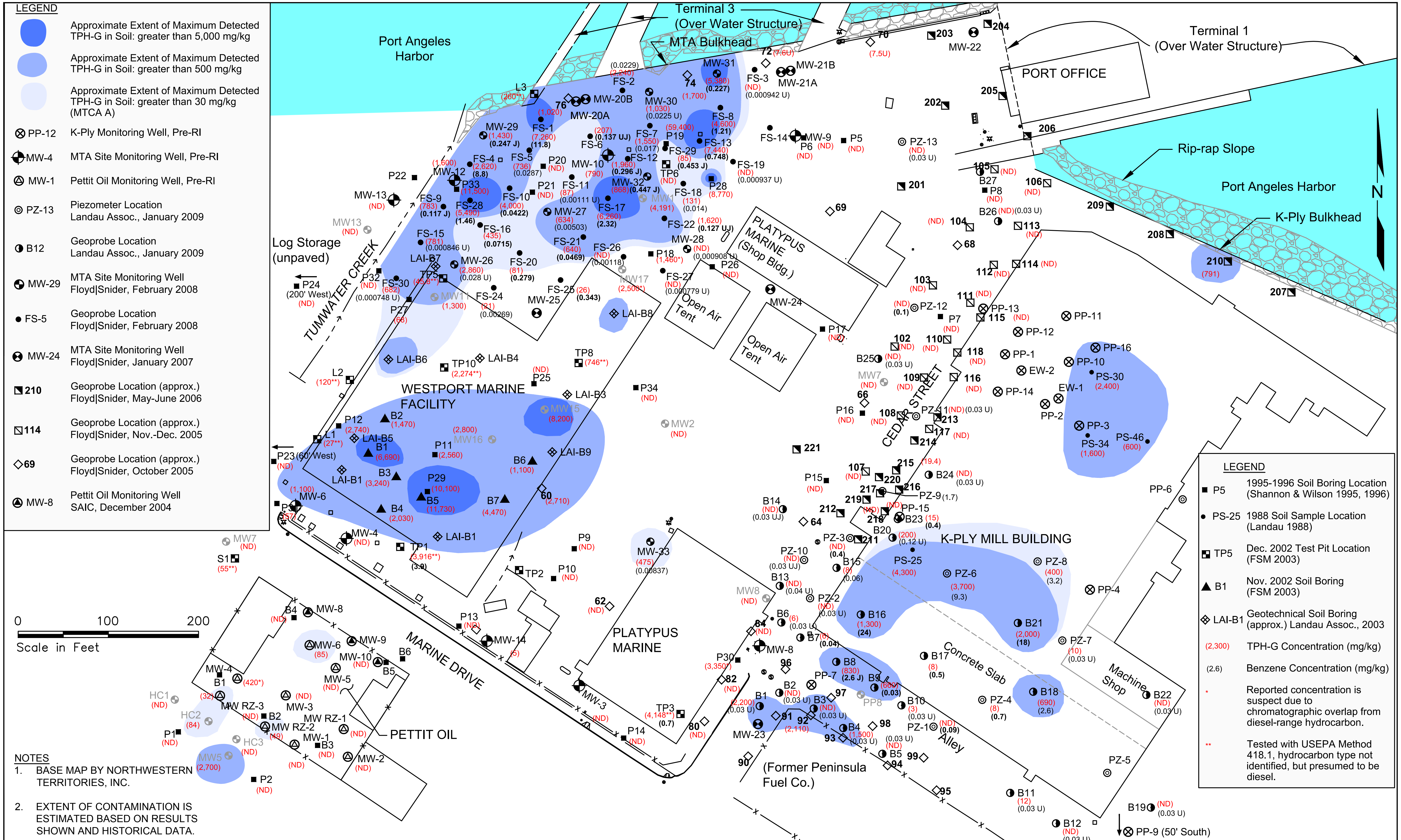

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Remedial Investigation/Feasibility Study
Marine Trades Area Site
Port Angeles, Washington

Figure 4.3
Historical and Current Areas of Elevated TPH-G and Benzene in Soil

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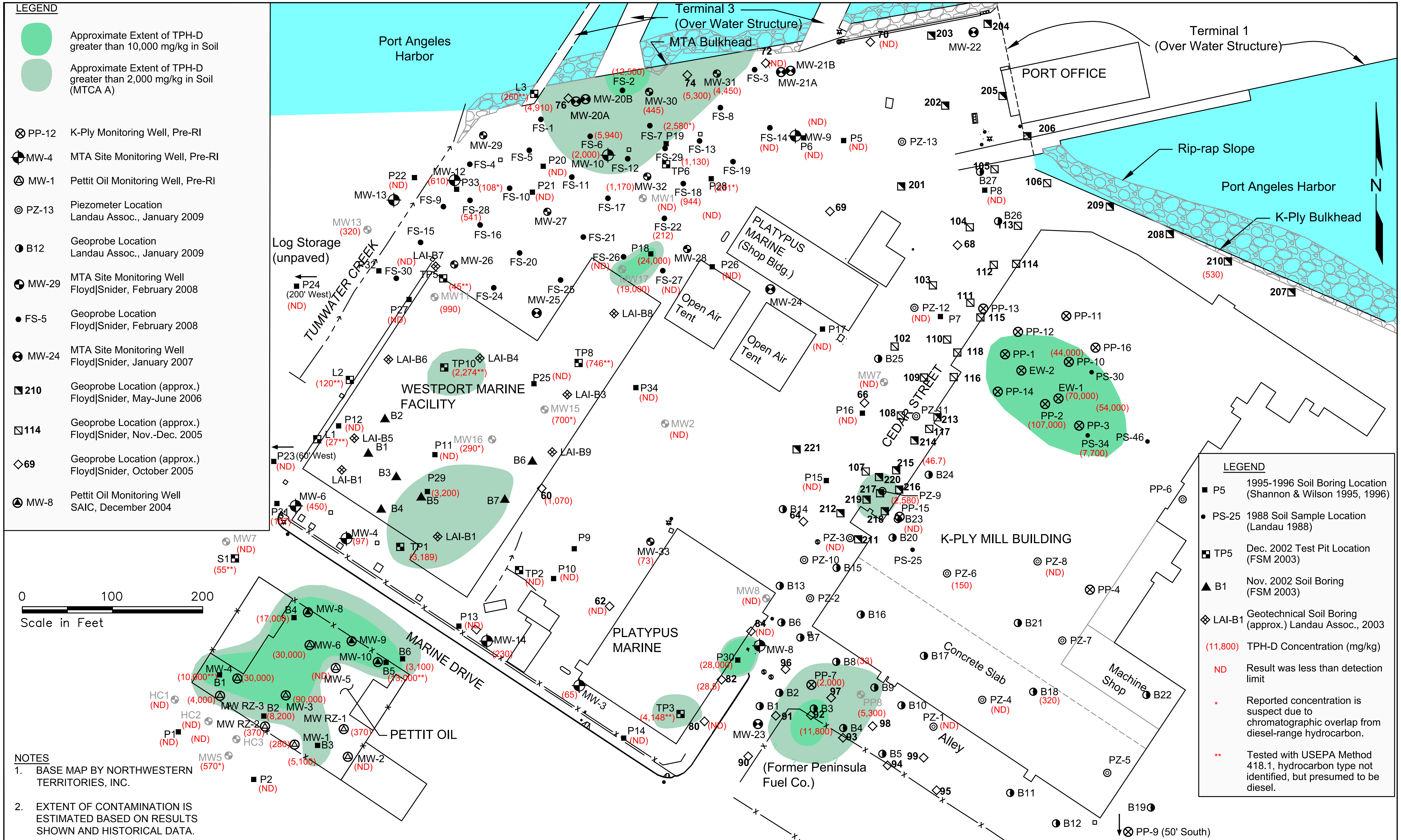

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Remedial Investigation/Feasibility Study
Marine Trades Area Site
Port Angeles, Washington

Figure 4.4
Historical and Current Areas of Elevated TPH-D in Soil

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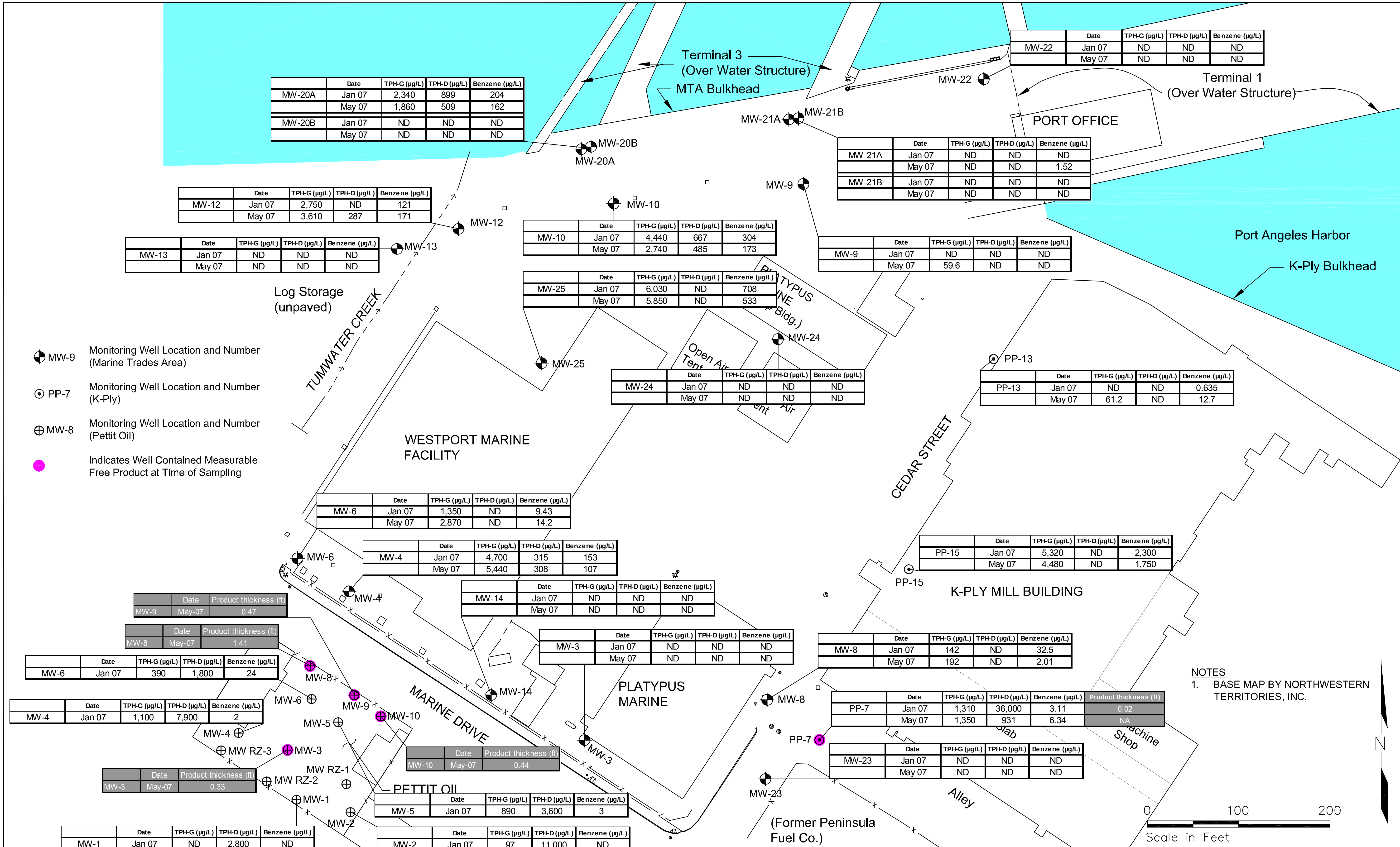

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
MW-20A	Jan 07	2,340	899	204
	May 07	1,860	509	162
MW-20B	Jan 07	ND	ND	ND
	May 07	ND	ND	ND

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
MW-22	Jan 07	ND	ND	ND
	May 07	ND	ND	ND

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
MW-21A	Jan 07	ND	ND	ND
	May 07	ND	ND	1.52
MW-21B	Jan 07	ND	ND	ND
	May 07	ND	ND	ND

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
MW-12	Jan 07	2,750	ND	121
	May 07	3,610	287	171

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
MW-13	Jan 07	ND	ND	ND
	May 07	ND	ND	ND

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
MW-10	Jan 07	4,440	667	304
	May 07	2,740	485	173

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
MW-9	Jan 07	ND	ND	ND
	May 07	59.6	ND	ND

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
MW-25	Jan 07	6,030	ND	708
	May 07	5,850	ND	533

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
MW-24	Jan 07	ND	ND	ND
	May 07	ND	ND	ND

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
PP-13	Jan 07	ND	ND	0.635
	May 07	61.2	ND	12.7

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
MW-6	Jan 07	1,350	ND	9.43
	May 07	2,870	ND	14.2

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
MW-4	Jan 07	4,700	315	153
	May 07	5,440	308	107

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
MW-14	Jan 07	ND	ND	ND
	May 07	ND	ND	ND

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
PP-15	Jan 07	5,320	ND	2,300
	May 07	4,480	ND	1,750

Well	Date	Product thickness (ft)
MW-9	May-07	0.47

Well	Date	Product thickness (ft)
MW-8	May-07	1.41

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
MW-6	Jan 07	390	1,800	24

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
MW-3	Jan 07	ND	ND	ND
	May 07	ND	ND	ND

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
MW-8	Jan 07	142	ND	32.5
	May 07	192	ND	2.01

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)	Product thickness (ft)
PP-7	Jan 07	1,310	36,000	3.11	0.02
	May 07	1,350	931	6.34	NA

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
MW-4	Jan 07	1,100	7,900	2

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
MW-23	Jan 07	ND	ND	ND
	May 07	ND	ND	ND

Well	Date	Product thickness (ft)
MW-10	May-07	0.44

Well	Date	Product thickness (ft)
MW-3	May-07	0.33

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
MW-5	Jan 07	890	3,600	3

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
MW-1	Jan 07	ND	2,800	ND

Well	Date	TPH-G (µg/L)	TPH-D (µg/L)	Benzene (µg/L)
MW-2	Jan 07	97	11,000	ND

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Remedial Investigation/Feasibility Study
Marine Trades Area Site
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Figure 4.5
Summary of 2007 Groundwater Analytical Results
From Monitoring Wells

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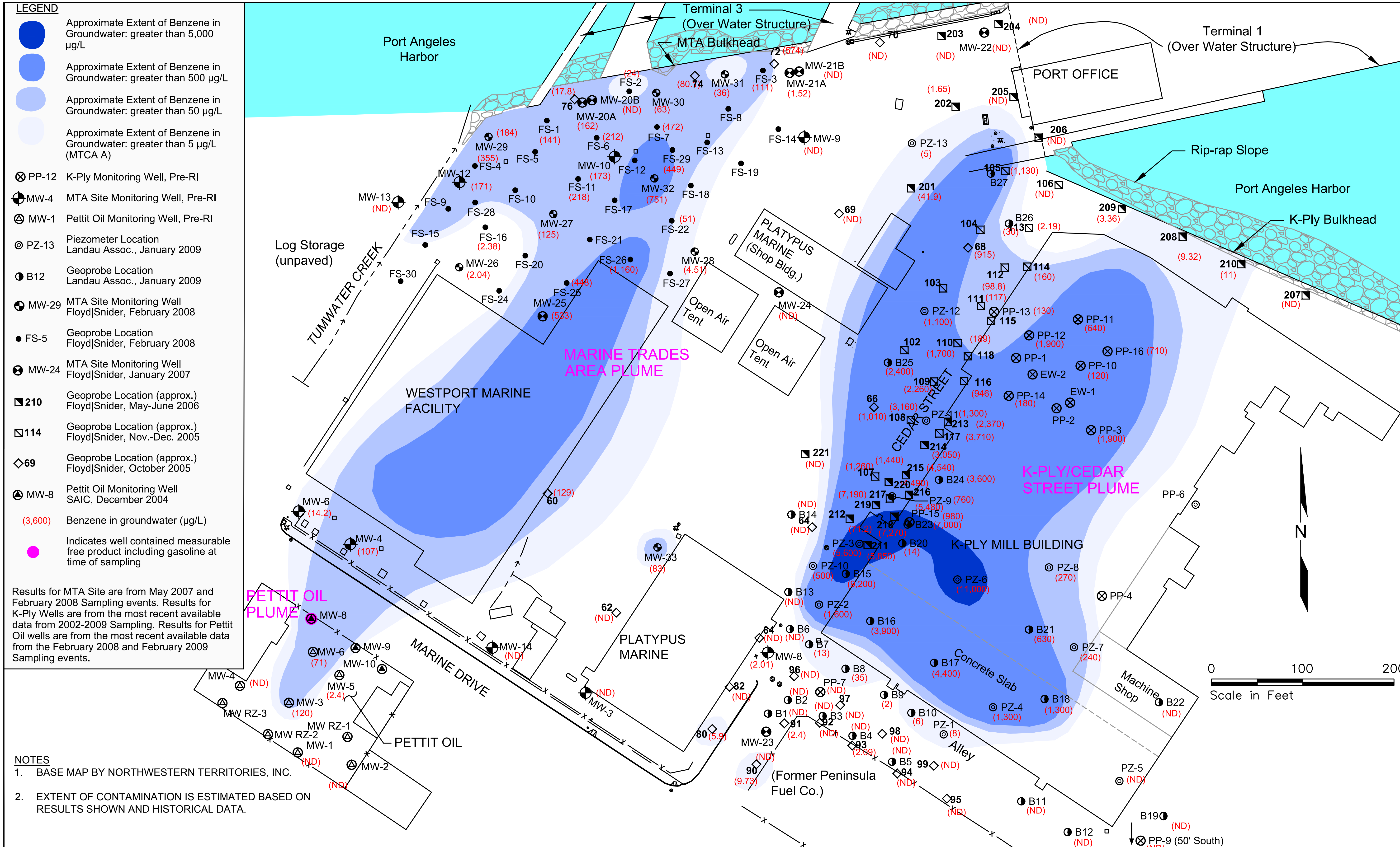

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Figure 4.6
Benzene in Groundwater

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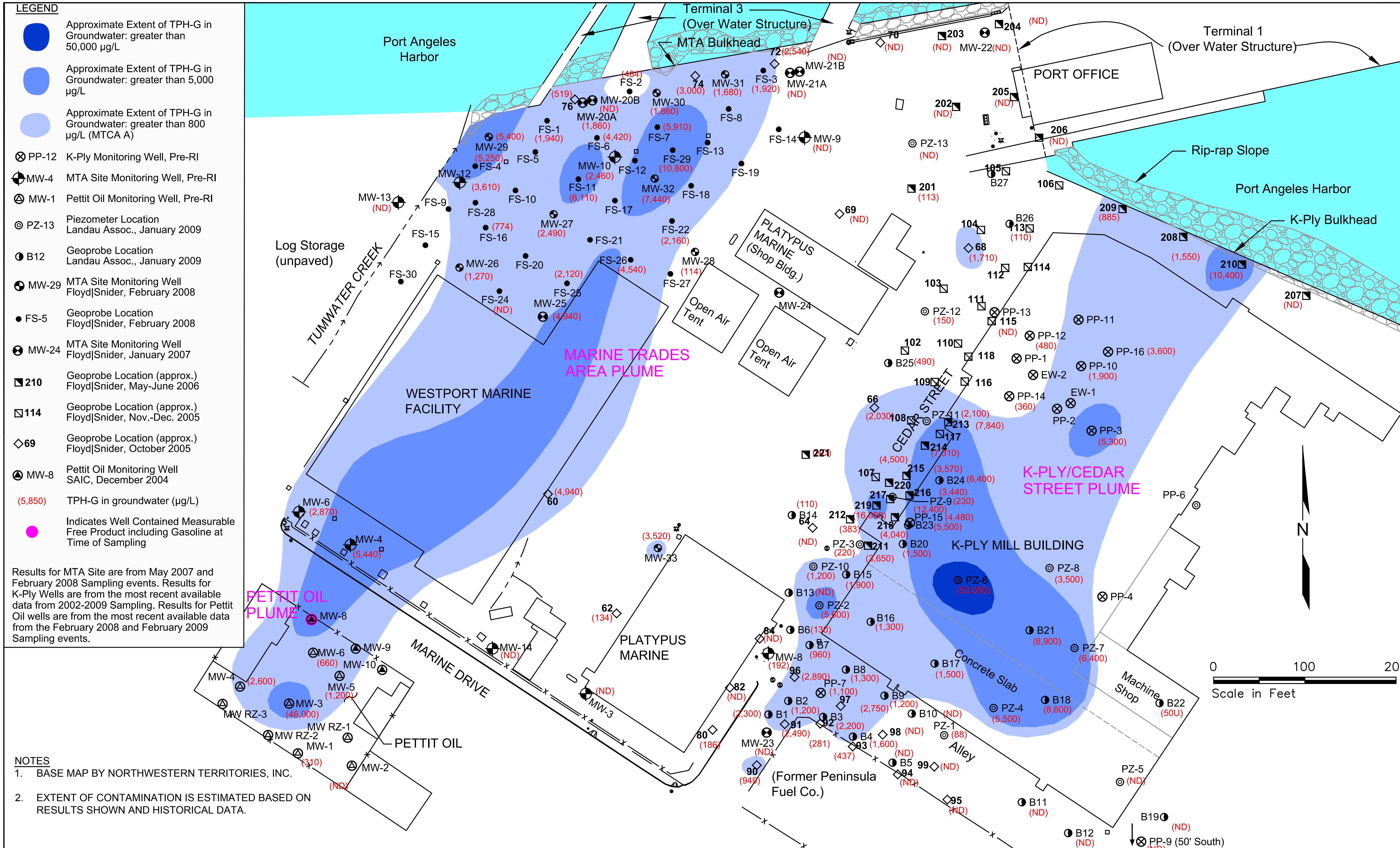

FLOYD | SNIDER strategy ▪ science ▪ engineering	**Remedial Investigation/Feasibility Study** **Marine Trades Area Site** **Port Angeles, Washington**	Figure 4.7 TPH-G in Groundwater

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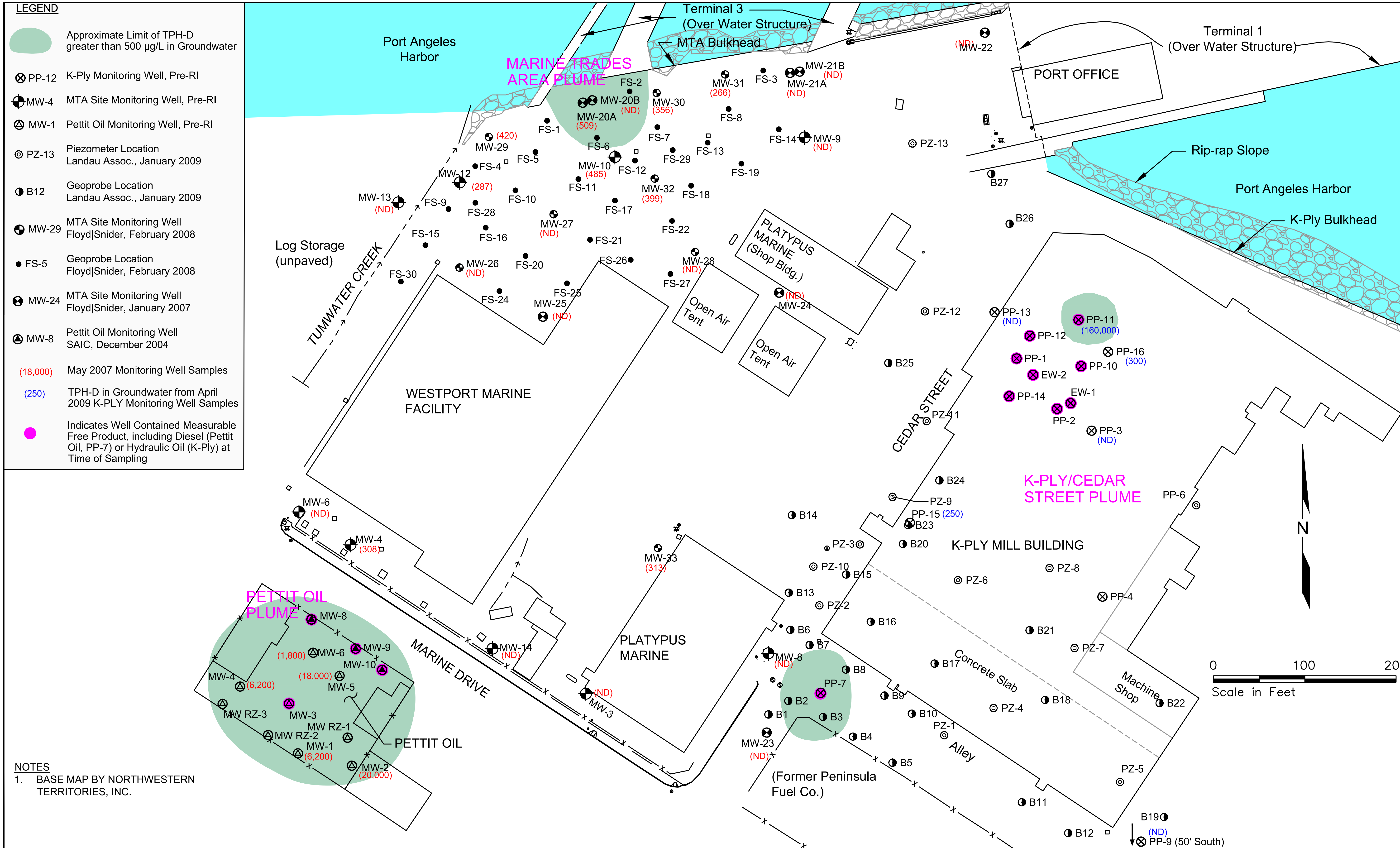

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Remedial Investigation/Feasibility Study
Marine Trades Area Site
Port Angeles, Washington

Figure 4.8
TPH-D in Groundwater

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K Ply Site

Remedial Investigation/ Feasibility Study Work Plan

Appendix B
Sampling and Analysis Plan/ Quality Assurance and Project Plan

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List of Abbreviations and Acronyms

Acronym/ Abbreviation	Definition
DO	Dissolved oxygen
Ecology	Washington State Department of Ecology
EDD	Electronic data deliverable
EIM	Environmental Information Management
GPS	Global Positioning System
HDPE	High-density polyethylene
LCS	Laboratory control sample
µm	Micrometer
mg/L	Milligrams per liter
MS/MSD	Matrix spike/matrix spike duplicate
NAPL	Non-aqueous phase liquid
NTU	Nephelometric Turbidity Unit
PID	Photoionization detector
Port	Port of Port Angeles
QA/QC	Quality assurance/quality control
RI/FS	Remedial Investigation/Feasibility Study
RF	Radio frequency
RPD	Relative percent difference
SAP/QAPP	Sampling and Analysis Plan/Quality Assurance Project Plan
SOP	Standard Operating Procedure
USCS	Unified Soil Classification System
USEPA	U.S. Environmental Protection Agency
VOC	Volatile organic compound

1.0 Project Description

This Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP) presents the specific field protocols and field and lab quality assurance/quality control (QA/QC) procedures associated with the draft Remedial Investigation/Feasibility Study (RI/FS) Work Plan activities for the K Ply Site located in Port Angeles, Washington.

1.1 INTRODUCTION

The RI/FS Work Plan describes general site investigation field activities to be performed as part of the RI including the following:

- Utility surveys
  - Via sewer camera
  - Via sonde
- Groundwater sampling
  - Via new and existing wells
  - Via Geoprobe
- Soil sampling
  - Via Geoprobe
  - Via surface soil sampling
  - Via Test Pits

Note that this SAP/QAPP does not address the field procedures or specific laboratory QA/QC protocols for sediment sampling. The three sediment samples specified for this project were collected in early July 2013 l following the procedures set forth in the RI/FS Work Plan developed for the Western Port Angeles Harbor Group (Exponent et. al 2013).

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2.0 Project Organization and Responsibility

The various QA field, laboratory, and management responsibilities of key project personnel are defined below.

2.1 MANAGEMENT RESPONSIBILITIES

Jesse Waknitz—Port of Port Angeles

Jesse Waknitz is the Port of Port Angeles' (Port's) primary point of contact. He will perform the following:

- Authorize and coordinate access for field activities.
- Assist with field activities.
- Review and approve all reports (deliverables) before their submission to Washington State Department of Ecology (Ecology).
- Manage the disposal of any investigation-derived waste.

Tom Colligan—Floyd|Snider Project Manager

Tom Colligan, Project Manager, will have overall responsibility for project implementation. As Project Manager he will be responsible for maintaining QA on this project and ensuring that the RI/FS Work Plan objectives are met. The Project Manager will perform the following:

- Approve the SAP/QAPP.
- Monitor project activity and quality.
- Provide overview of field activities to the Port and Ecology.
- Prepare and review the draft RI/FS reports.
- Provide technical representation of project activities at meeting.

2.2 QUALITY ASSURANCE RESPONSIBILITIES

Chell Black—Floyd|Snider Data Manager

The Data Manager will be responsible for the data validation of all sample results from the analytical laboratories and entering the data into a database. Additional responsibilities include the following:

- Review of laboratory reports.
- Loading analytical data to Ecology's Environmental Information Management (EIM) database.
- Advising on data corrective action procedures.
- QA/QC on analytical data reports.
- Database management and queries.

2.3 LABORATORY RESPONSIBILITIES

An Ecology-accredited laboratory will perform all analytical services in support of the RI/FS work activities.

Laboratory Project Manager

The Laboratory Project Manager will be responsible for the following:

- Coordinating laboratory analyses with Floyd|Snider.
- Review and approval of final analytical reports.
- Scheduling sample analyses.
- Overseeing data review.

2.4 FIELD RESPONSIBILITIES

Kristin Andersen—Floyd|Snider Field Lead

The Field Lead will be responsible for leading and coordinating the day-to-day activities in the field. The Field Lead will report directly to the Floyd|Snider Project Manager.

Specific responsibilities include the following:

- Coordinating with the Project Manager.
- Coordinating and managing field staff including sampling and drillers.
- Reviewing field data including field logs and field measurement data.
- Adhering to the work schedule.
- Coordinating and overseeing subcontractors.
- Preparing the RI/FS and Data Summary Report.

3.0 Laboratory Quality Assurance Objectives

The objective of this section is to clarify laboratory data QA objectives for field sampling and laboratory analyses. Specific procedures for sampling, chain of custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal QC, audits, preventative maintenance of field/laboratory equipment, and corrective action are described in subsequent sections of this SAP/QAPP.

3.1 LABORATORY QUALITY ASSURANCE OBJECTIVES

The quality of analytical data generated is assessed by the frequency and type of internal QC checks developed for analysis type. Laboratory results will be evaluated against QA objectives by reviewing results for analysis of method blanks, matrix spikes, duplicate samples, laboratory control samples, calibrations, performance evaluation samples, and interference checks as specified by the specific analytical methods. Data quality objectives are summarized in Table B.1.

3.2 PRECISION

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, precision is a quantitative measure of the variability of a group of measurements compared to their average values. Analytical precision is measured through matrix spike/matrix spike duplicate (MS/MSD) samples for organic analysis and through laboratory duplicate samples for inorganic analyses.

Analytical precision measurements will be carried out on project-specific samples at a minimum lab duplicate frequency of one per laboratory analysis group or 1 in 20 samples, whichever is more frequent per matrix analyzed, as practical. Laboratory precision will be evaluated against quantitative relative percent difference (RPD) performance criteria.

Field precision will be evaluated by the collection of blind field duplicates at a minimum frequency of one per laboratory analysis group or 1 in 20 samples. Currently, no performance criteria have been established for field duplicates. Field duplicate precision will therefore be screened against a RPD of 75 percent for all samples. However, no data will be qualified based solely on field duplicate precision.

Precision measurements can be affected by the nearness of a chemical concentration to the method detection limit, where the percent error (expressed as RPD) increases. The equations used to express precision are as follows:

$$RPD = \frac{(C_1 - C_2) \times 100\%}{(C_1 + C_2)/2}$$

Where:

RPD = relative percent difference
C_1 = larger of the two observed values
C_2 = smaller of the two observed values

3.3 ACCURACY

Accuracy is an expression of the degree to which a measured or computed value represents the true value. Analytical accuracy may be assessed by analyzing "spiked" samples with known standards (surrogates, laboratory control samples, and/or matrix spike) and measuring the percent recovery. Accuracy measurements on MS samples will be carried out at a minimum frequency of 1 in 20 samples per matrix analyzed. Because MS/MSDs measure the effects of potential matrix interferences of a specific matrix, the laboratory will perform MS/MSDs only on samples from this investigation and not from other projects. Surrogate recoveries will be determined for every sample analyzed for organics.

Laboratory accuracy will be evaluated against quantitative laboratory control sample, matrix spike, and surrogate spike recoveries using limits for each applicable analyte. Accuracy can be expressed as a percentage of the true or reference value, or as a percent recovery in those analyses where reference materials are not available and spiked samples are analyzed. The equation used to express accuracy is as follows:

$$\%R = 100\% \times (S-U)/C_{sa}$$

Where:

- %R = percent recovery
- S = measured concentration in the spiked aliquot
- U = measured concentration in the unspiked aliquot
- C_{sa} = actual concentration of spike added

3.4 REPRESENTATIVENESS

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Care will be taken in the design of the sampling program to ensure sample locations are properly selected, sufficient numbers of samples are collected to accurately reflect conditions at the location(s), and samples are representative of the sampling location(s). A sufficient volume of sample will be collected at each sampling location to minimize bias or errors associated with sample particle size and heterogeneity.

3.5 COMPARABILITY

Comparability is a qualitative parameter expressing the confidence with which one dataset can be compared to another. In order to insure results are comparable, samples will be analyzed using standard U.S. Environmental Protection Agency (USEPA) methods and protocols. Calibration and reference standards will be traceable to certified standards and standard data reporting formats will be employed. Data will also be reviewed to verify that precision and accuracy criteria were achieved and, if not, that data were appropriately qualified.

3.6 COMPLETENESS

Completeness is a measure of the amount of data that is determined to be valid in proportion to the amount of data collected. Completeness will be calculated as follows:

$$C = \frac{\text{(Number of acceptable data points)} \times 100}{\text{(Total number of data points)}}$$

The data quality objective for completeness for all components of this project is 95 percent. Data that were qualified as estimated because the QC criteria were not met will be considered valid for the purpose of assessing completeness. Data that were qualified as rejected will not be considered valid for the purpose of assessing completeness.

3.7 QUALITY CONTROL PROCEDURES

QC samples will be collected and analyzed as described in this section.

3.7.1 Field Quality Control Procedures

Trip blanks will be included in each cooler with samples being analyzed for volatile organic compounds (VOCs) to ensure the sample containers do not contribute to any detected analyte concentrations and to identify any artifacts of improper sample handling, storage, or shipping. A rinsate blank QC sample will also be collected for each sampling event on the non-dedicated field equipment (i.e., stainless steel bowl and spoon) to ensure field decontamination procedures are effective. All field QC samples will be documented in the field logbook and verified by the QA Manager or designee. A blind field duplicate will be collected at a frequency of 1 in 20 samples to evaluate the efficiency of field decontamination procedures, variability from sample handling, and site heterogeneity.

3.7.2 Laboratory Quality Control Procedures

Laboratory Quality Control Criteria. Certain samples will be spiked and the recoveries of spiked compounds compared to the QC criteria. Results of the laboratory QC samples from each sample group will be reviewed by the analyst immediately after a sample group has been analyzed. The QC sample results will then be evaluated to determine whether control limits were exceeded. If control limits are exceeded in the sample group, corrective action (e.g., method modifications followed by reprocessing the affected samples) will be initiated prior to processing a subsequent group of samples.

All primary chemical standards and standard solutions used in this project will be traceable to documented and reliable commercial sources. Standards will be validated to determine their accuracy by comparison with an independent standard. Any impurities identified in the standard will be documented.

The following sections summarize the procedures that will be used to assess data quality throughout sample analysis.

Laboratory Duplicates. Analytical duplicates provide information on the precision of the analysis and are useful in assessing potential sample heterogeneity and matrix effects. Analytical duplicates are subsamples of the original sample that are prepared and analyzed as a separate sample. A minimum of one duplicate will be analyzed per sample group or for every 20 samples, whichever is more frequent.

Matrix Spikes and Matrix Spike Duplicates. Analysis of MS samples provides information on the extraction efficiency of the method on the sample matrix. By performing MSD analyses, information on the precision of the method is also provided for organic analyses. A minimum of one MS/MSD will be analyzed for every sample group or for every 20 samples, whichever is more frequent. MS/MSD analyses will be performed on project-specific samples (i.e., batch QC using samples from other projects is not permitted).

Laboratory Control Samples. A laboratory control sample (LCS) is a method blank sample carried throughout the same process as the samples to be analyzed, with a known amount of standard added. The blank spike compound recovery assesses analytical accuracy in the absence of any sample heterogeneity or matrix effects.

Surrogate Spikes. All project samples analyzed for organic compounds will be spiked with appropriate surrogate compounds as defined in the analytical methods. Surrogate recoveries will be reported by the laboratories; however, no sample result will be corrected for recovery using these values.

Method Blanks. Method blanks are analyzed to assess possible laboratory contamination at all stages of sample preparation and analysis. A minimum of one method blank will be analyzed for every extraction batch or for every 20 samples whichever is more frequent.

4.0 Sample Handling and Custody Documentation

Sample possession and handling must be traceable from the time of sample collection, through laboratory and data analysis, to the time sample results are reported. A sample log form and field logbook entries will be completed for each location occupied and each sample collected.

4.1 SAMPLE HANDLING

To control the integrity of the samples during transit to the laboratory and during hold prior to analysis, established preservation and storage measures will be taken. Sample containers will be labeled with the client name, location name/number, sample number, sampling date and time, required analyses, and initials of the individual processing the sample. The Field QA Officer will check all container labels, custody form entries, and logbook entries for completeness and accuracy at the end of each sampling day.

4.2 SAMPLE CHAIN-OF-CUSTODY

Sample labeling and custody documentation will be performed as described in this document. Custody procedures will be used for all samples at all stages in the analytical or transfer process and for all data and data documentation whether in hard copy or electronic format.

4.3 SAMPLE PRESERVATION

Samples requiring field preservation will be placed into pre-preserved sample jars supplied by the lab (i.e., VOCs and metals depending on media). Immediately after the sample jars are filled with each media, they will be placed in the appropriate cooler with a sufficient number of ice packs (or crushed ice) to keep them cool through the completion of that day's sampling and transport to the laboratory.

4.4 SAMPLE SHIPMENT

Technical field staff will be responsible for all sample tracking and custody procedures in the field. The Field QA Officer will be responsible for final sample inventory and will maintain sample custody documentation. At the end of each day, and prior to transfer, custody form entries will be made for all samples. Each shipment of coolers will be accompanied by custody forms; the forms will be signed at each point of transfer and will include sample numbers. All custody forms will be completed in indelible ink. Copies of all forms will be retained as appropriate and included as appendices to QA/QC reports to management.

Prior to shipping, sample containers will be wrapped and securely packed inside the cooler with ice packs or crushed ice by the field technician or designee. The original, signed custody forms will be transferred with the cooler. The cooler will be secured and appropriately sealed and labeled for immediate shipping or transport via vehicle. Samples will be delivered to the laboratory under custody following completion of sampling activities.

4.5 SAMPLE RECEIPT

The designated sample custodian at the laboratory will accept custody of the samples and verify that the chain-of-custody form matches the samples received. The laboratory Project Manager will ensure that the custody forms are properly signed upon receipt of the samples and will note questions or observations concerning sample integrity on the custody forms. The laboratory will contact the QA Manager immediately if discrepancies are discovered between the custody forms and the sample shipment upon receipt. The laboratory Project Manager, or designee, will specifically note any coolers that do not contain ice packs or are not sufficiently cold upon receipt.

5.0 Data Reduction, Validation, and Reporting

Initial data reduction, evaluation, and reporting at the laboratory will be carried out as described in the appropriate analytical protocols and the laboratory's QA Manual. QC data resulting from methods and procedures described in this document will also be reported.

5.1 DATA REDUCTION AND REPORTING

The laboratory will be responsible for internal checks on data reporting and will correct errors identified during the QA review. Close contact will be maintained with the laboratories to resolve any QC problems in a timely manner. The analytical laboratories will be required, where applicable, to report the following:

- **Project Narrative.** This summary, in the form of a cover letter, will discuss problems, if any, encountered during any aspect of analysis. This summary should discuss, but not be limited to, QC, sample shipment, sample storage, and analytical difficulties. Any problems encountered (actual or perceived) and their resolutions will be documented in as much detail as necessary.
- **Sample IDs.** Records will be produced that clearly match all blind duplicate QA samples with laboratory sample IDs.
- **Chain-of-Custody Records.** Legible copies of the custody forms will be provided as part of the data package. This documentation will include the time of receipt and condition of each sample received by the laboratory. Additional internal tracking of sample custody by the laboratory will also be documented.
- **Sample Results**. The data package will summarize the results for each sample analyzed. The summary will include the following information when applicable:
    - Field sample identification code and the corresponding laboratory identification code:
        - Sample matrix.
        - Date of sample extraction.
        - Date and time of analysis.
        - Weight and/or volume used for analysis.
        - Final dilution volumes or concentration factor for the sample.
        - Percent moisture in solid samples.
        - Identification of the instrument used for analysis.
        - Method reporting and quantitation limits.
    - Analytical results reported with reporting units identified.
    - All data qualifiers and their definitions.
    - Electronic data deliverables (EDDs).
- **Quality Assurance/Quality Control Summaries.** This section will contain the results of all QA/QC procedures. Each QA/QC sample analysis will be documented with the same information required for the sample results (refer to above). No recovery or blank corrections will be made by the laboratory. The required summaries are listed below; additional information may be requested.

- **Method Blank Analysis.** The method blank analyses associated with each sample and the concentration of all compounds of interest identified in these blanks will be reported.
- **Surrogate Spike Recovery.** All surrogate spike recovery data for organic compounds will be reported. The name and concentration of all compounds added, percent recoveries, and range of recoveries will be listed.
- **Matrix Spike Recovery.** All MS recovery data for metals and organic compounds will be reported. The name and concentration of all compounds added, percent recoveries, and range of recoveries will be listed. The RPD for all duplicate analyses will be reported.
- **Matrix Duplicate.** The RPD for all matrix duplicate analyses will be reported.
- **Blind Duplicates.** Blind duplicates will be reported in the same format as any other sample. RPDs will be calculated for duplicate samples and evaluated as part of the data quality review.

5.2 DATA VALIDATION

Once data are received from the laboratory, a number of QC procedures will be followed to provide an accurate evaluation of the data quality. Specific procedures will be followed to assess data precision, accuracy, and completeness.

A data quality review of the analytical data will follow USEPA National Functional Guidelines in accordance with the QAPP limits (USEPA 1999 and USEPA 2004). All chemical data will be reviewed with regard to the following:

- Chain of custody/documentation.
- Sample preservation and holding times.
- Instrument performance (calibration, tuning, sensitivity).
- Method blanks.
- Reporting limits.
- Surrogate recoveries.
- MS/MS recoveries.
- LCS recoveries.
- Laboratory and field duplicate relative percent differences.

The Data Validation summary report will be presented as an appendix to the data reports. Validated data will be entered into the project database and uploaded to Ecology's EIM system.

6.0 Corrective Actions

Corrective action procedures are described in this section.

Corrective Action for Field Sampling. The Field Lead will be responsible for correcting field errors in sampling or documenting equipment malfunctions during the field sampling effort and will be responsible for resolving situations in the field that may result in non-compliance with the SAP/QAPP. All corrective measures will be immediately documented in the field logbook. Substantial deviations from the RI/FS Work Plan will be reported immediately to the project manager who will then report the deviation to Ecology.

Corrective Action for Laboratory Analyses. The laboratory is required to comply with their Standard Operating Procedures (SOPs). The laboratory Project Manager will be responsible for ensuring that appropriate corrective actions are initiated as required for conformance with this SAP/QAPP. All laboratory personnel will be responsible for reporting problems that may compromise the quality of the data.

If any QC sample exceeds the project-specified control limits, the analyst will identify and correct the anomaly before continuing with the sample analysis. The analyst will document the corrective action taken in a memorandum submitted to the QA Manager. A narrative describing the anomaly, the steps taken to identify and correct the anomaly, and the treatment of the relevant sample batch (i.e., recalculation, reanalysis, and/or re-extraction) will be submitted with the data package.

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7.0 Field Investigation Procedures

The following sections describe the specific protocols that will be used to gather site data to be used in the RI/FS report. Refer to the RI/FS Work Plan Tables 7.1 and 7.2 for the specific sampling methods that will be used in each area of potential concern.

7.1 UNDERGROUND UTILITY INVESTIGATION PROTOCOLS

A utility locate survey was conducted to determine the precise locations of Pipeline 8 and the abandoned storm sewer lines. A video survey of the abandoned sewer lines was attempted at the same time as the utility locate survey. The results of the survey are summarized in a memorandum that was transmitted to Ecology in July 2013. (Floyd|Snider 2013).

The exact location of the ends of these pipes, as determined by the utility locate survey, is shown on Figure B.1. Buried utility lines, including Pipeline 8 and the storm sewer lines, will be inspected and tested according to the following procedures:

1. The soil overlying the ends of Pipeline 8, as well as the southern terminus of the 4-inch storm sewer line that contained gasoline odors, will be excavated by backhoe. The pipelines will be exposed by hand digging. In addition, the asphalt covering the possible manhole at the terminus of the 8-inch sewer line will be removed to determine whether a buried manhole exists at this location.
2. A trench box or other shoring system will be installed in any test pit deeper than 4 feet to allow direct inspection. All workers entering the trench boxes will follow proper confined space entry protocols. The ends of the pipelines and sewers will be opened; and their contents, if any, may be sampled for laboratory analysis. Cleanouts or other additional piping will be installed prior to backfilling to allow these pipelines/sewers to be pressure tested and/or jet cleaned at a later date.
3. A trench will be excavated to expose the portion of Pipeline 8 that is accessible. Soils surrounding the pipeline will be field screened for evidence of petroleum, consistent with the screening procedures for test pit excavation. If Pipeline 8 appears to be intact, with no obvious holes or cracks, it will be pressure tested with nitrogen. If there are clear visual indications that the pipeline has been breached (i.e., holes), pressure testing will not be performed. If pressure testing is performed and indicates a significant leak, then a second pressure test will be conducted on only the inaccessible portions of Pipeline 8 with helium. In order to do this, the pipeline will be cut where it exits the northern section of the raised concrete slab.

7.2 GROUNDWATER SAMPLING PROTOCOL

Several new groundwater monitoring wells will be installed and developed according to standard industry procedures. The wells will be 2-diameter polyvinyl chloride (PVC) and drilled using an 8–inch interior diameter hollow-stem auger with samples collected at 5-foot intervals. The screened interval shall be 10 feet long and the well will be screened across the water table. All wells will be surface-mounted and protected against possible damage by placement of either bollards or concrete Ecology blocks to protect the well. Specific procedures are described in the Interim Action Work Plan (Floyd|Snider 2012).

Groundwater samples will be collected from all monitoring wells after purging with low-flow techniques, using a peristaltic pump and disposable or dedicated polyethylene tubing as described below. Groundwater grab samples for screening purposes will also be collected directly from selected soil borings using a Geoprobe and temporary well screens.

7.2.1 Monitoring Well Sampling Procedure

Groundwater samples will be collected from all site wells following the procedure described below:

1. After the protective casing has been opened, the condition of monument/well will be observed and noted on the field log.
2. A decontaminated water level indicator will be dropped into the well and depth-to-water will be measured to the nearest 0.01 foot using a tape measure. This value, along with the date and time, will be recorded on the field log as the static depth–to-water.
3. Disposable, new polyethylene tubing will be lowered into the well to the midpoint depth of the screened interval or, if the groundwater level is below this depth, the midpoint depth of the water column. A peristaltic pump will be used to begin purging the water. All purge water will be collected and processed as described in Section 7.6 below.
4. The well will be purged at low-flow rates in order to ensure less than 0.1 foot of drawdown in the well and non-turbid water (less than 10 Nephelometric Turbidity Units [NTU]), generally a flow-rate of less than 0.5 liters/minute Because water levels may fluctuate in the monitoring wells with the tide, the drawdown will be measured and compared against this criterion in the first 5 minutes of purging.

4. During purging, field parameters (temperature, pH, dissolved oxygen [DO], conductivity, salinity, and turbidity) in the purge water as well as depth-to-water will be recorded at 3- to 5-minute intervals. If the field measurements for turbidity, DO, and electrical conductivity are approximately stable (within 10 percent) for three consecutive readings, the groundwater sample will be collected. If DO is less than 5 milligrams per liter (mg/L), three consecutive readings within 1 mg/L will be considered stable. If turbidity readings are negative values, the measurement will be recorded as less than 1 NTU. Because these field parameters (particularly turbidity) may not reach these stringent stabilization criteria at a particular well, collection of each groundwater sample will be based on the field personnel’s best professional judgment at the time of sampling. The last set of field parameters measured during purging will represent field parameters for the groundwater sample.

5. The groundwater sample will be collected by directly filling the laboratory-provided bottles from the pump discharge line (maintaining the same flow rate as purging). All labeled, filled bottles will immediately be placed in coolers packed with ice. Samples collected for dissolved metals analysis will be filtered at the laboratory.

7.2.2 Groundwater Screening Sampling Procedure

Groundwater screening samples will be collected directly from Geoprobe soil boring locations following the procedure described below:

1. A retractable drop-down type screen sampler made of stainless steel will be driven to the desired sample depth, typically a minimum of 5 feet into the water table. Once driven, the screen will be retracted, open to the formation, and groundwater that enters the screen will be coarsely filtered.

2. A disposable polyethylene tube will be inserted into the screen and attached to a peristaltic pump. The boring will be purged until the pumped water begins to clear visually.
3. The groundwater sample will be collected by directly filling the laboratory-provided bottles from the pump discharge line (maintaining the same flow rate as purging). After collection, the polyethylene tubing will be discarded and the screen and related equipment will be decontaminated between uses. At most locations, the sample will be collected between 5 to 10 feet below the groundwater surface.
4. All labeled, filled bottles will immediately be placed in coolers packed with ice. Samples collected for dissolved metals analysis will be field filtered using a 0.45 micrometer (µm) flow-through filter.

7.2.3 Groundwater Sample Nomenclature and Handling Procedures

The sample number format for monitoring well groundwater samples will be the well number. Groundwater screening samples will be "boring number-screen top depth-screen bottom depth" For example, an example collected from K-10 from 10 to 12 feet would be labeled "K10-10-12'." Every groundwater sample will have a unique identifier, and the collection date will be known from the bottle label and chain-of-custody form. Sample labels will also include the time of collection and initials of sampler on the bottle label.

The samples will be shipped overnight or delivered to the laboratory on the day following collection to ensure that the analytical holding times specified in Table B.2 are met.

7.2.4 Laboratory Analysis

The analyses to be performed on groundwater samples collected during the RI/FS are summarized in Table B.3.

7.3 SOIL SAMPLING PROTOCOL

Soil samples will be collected from soil borings advanced using direct-push technology (e.g., Geoprobe), from excavated test pits, and from the ground surface. Soil samples will be collected from selected boring, test pit, and surface locations shown in Figure B.1. Prior to conducting the subsurface exploration program, each location will be checked for the presence of underground utilities by a utility location company. Exploration locations may be moved to a limited degree if underground or aboveground utility locations, and/or site operational constraints are present.

7.3.1 Soil Boring Sampling Procedure

All direct-push soil boring samples will be collected using the following procedure:

1. Soil core samples will be collected continuously using a 4- or 5-foot long sampler with a disposable high-density polyethylene (HDPE) liner. Sampling will start below the ground surface and continue until saturated soils are encountered. If the saturated soils display evidence of contamination (staining, sheens, odors), sampling will continue until no indications of contamination are noted on the sample.
2. The soil borings will be photographed and logged by a field technician in accordance with the Unified Soil Classification System (USCS [ASTM D-2488]) and standard

practices for the environmental industry. Soil boring logs will record the location, date, name of person logging, sample depth, and recovery. The presence of debris, photoionization detector (PID) readings, and other evidence of contamination (visual and/or odors) will also be noted. In soils near known hydraulic oil and gasoline contamination, the Geoprobe core will be split open and assessed for the presence of free product (i.e., non-aqueous phase liquid [NAPL]) using a variety of field tests (paper towel adsorption, shake test, sheen test, etc.). The intervals in the core displaying signs of light non-aqueous phase liquid will be measured to the nearest inch, photographed, and noted in the field logs for potential further petrophysical testing.

3. Soil samples will be screened for organic vapors using a PID. Selected intervals showing elevated PID response will be analyzed for volatile petroleum-hydrocarbon analysis. These soil intervals will be sampled directly from the open core using USEPA Method 5035A (for VOCs and gasoline-range organics/benzene, toluene, ethylbenzene, and xylenes only). This preservation method uses a Teflon corer to collect a sealed sample that minimizes loss of volatiles during sampling and transport.
4. Soil samples for other analyses will be collected from the desired depth interval of the core barrel using a decontaminated stainless steel spoon and homogenized in a stainless steel bowl until the soil is uniform in color and texture. Homogenized samples will be placed in laboratory-provided clean jars.
5. Soil samples collected for petrophysical tests (ultraviolet photography and pore fluid saturation) will be collected using Geoprobe core barrels filled with 6-inch brass or stainless steel liners. The liner containing the interval(s) of interest will be removed from the core barrel and immediately capped at each end (to prevent fluid loss) and frozen in dry ice for transport to a specialty petrophysical testing laboratory.
6. All labeled, filled sample jars will be placed in a field cooler packed with ice. Standard chain-of-custody procedures will be implemented for all sampling events.
7. If the required penetration depth or sufficient sample volume cannot be achieved at any of the selected sampling locations, the hole will be relocated within 10 feet of the target location. The new sampling location will be recorded in the field logbook. Field judgment will be used to determine if samples collected from the original boring location will be discarded and replaced with samples from the new location, or if samples collected from both locations will be submitted for laboratory analysis. This determination will be dependent on the soil conditions encountered and sample volume requirements.

7.3.2 Test Pit Sampling Procedure

Test pits will be excavated and sampled according to the following procedure:

1. An excavator will be used to remove soil at the direction of a field technician.
2. The test pit sidewall soils will be photographed and logged by a field technician according to USCS and standard practices for the environmental industry. Test pit logs will record the location, date, name of person logging, and sample depth. The presence of debris, PID readings, and other evidence of contamination (visual and/or

odors) will also be noted by a field technician according to USCS and consistent with the procedures outlined above.

3. Soil samples from the test pit sidewalls will be screened for organic vapors using a PID. Selected intervals showing elevated PID response will be analyzed. These soil intervals will be sampled directly from the sidewall using USEPA Method 5035A (for VOCs and gasoline-range organics/benzene, toluene, ethylbenzene, and xylenes only). This preservation method uses a Teflon corer to collect a sealed sample that minimizes loss of volatiles during sampling and transport.
4. Soil samples for other analyses will be collected from the test pit sidewall, or from the excavator bucket if the test pit is not accessible, using a decontaminated stainless steel scoop or trowel. Soil samples will be placed in a decontaminated stainless steel bowl and homogenized until the soil is uniform in color and texture. Homogenized samples will be placed in laboratory-provided clean jars.
5. All labeled, filled sample jars will be placed in a field cooler packed with ice. Standard chain-of-custody procedures will be implemented for all sampling events.
6. The test pit will be backfilled with the excavation spoils.

7.3.3 Surface Soil Sampling Protocol

1. The ground surface will first be cleared of visible debris or other cover materials such as gravel, asphalt, or duff in order to expose the underlying soil. Care will be taken to select minimally disturbed locations for sample collection, with the locations shown on Figure B.1 revised in the field as necessary in order to obtain a minimally disturbed surface soil sample.
2. The top 3 inches of soil will be removed using a decontaminated stainless steel scoop or trowel and placed into a decontaminated stainless steel bowl for classification generally according to USCS. This information will be recorded on a surface soil sample log along with the location, date, name of sampler, and sample depth. The presence of debris, PID readings, and other evidence of contamination (visual and/or odors) will also be noted by a field technician.
3. The soil sample will be homogenized until uniform in color and texture. Homogenized samples will be place in laboratory-provided clean jars.
4. All labeled and filled sample jars will be placed in a field cooler packed with ice. Standard chain-of-custody procedures will be implemented for all sampling events.

7.3.4 Soil Sample Nomenclature and Handling Procedures

The sample number format for soil samples will be “boring (or surface) location-top depth-bottom depth.”For example, a surface sample collected from K-10 from 0 to 0.5 feet would be labeled “K10-0-0.5”. A duplicate sample would be labeled “K10-0-0.5’-B”. Every soil sample will have a unique identifier, and the collection date will be known from the sample bottle and chain-of-custody form. Sample labels will include the time of collection and initials of sampler on the bottle label.

The samples will be shipped overnight or delivered to the laboratory on the day following collection or as soon as possible following collection to ensure that analytical holding times specified in Table B.2 are met.

7.35 Laboratory Analysis

The analyses to be performed on soil samples collected during the RI/FS are summarized in Table B.3.

7.4 EQUIPMENT DECONTAMINATION

Field sampling equipment, such as the Geoprobe rods, hand auger, water level indicator, and diver-assisted hand corer, will be cleaned between use at each sampling location. Equipment for reuse will be decontaminated according to the procedure below, before each sample interval.

1. Water will be sprayed over equipment to dislodge and remove any remaining sediments.
2. Surfaces of equipment contacting sample material will be scrubbed with brushes using an Alconox solution.
3. Scrubbed equipment will be rinsed and scrubbed with clean water.
4. Equipment will undergo a final spray rinse of deionized water.
5. A rinsate blank QC sample will be collected by pouring laboratory-provided deionized water over the sampling equipment and collecting the rinsate in laboratory-provided bottles. Rinsate blanks will be collected for each sampling method following the completion of sampling by that method.

7.5 SURVEYING

All wells, soil boring, and surface soil sampling locations will be professionally surveyed after sampling is complete. Physical site features such as topography and the presence of surface wastes such as resins or other inert material will also be noted. Site mapping will be conducted using the Washington State Plane North Coordinate System.

7.6 INVESTIGATION-DERIVED WASTE MANAGEMENT

Investigation-derived waste solids, including soil and sediments, if free of visual evidence of contamination, will be placed in their original location at the Site when possible. If a soil sample exhibits significant signs of contamination such as NAPL, heavy sheen, strong odor, or elevated VOC concentrations measured by PID, the sample will be transferred to Washington State Department of Transportation-approved drums. Profiling and disposal of contaminated waste will be coordinated by the Port.

Investigation-derived waste liquids, such as well development waters and decontamination fluids will be drummed on-site and appropriately labeled. Profiling and disposal of contaminated waste waters will be coordinated by the Port.

7.7 DATA REPORTING

The initial data summary report and subsequent RI/FS report will document activities associated with the collection, transportation, and laboratory analysis of groundwater, soil, and sediment samples. These reports will include the following:

- A description of the purpose and goals of the investigation.
- A summary of the field sampling and laboratory analytical procedures, referencing this SAP/QAPP and identifying any deviations resulting from field conditions.
- A general vicinity map showing the location of the Site and a sampling location map. Coordinates (i.e., latitude and longitude or state plan coordinates) will be reported in an accompanying table for the sampling locations.
- Data tables for all media summarizing the chemical and conventional analytical results, as well as pertinent QA/QC data. The data tables will include sample location numbers, sample IDs, dates of sample collection, depth of sample collection, and whether the sample was a duplicate.
- Interpretation of the results of this investigation, incorporating the results of previous investigations relative to the nature and extent of contamination on the Site as well as potential contamination sources. All analytical results will be compared to the Model Toxics Control Act and Sediment Management Standards criteria as appropriate.
- QA reports and laboratory data reports as appendices or attachments.
- Copies of field logs and chain-of-custody forms as appendices or attachments.

Following validation, data will be submitted to the Ecology EIM database.

8.0 References

Exponent, Anchor QEA, Integral Consulting Inc., and Floyd|Snider. 2013. *Western Port Angeles Harbor Remedial Investigation/Feasibility Study Work Plan.* Final. 14 March.

Floyd|Snider. 2013. *Memorandum Re: K Ply Utility Survey*. Prepared for Washington State Department of Ecology. 3 July.

———.2012. *K Ply Mill Site Exhibit B, Interim Action Work Plan.* Prepared for Port of Port Angeles, Port Angeles, Washington. October.U.S. Environmental Protection Agency (USEPA). 1999. *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*. EPA 540/R-99/1008. October.

———. 2004. *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. EPA 540-R-01-008. October.

K Ply Site

Remedial Investigation/ Feasibility Study Work Plan

Appendix B
Sampling and Analysis Plan/ Quality Assurance and Project Plan

Tables

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Table B.1
Data Quality Assurance Criteria

Parameter	Reference	Precision (Relative Percent Difference)	Accuracy (Percent Difference from Standard)	Completeness (Percentage of Data Validated)
Soil				
SVOCs (including cPAHs and Pentachlorophenol)	USEPA Method 8270	± 20%	± 60%[1]	95%
Polychlorinated Biphenyls	USEPA Method 8082	± 20%	± 60%	95%
DRO	NWTPH-Dx	± 20%	± 50%	95%
GRO	NWTPH-Gx	± 20%	± 50%	95%
BTEX Compounds Benzene Toluene Ethylbenzene Xylenes	USEPA Method 8021 or 8260	± 20%	± 50%	95%
VOCs Methyl tert-Butyl Ether Ethylene Dichloride Naphthalenes n-Hexane Ethylene Dibromide	USEPA Method 8260	± 20%	± 50%	95%
RCRA Metals Arsenic Barium Cadmium Chromium Lead Silver Selenium	USEPA Method 6020	± 20%	± 50%	95%
Mercury	USEPA Method 1631			
Dioxins/Furans	USEPA Method 1613	± 30%	± 30%	95%
Water				
SVOCs (including cPAHs and Pentachlorophenol)	USEPA Method 8270	± 20%	± 60%	95%
Polychlorinated Biphenyls	USEPA Method 8082	± 20%	± 60%	95%
Formaldehyde	USEPA Method 8315	± 20%	± 60%	95%
DRO	NWTPH-Dx	± 20%	± 60%	95%
GRO	NWTPH-Gx	± 20%	± 60%	95%
BTEX Compounds Benzene Toluene Ethylbenzene Xylenes	USEPA Method 8021 or 8260	± 20%	± 50%	95%
VOCs Methyl tert-Butyl Ether Ethylene Dichloride Naphthalenes n-Hexane	USEPA Method 8260	± 20%	± 50%	95%
Ethylene Dibromide	USEPA Method 8011			
Metals (dissolved) Arsenic Lead Cadmium Chromium	USEPA Method 200.8	± 20%	± 50%	95%
Mercury	USEPA Method 1631			

Abbreviations:
- BTEX Benzene, toluene, ethylbenzene, xylenes
- cPAH Carcinogenic polycyclic aromatic hydrocarbon
- DRO Diesel-range organics
- GRO Gasoline-range organics
- RCRA Resource Conservation and Recovery Act
- SVOC Semivolatile organic compound
- USEPA U.S. Environmental Protection Agency
- VOC Volatile organic compound

Notes:
1 Accuracy of +/- 60% is generally not attainable for a limited number of SVOCs; in these instances, laboratory control charting practices will be used

Table B.2
Analytical Requirements, Methods, Preservation, Bottle Type, and Holding Times

<table>
<tr><th>Parameter</th><th>Reference</th><th>Bottle Type</th><th>Preservative</th><th>Holding Time</th></tr>
<tr><td colspan="5">Soil</td></tr>
<tr><td>SVOCs (including cPAHs, Pentachlorophenol)</td><td>USEPA Method 8270</td><td>(1) 4-oz WMG</td><td>None, cool to ≤6˚C</td><td>14 days to extract, then 40 days to analyze</td></tr>
<tr><td>Polychlorinated Biphenyls</td><td>USEPA Method 8082</td><td>(1) 4-oz WMG</td><td>None, cool to ≤6˚C</td><td>None</td></tr>
<tr><td>DRO</td><td>NWTPH-Dx</td><td>(1) 4-oz WMG</td><td>None, cool to ≤6˚C</td><td>14 days to extract, then 40 to analyze</td></tr>
<tr><td>GRO</td><td>NWTPH-Gx</td><td rowspan="3">(3) Tared Glass VOA vials with PTFE Septum</td><td rowspan="3">Methanol and cool to ≤6˚C or none and cool to ≤6˚C</td><td rowspan="3">14 days to analyze with MeOH preservation
or
if none, 2 days at ≤6˚C, 14 days at ≤-7˚C</td></tr>
<tr><td>BTEX Compounds
Benzene
Toluene
Ethylbenzene
Xylenes</td><td>USEPA Method 8021 or 8260</td></tr>
<tr><td>VOCs
Methyl tert-Butyl Ether
Ethylene Dichloride
Naphthalenes
n-Hexane
Ethlyene Dibromide</td><td>USEPA Method 8260</td></tr>
<tr><td>RCRA Metals
Arsenic
Barium
Cadmium
Chromium
Lead
Silver
Selenium</td><td>USEPA Method 6020 or 200.8</td><td rowspan="2">(1) 4-oz WMG</td><td rowspan="2">None, cool to ≤6˚C</td><td rowspan="2">6 months (or freeze for 1 year)
28 days for Mercury</td></tr>
<tr><td>Mercury</td><td>USEPA Method 1631E</td></tr>
<tr><td>Dioxins/Furans</td><td>USEPA Method 1613</td><td>(1) 4-oz WMG</td><td>None, cool to ≤6˚C</td><td>1 year</td></tr>
<tr><td colspan="5">Water</td></tr>
<tr><td>SVOCs (including cPAHs and Pentachlorophenol)</td><td>USEPA Method 8270</td><td rowspan="4">(2) 500-mL amber glass
(2) 1-L amber glass</td><td rowspan="4">None, cool to ≤6˚C</td><td rowspan="4">7 days to extract, then 40 days to analyze
None for PCBs
3 days for Formaldehyde</td></tr>
<tr><td>Polychlorinated Biphenyls</td><td>USEPA Method 8082</td></tr>
<tr><td>Formaldehyde</td><td>USEPA Method 8315</td></tr>
<tr><td>DRO</td><td>NWTPH-Dx</td></tr>
<tr><td>GRO</td><td>NWTPH-Gx</td><td rowspan="4">(4) 40-mL VOA vials with PTFE Septum</td><td rowspan="4">Hydrochloric acid to pH ≤2.0, cool to ≤6˚C</td><td rowspan="4">14 days to analyze</td></tr>
<tr><td>BTEX Compounds
Benzene
Toluene
Ethylbenzene
Xylenes</td><td>USEPA Method 8021 or 8260</td></tr>
<tr><td>VOCs
Methyl tert-Butyl Ether
Ethylene Dichloride
Naphthalenes
n-Hexane</td><td>USEPA Method 8260</td></tr>
<tr><td>Ethlyene Dibromide</td><td>USEPA Method 8011</td></tr>
</table>

Table B.2
Analytical Requirements, Methods, Preservation, Bottle Type, and Holding Times

Parameter	Reference	Bottle Type	Preservative	Holding Time
Water (continued)				
Metals (dissolved) Arsenic Lead Cadmium Chromium	USEPA Method 200.8	(1) 500-mL HDPE	Field filtered and nitric acid, cool to ≤6°C	6 months 28 days for Mercury
Mercury	USEPA Method 1631E			

Abbreviations:
BTEX Benzene, toluene, ethylbenzene, xylenes
°C Degrees Celsius
cPAH Carcinogenic polycyclic aromatic hydrocarbon
DRO Diesel-range organics
GRO Gasoline-range organics
HDPE High-density polyethylene
mL Milliliter
Oz Ounce
PTFE Polytetrafluoroethylene (Teflon)
RCRA Resource Conservation and Recovery Act
SVOC Semivolatile organic compound
USEPA U.S. Environmental Protection Agency
VOA Volatile organic analysis
VOC Volatile organic compound
WMG Wide-mouth glass jar

Table B.3
Analytical Methods, Detection Limits, and Reporting Limits

Parameter	Reference	Units	Detection Limit	Reporting Limit/PQL
Soil				
SVOCs (including cPAHs, Pentachlorophenol)	USEPA Method 8270D	µg/kg	0.5-28	10–250
Polychlorinated Biphenyls	USEPA Method 8082A	µg/kg	1.5	100
DRO	NWTPH-Dx	mg/kg	5.8	25–50
GRO	NWTPH-Gx	mg/kg	0.3	2
BTEX Compounds	USEPA Method 8021B	µg/kg		
Benzene			6	20
Toluene			2	20
Ethylbenzene			2	20
Xylenes			6	60
VOCs	USEPA Method 8260C	µg/kg	0.4–0.7	5
Methyl tert-Butyl Ether				
Ethylene Dibromide				
Ethylene Dichloride				
Naphthalene				
n-Hexane				
RCRA Metals	USEPA Method 6020 or 200.8	mg/kg		
Arsenic			0.05	1
Barium			0.009	1
Cadmium			0.02	1
Chromium			0.03	1
Lead			0.02	1
Silver			0.02	1
Selenium			0.2	1
Mercury	USEPA Method 1631E		0.001	0.2
Dioxins/Furans	USEPA Method 1613	pg/g	0.04–0.09	1–10
Water				
SVOCs (including cPAHs and Pentachlorophenol)	USEPA Method 8270D	µg/L	0.004–0.05	0.1–0.6
Polychlorinated Biphenyls	USEPA Method 8082A	µg/L	0.04	0.1
Formaldehyde	USEPA Method 8315A	µg/L	25	100
DRO	NWTPH-Dx	mg/L	0.009	0.05
GRO	NWTPH-Gx	mg/L	0.006	0.1
BTEX Compounds	USEPA Method 8021B	µg/L		
Benzene			0.02	1
Toluene			0.03	1
Ethylbenzene			0.03	1
Xylenes			0.09	3
VOCs	USEPA Method 8260C	µg/L		
Methyl tert-Butyl Ether			0.07	2
Ethylene Dibromide			0.12	2
Ethylene Dichloride			0.05	2
Naphthalene			0.14	2
n-Hexane			0.17	5
Ethylene Dibromide	USEPA Method 8011B	µg/L	0.002	0.01

Table B.3
Analytical Methods, Detection Limits, and Reporting Limits

Parameter	Reference	Units	Detection Limit	Reporting Limit/PQL
Water (continued)				
Metals (dissolved)				
Arsenic	USEPA Method 200.8	µg/L	0.08	1
Lead			0.07	1
Cadmium			0.05	1
Chromium			0.07	1
Mercury	USEPA Method 1631E		0.001	0.2

Abbreviations:
BTEX Benzene, toluene, ethylbenzene, xylenes
cPAH Carcinogenic polycyclic aromatic hydrocarbon
DRO Diesel-range organics
GRO Gasoline-range organics
µg/L Micrograms per liter
µg/kg Micrograms per kilogram
mg/L Milligrams per liter
mg/kg Milligrams per kilogram
pg/g Picograms per gram
PQL Practical quantitation limit
RCRA Resource Conservation and Recovery Act
SVOC Semivolatile organic compound
USEPA U.S. Environmental Protection Agency
VOC Volatile organic compound

K Ply Site

Remedial Investigation/ Feasibility Study Work Plan

Appendix B
Sampling and Analysis Plan/ Quality Assurance and Project Plan

Figure

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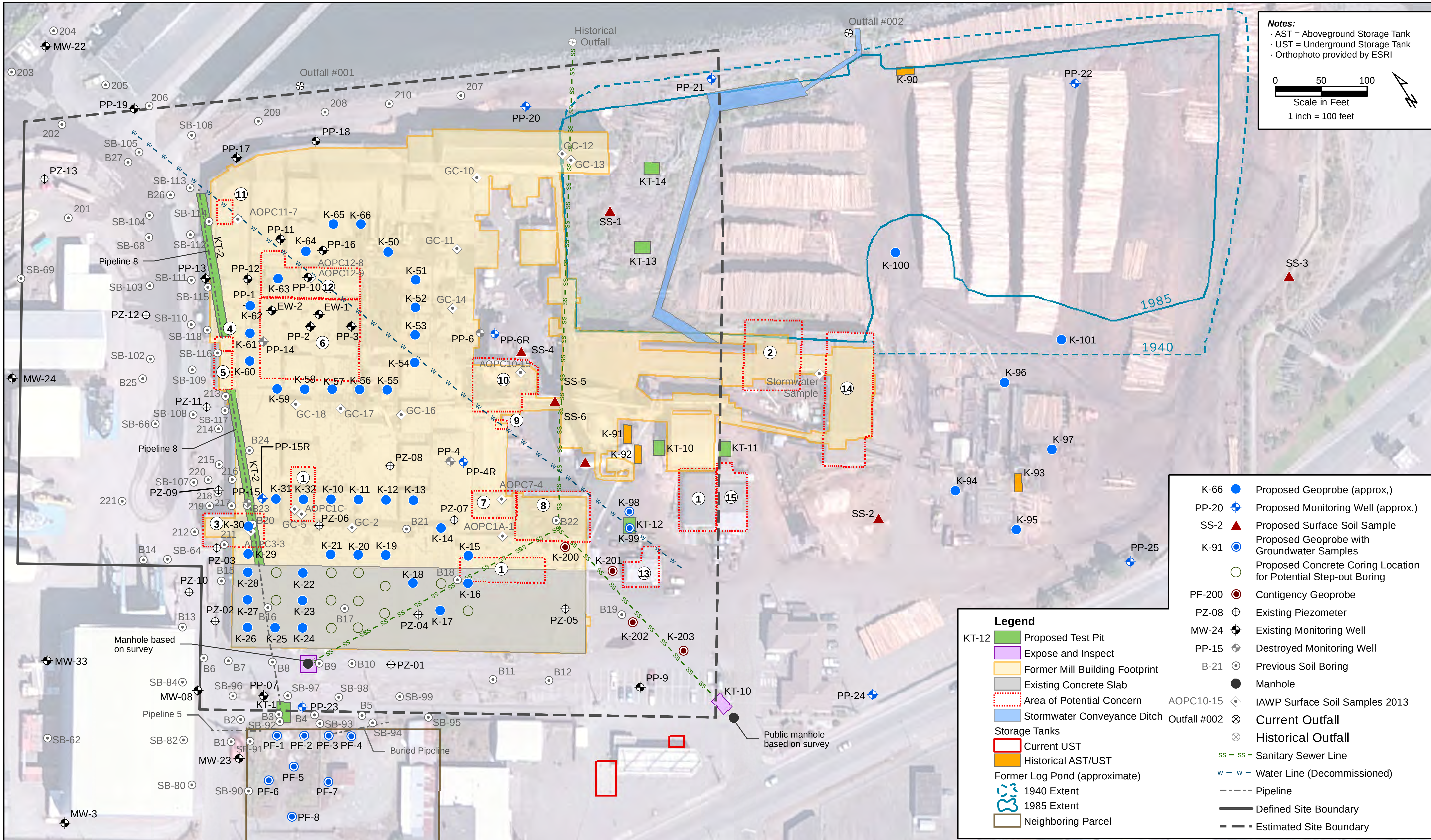

FLOYD | SNIDER
strategy ▪ science ▪ engineering

Remedial Investigation/Feasibility Study Work Plan
K Ply Site
Port Angeles, Washington

Figure B.1
Proposed Soil and Groundwater Investigation Locations

I:\GIS\Projects\PPA_KPLY\MXD\Figure 7.1 (Proposed Soil and Groundwater Investigation Locations).mxd
7/18/2013

K Ply Site

Remedial Investigation/ Feasibility Study Work Plan

Appendix C
Health and Safety Plan

FINAL

Table of Contents

List of Tables

List of Attachments

1.0 Site Description

Site Name:	K Ply Site
Specific Location:	439 Marine Drive, Port Angeles, Washington
Site Description:	Flat lying, industrial plywood mill site, with operations including wood chipping/lathing, hydraulic pressing, resin impregnation, fuel storage, and solvent use
Project Manager:	Thomas H. Colligan, Floyd|Snider
Site Safety Officer:	Kristin Andersen, Floyd|Snider
Surrounding Population:	Mostly workers in immediate vicinity, residential on bluff to south
Site Security:	Fenced site
Other Measures to Protect Health and Safety of General Public:	Delineate work area using traffic cones, caution tape, and/or construction fencing as needed to prevent unauthorized entry into work/exclusion zone; erect two signs at site perimeter providing warning and explanation of cleanup in progress
Provisions for Anticipated Weather Conditions:	Wet to dry spring and early summer weather
Unusual Physical Safety Issues:	None
Brief Site History:	Used in past for production of plywood
Purpose of Field Activities:	Collect groundwater, soil and sediment samples and determine location of underground gasoline pipeline
Anticipated Activities:	Soil boring, logging and sampling, shallow soil sample collection, sediment grab sample collection, geophysical survey

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2.0 Hazard Description

Field Activity Hazard Level: ☐ B ☐ C ☒ D ☐ Unknown

Potential Chemical Exposure? ☒ Yes ☐ No

If yes, list chemicals and attach specific hazard information for each chemical. Also include maximum allowable exposure levels.

List of Chemicals (describe potential routes of exposure for each:

Benzene, toulene, ethylbenzene, and xylenes; gasoline, diesel and heavy oil-range organics; formaldehyde; methylene chloride; 1,1,1-trichloroethene; polychlorinated biphenyls; dioxins/furans; pentachlorophenol; lead

Routes of exposure for above chemicals are: direct dermal contact and ingestion of soil cuttings and environmental samples and breathing vapors emanating from samples and/or boreholes. Specific hazard information for each chemical is included on Table C.1.

Indicate the appropriate potential exposure routes on the list below:

- ☒ Inhalation
- ☒ Ingestion
- ☒ Dermal
- ☐ Explosive
- ☐ Oxygen Deficiency

Potential Physical Hazards? ☒ Yes ☐ No

If yes, indicate each type of potential exposure, and attach a description of the methods used to avoid each type of physical safety hazard:

- ☒ Cold Stress
- ☐ Heat Stress
- ☒ Noise – during drilling
- ☒ Machinery Hazards (Table C.2)
- ☐ Confined Spaces
- ☒ Terrain/Obstacles – may be present: need to evaluate at each location prior to drilling or sampling and take necessary precautions.
- ☒ Other: vehicular traffic, open water

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3.0 Emergency Response

Location of HASP Field Copy: Field vehicle

Location of First Aid Kit: Field vehicle

Additional Emergency Equipment and On-site Location:

Fire Extinguisher	Field vehicle
Eye Wash	Field Vehicle
Other (specify)	n/a

Nearest Hospital: Olympic Medical Center, (360) 417-7000

Directions to Hospital:

1. Start at **439 MARINE DR, PORT ANGELES** on **MARINE DR/W MARINE DR** going towards **W 2ND ST** - go **0.2** mi
2. Bear Right on **W 1ST ST** - go **0.3** mi
3. Continue on **E 1ST ST** - go **0.8** mi
4. Turn Left on **N RACE ST** - go **0.2** mi
5. Turn Right on **CAROLINE ST/E CAROLINE ST** - go **< 0.1** mi
6. Arrive at **939 CAROLINE ST, PORT ANGELES**

Emergency Transportation/Assistance: Dial 911

Poison Control: (206) 526-2121

USEPA Region 10: (206) 553-1200

Emergency Procedures:

- Prevent further injury, perform appropriate decontamination, and notify the Project Manager at the Site or the Site Safety Officer.
- Depending upon the type and severity of the injury, call 911.
- Notify the Floyd|Snider office (refer to contact information below). Also, if injured person(s) are subcontractors, notify their offices.
- The injured party and Project Manager shall prepare accident reports and keep them on file.

Emergency Contact: Tom Colligan, Floyd|Snider

Work: (206) 292-2078 ext. 2166
Cell: (206) 276-8527
Home: (206) 328-6478

4.0 Work Practices and Provisions

Only approved Floyd|Snider personnel and subcontractors who have read and signed this safety plan will be allowed in the work zone on the Site.

Floyd|Snider personnel and their subcontractors shall abide by all environmental regulations and site-specific permit conditions while working at the Site.

A safety meeting shall be held at the start of fieldwork, and at least weekly thereafter to assess changing conditions.

All site work will be performed during daylight hours, unless proper lighting is provided.

An adequate supply of potable water shall be provided at the work site.

No eating, drinking, smoking, gum chewing, or tobacco chewing on-site, except in designated areas.

Toilet and washing facilities shall be provided if not already available.

Wear all the personal protective equipment specified in this plan (Table C.3).

Stay in visual contact with all equipment operators.

Report to the Site Safety Officer any symptoms of exposure, as well as all accidents/incidents.

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5.0 Acknowledgement Form

I have read and understand the information contained in this Health and Safety Plan and its attachments, and agree to abide by its provisions.

Name (print)	Signature	Date

K Ply Site

Remedial Investigation/ Feasibility Study Work Plan

Appendix C Health and Safety Plan

Tables

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Table C.1
Chemical Contaminants of Concern

Contaminant	PEL (ppm)	IDLH (ppm)	LEL (%)	Source/Quantity Characteristics	Route of Exposure	Symptoms of Acute Exposure	Instruments/ Frequency of Monitoring Contaminant[1]
Benzene	10	N/A	1.2	Historic gasoline releases	Inhalation	Dizziness	PID on each soil sample
Toluene	200	500	1.1	Historic gasoline releases	Inhalation	Dizziness	PID on each soil sample
Ethylbenzene	100	800	0.8	Historic gasoline releases	Inhalation	Dizziness	PID on each soil sample
Xylenes	100	N/A	N/A	Historic gasoline releases	Inhalation	Dizziness	PID on each soil sample
Gasoline-range Organics	N/A	N/A	1.4	Historic gasoline pipeline releases	Inhalation	N/A	PID on each soil sample
Diesel-range Organics	N/A	N/A	N/A	Historic fuel releases	N/A	N/A	N/A; PPE is protective
Heavy Oil-range Organics	N/A	N/A	N/A	Historic hydraulic oil releases	N/A	N/A	
Formaldehyde	0.75	20	7.0	Historic resin glue mixing	Inhalation	Coughing, Wheezing	PID on each sample
Methylene Chloride	25	2,300	13	Historic solvent usage	Inhalation	Drowsiness, Dizziness	PID on each sample
1,1,1-Trichloroethene	100	1,000	8.0	Historic solvent usage	Inhalation	Dizziness, Drowsiness, Tremors, Nausea	PID on each sample
Polychlorinated Biphenyls	0.50–1.0 mg/m^3 (skin)	5.0	N/A	Historic releases from transformers	Absorption	Eye Irritation, Chloracne	N/A; PPE is protective
Dioxins/Furans	N/A	N/A	N/A	Historic hog fuel burning of salt water rafted wood	Absorption	Dermatitis, Chloracne	N/A; PPE is protective

Table C.1
Chemical Contaminants of Concern

Contaminant	PEL (ppm)	IDLH (ppm)	LEL (%)	Source/Quantity Characteristics	Route of Exposure	Symptoms of Acute Exposure	Instruments/ Frequency of Monitoring Contaminant[1]
Pentachloro-phenol	0.50 mg/m^3 (skin)	2.5 mg/m^3	N/A	Historic wood preservative usage	Absorption	Dizziness, Nausea, Chest Pain	N/A; PPE is protective
Lead	0.050	100	N/A	Historic usage as polyurethane catalyst and gasoline additive	Ingestion	Gastrointestinal Distress, Insomnia, Anemia	N/A; PPE is protective

Note:

1 Measurements will be collected in worker's breathing zone.

Abbreviations:

IDLH Immediately dangerous to life and health (National Institute for Occupational Safety and Health)
LEL Lower explosive limit
mg/m^3 Milligrams per cubic meter
N/A Not applicable or not available
PEL Permissible exposure limit, as defined by OSHA
PID Photoionization detector
PPE Personal Protective Equipment
ppm Parts per million

Table C.2
Physical Hazards of Concern

Hazard	Description	Location	Procedures to Prevent Hazard
Construction Equipment	Objects could fall from the drill rig or probe tower	Within 10 feet of drill rig	Inspect cables daily. Use safety clips on hooks. Wear hardhat and steel toed boots.
Construction Equipment	Personnel could be caught in the twisting augers of the drill rig or the direct push probe	Within 3 feet of augers or direct push probe	Ensure that no personnel wear loose clothing and that long hair is bound.
Vehicle Traffic	Personnel could be injured by passing vehicles	Entire work area	Use cones to divert traffic, flagging to demarcate work area.
Open Water	Personnel could be injured, drown or contract hypothermia from falling into open water	In-water sediment sampling locations	Use personal flotation device and waders if entering water on foot, stay in designated areas if collecting samples from boat.
Weather	Personnel could become overheated in hot weather or hypothermic in cold weather	Entire site	Wear proper attire. Take sheltered breaks in climate controlled location such as field vehicle.

Table C.3
Personal Protective Equipment

Level of Personal Protection:	☐ A	☐ B	☐ C	☒ D
Location:	K Ply Site			
Activity:	Collection of subsurface soil and groundwater samples			

Protective Equipment

Clothing

- ☐ Fully encapsulating suit
- ☐ Chemically-resistant splash suit
- ☐ Apron, specify:
- ☐ Tyvek coverall
- ☐ Saranex coverall
- ☐ Coverall, specify:
- ☒ Other, specify: Level "D" clothing and traffic safety vest.
- ☒ Other, specify: Personal flotation device for in-water work

Head, Ear, and Eye

- ☒ Hard hat
- ☐ Goggles
- ☐ Face shield
- ☒ Safety eyeglasses
- ☒ Ear protection (during drilling)
- ☐ Muffs or plugs
- ☐ Other

Respiratory

- ☐ None
- ☐ SCBA, Airline
- ☐ Full-face respirator
- ☒ Half-face respirator (if required based on air monitoring)
- ☐ Escape mask
- ☐ Other, specify:

Hand Protection

- ☐ Not applicable
- ☐ None
- ☐ Undergloves, type:
- ☒ Gloves, type: Nitrile
- ☐ Overgloves, type:
- ☒ Other, specify: glove material will match the task being performed.

Foot Protection

- ☐ Not applicable
- ☐ Neoprene safety boots with steel toe/shank
- ☐ Disposable overboots
- ☒ Other, specify: steel-toed shoes/boots

Monitoring Equipment

- ☐ CGI
- ☐ Oxygen meter
- ☐ Rad survey
- ☐ Detector tubes, type:
- ☒ PID
- ☐ FID
- ☐ Noise meter
- ☐ Other, specify:

Personal Decontamination:	☐ Not required	☒ Required
Equipment Decontamination	☐ Not required	☒ Required

If required, describe requirements:

Wear gloves to collect samples, change between locations. Dispose of gloves, wash hands and face prior to eating or drinking. Decontaminate sampling equipment with Alconox scrub and two clean water rinses.

K Ply Site

Remedial Investigation/ Feasibility Study Work Plan

Appendix C
Health and Safety Plan

Attachment C.1
Action Levels for Respiratory Protection

FINAL

Attachment C.1
Action Levels for Respiratory Protection

Monitoring Parameters	Reading	Action Level
Organic vapors[1,2]	0–5 ppm over background	Level D modified
	Greater than 5 ppm over a 1-minute duration	Leave work area
Combustible gas[1,2]	5%	Stop work, investigate source, develop action plan to resume work in the 5% to 25% range
	25% of the lower explosive limit	Leave work area

Notes:

1 Reading collected in worker breathing zone for organic vapors and at the ground surface or borehole for combustible gas.

2 Personnel required to use respirator must be able to demonstrate that respirator fit testing and training requirements are current.

Abbreviation:

ppm Parts per million

K Ply Site

Remedial Investigation/ Feasibility Study Work Plan

Appendix C
Health and Safety Plan

Attachment C.2
Forms to be Completed for an Occupational Injury or Illness

FINAL

Attachment C.2
Forms to be Completed for an Occupational Injury or Illness

This attachment contains the forms that should be completed by the employee and supervisor in the event of an occupational injury or illness.

Employee's Report of an Occupational Injury or Illness

Employee Name:	
Employee Job Title:	
Exact date and time of incident:	
Location of incident:	
Person to whom incident was reported:	
Witnesses:	
Summarize what you think occurred:	
What could have been done to avoid this accident:	
Explain in detail: what part(s) of your body was injured or affected:	
Is this an original injury or a re-injury?	
If a re-injury, when and where was previous injury?	
Who was the employer?	
Claim number:	
Would you be willing to perform light-duty work during your recovery?	☐ Yes ☐ No
Date and time you sought medical attention:	
Whom did you see for medical attention?	
Office/Hospital:	

Employee Signature: ______________________ Date: ____________

Return this form to Floyd|Snider as soon as possible.

NOTE: Washington Administrative Code # 296-24-025(6) states: *Employee's responsibility: "Employees shall make a prompt report to their immediate supervisor of each industrial injury."*

Project Manager's Report of an Occupational Injury or Illness

Project Manager			
Date:		**Exact time incident reported to you:**	
Employee's Name:			
Who reported the incident?			
Witnesses:			
Describe the incident:			
Was first aid required?	☐ Yes ☐ No		
Did the accident require a doctor's treatment?	☐ Yes ☐ No		
Date and time of next doctor appointment:			
Was the employee competent and skillful in his/her job?	☐ Yes ☐ No		
What were the causes?			
Will this be a time-loss case?	☐ Yes ☐ No		
If so, was the employee instructed to keep the company informed of his/her progress?	☐ Yes ☐ No		
If not, why not?			
Has this employee had other occupational injuries?	☐ Yes ☐ No		
Explain in detail: what part(s) of the body was injured or affected:			
Other details of the incident:			

Project Manager Signature: ______________________ Date: ______________

K Ply Site

Remedial Investigation/ Feasibility Study Work Plan

Appendix D
Cultural Resources Protocol

FINAL

MONITORING AND DISCOVERY PLAN

This monitoring plan establishes policies, describes the pre-project briefing, states responsibilities and chain of command, and provides procedures to ensure that any cultural resources or human remains encountered during construction are properly identified and appropriately treated. The Appendix (A) to this plan provides contact information for the personnel referenced in the following sections.

Policies

As a general policy, and as far as practically feasible, all cultural resources, prehistoric and historic, and buried human remains, will be avoided and actively protected in place. Collection of artifacts by employees, construction personnel, or others with access to the construction zone is prohibited. Typical markers of prehistoric activity include discarded shell, fire-modified rock, animal bone, lithic debitage, flaked or ground stone and bone tools, cordage, fibers, burned earth, charcoal, ash, and exotic rocks and minerals. Historic artifacts prior to the 1950s may include milled lumber, masonry features, concrete, glass, ceramic, brick, metal fragments or other evidence of early historic occupation and industry. In those instances where modification of the project to accommodate avoidance of an archaeological resource is not possible, the resource in question will be treated in the manner described below.

Briefing

Prior to construction, the Monitoring Coordinator will brief the Construction Supervisor and construction crew members on cultural resource issues. The briefing will include information on the legal context of cultural resources protection and on the prehistoric, ethnographic and historic cultural resources likely to be present in the construction area. The primary goals of this briefing are to familiarize construction personnel with the procedures to be followed in the event there is discovery of cultural material (see below), and to provide contact protocols and information to construction supervisors.

Chain of Communication

The project supervisor will insure that the provisions of this document are carried out, and the Supervising Professional Archaeologist will report to the project supervisor. The Supervising Professional Archaeologist's designated Monitoring Coordinator will schedule the monitoring activities. (A minimum of 48 hours notification of the need for a monitor is required if monitoring becomes intermittent as construction progresses.) The archaeological monitor will be present whenever ground-disturbing construction activities occur within the areas determined to be archaeologically sensitive as identified The Monitor will have the authority to temporarily halt construction while examining possible discoveries, and will also be responsible for notifying the project supervisor and Construction Superintendent immediately of any discoveries. The project supervisor is then responsible for notifying the appropriate officials including the Department of Archaeology and Historic Preservation (DAHP), the Lower Elwha Klallam Tribe (LEKT), the Clallam County Coroner, and the Port Angeles Police (see Appendix A). The Monitor will be responsible for maintaining daily work records and documentation of any discoveries.

MONITORING PROCEDURES

The Monitor will examine cleared and graded surfaces exposed by grading and trenching to identify any previously undocumented prehistoric or historic archaeological materials. The Monitor will be observing construction equipment work and sediment removal from multiple perspectives around and in front of working equipment, requiring close communications with construction supervisors and equipment operators; be safely stationed on the edge of a trench, or near a track hoe bucket, to observe trench sidewalls as they are excavated; will coordinate with construction personnel to enter an excavation trench or similar type of shored, enclosed space; may examine excavation spoils, if the material is placed on the ground prior to removal.

1) The LEKT Cultural Resources Program (CRP) Monitor will examine cleared and graded surfaces exposed by excavation and the excavation spoils to identify any previously undocumented cultural remains within the project area. These may include the remains of both prehistoric and historic activities and occupations. Typical markers of prehistoric activity include such things as: discarded shell, fire-modified rock, animal bone, lithic debitage, flaked or ground stone tools, burned earth, cordage or fiber, charcoal, ash, and exotic rocks and minerals. Typical markers of historic activity include such things as: old bottles, ceramic shards, nails, wire, and wood.

2) The contractor's construction supervisors will report any cultural, historic or archeological resources, including isolated artifacts, encountered by construction personnel to the CRP Monitor, who will communicate the nature of the find to the CRP Monitoring Supervisor. The CRP Monitors will ensure proper documentation and assessment of the finds.

3) The CRP Monitor will record all prehistoric and historic cultural material discovered by the Monitors or construction personnel on CRP standard forms. Initial effort will focus on establishing the nature, provenience and integrity of any discovery. Documentation methods include photographs, sketches, scaled drawings, and written descriptions. The CRP Monitor may take samples and artifacts for identification or analysis.

4) The primary goal of archaeological monitoring will be discovery and documentation of previously unknown cultural material in the project. Where complex or extensive cultural remains are encountered, the CRP Monitoring Supervisor may assign a team of archaeologists and CRP cultural resources technicians (CRTs) to provide timely documentation and assessment of the resource.

5) Newly discovered sites or components that appear to be significant will include resources with intact, stratified deposits or diagnostic artifacts or features that could provide chronological data as well as information about prehistoric or historic activities. If in the opinion of the CRP Monitor, significant cultural material has been encountered, the CRP Monitor will immediately contact the equipment operator, the CRP Monitoring Supervisor, and the Construction Superintendent and arrange for the re-direction or the halting of construction as needed until preliminary investigation and documentation can be completed. Where such sites or components are encountered during construction, but in the opinion of the CRP Monitor additional project effects to the resource are not anticipated, project construction may continue while cultural resource documentation and assessment proceed. If, in the opinion of the CRP Monitor, continued construction could cause additional impacts to such resources, project activities may be stopped in the vicinity of the discovery until the find has been documented, evaluated for significance, and potential project effects assessed.

6) Newly discovered cultural material will be reported by the CRP Monitor to the Construction Supervisor and CRP Monitoring Supervisor upon discovery. The CRP Monitoring Supervisor will ensure that the Tribal Archaeologist is fully briefed on the discovery. The CRP Monitoring Supervisor will assemble the documentation produced by the CRP Monitors and the preliminary assessment of significance that will accompany

draft site records. If warranted, site registration forms will be filed with the Washington State Department of Archaeology and Historic Preservation (DAHP). Criteria and integrity requirements for listing on the National Register (36 CFR 60.4) will provide the standards for identification and evaluation of significance for cultural material. If a discovery is made during construction, the agency official, in consultation with the SHPO, may assume eligibility for purposes of Section 106 and resolution of adverse effects [36 CFR 800.13 (c)].

7) Should the project require excavation or removal of archaeological or historic archaeological resources or sites, or Indian cairn or grave, or glyphic or painted record, an Archaeological Excavation and Removal permit will be obtained from the DAHP prior to excavation (WAC 25-48).

8) If project effects to an historic property cannot be avoided, a treatment plan will be developed and implemented by the agency and the CRP, in consultation with the DAHP. The Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation will apply including provisions for a Research Design, Documentation, Reporting, and Curation.

9) The particular data recovery measures applied to any given property will depend on development of research questions and design of excavation strategies to acquire the data needed to answer those questions. Field notes, maps, plans, profiles, and photographs should document the process. The final report should follow style guidelines of the professional archaeological journal, American Antiquity, synthesize the data collected, and address the research questions posed.

10) The CRP Monitoring Supervisor will co-ordinate the dissemination of any information beyond required reports that is deemed appropriate by the CRP, concerning cultural resources and this project.

11) Any samples or artifacts collected during monitoring will be held in secure storage by the CRP until such a time as they can be analyzed, conveyed to a repository that meets federal standards (36 CFR part 79), or returned to their original location. The CRP may provide this service.

12) The agency or private party agrees to donate to the Lower Elwha Klallam Tribe any artifact discovered that the CRP determines is of significance to the Tribe. If the artifact is exhibited in the Lower Elwha Klallam Tribe's Museum, Library and Research Center (MLRC), the display information will state that the agency or private party donated the artifact.

13) If items of cultural patrimony are identified on federal property, the agency will comply with the Native American Graves Protection and Repatriation Act (NAGPRA).

Communication

The Monitor will communicate with the onsite Construction Supervisor to make general requests about equipment movement, placement of spoils for examination, or to access trench excavations. The Monitor may also need to communicate with excavation equipment operators to determine appropriate timing and procedures to access construction excavation areas such as trenches or open excavations. The Monitor may direct the equipment operator to stop excavation or modify excavation, but will notify the Construction Supervisor prior to communicating excavation procedures directly to the equipment operator.

Work Stoppage

If the Monitor determines that archaeological resources considered significant may be exposed by construction excavation in a particular area, the Monitor may ask the Construction Supervisor to request equipment operators to modify construction excavation procedures to provide exposures of subsurface stratigraphy in order to confirm the presence of any such resources in that area. 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.

1) If significant, or potentially significant, archaeological resources are identified during construction; the Monitor will inform the Construction Supervisor. The Construction Supervisor will halt activity in the area of discovery large enough to ensure the integrity of the find is not compromised (though construction activities may continue elsewhere in the project area). The Construction Supervisor will contact the Project Engineer.

2) The project supervisor will contact the DAHP and the affected tribes within one working day.

3) The project supervisor shall arrange for the parties, including the Supervising Professional Archaeologist, to conduct a joint viewing of the discovery within forty-eight (48) hours of the notification, or, if that is not feasible, at the earliest time thereafter.

4) The project supervisor shall consult with the DAHP and affected tribes, if remains are Native American, on a data recovery plan. Resumption of work in the area of the discovery will be consistent with the results of the consultation.

DISCOVERY OF HUMAN REMAINS

If any construction activity exposes anything that appears to be human remains, either burials or isolated teeth or bones, or other mortuary items, construction in the vicinity of the find will halt immediately in an area sufficient to maintain integrity of the deposit and the following protocol shall be used:

1) All persons shall immediately halt ground-disturbing activities around the discovery and it shall be secured with a perimeter of not less than thirty (30) feet (Area of Discovery).

2) The Supervising Professional Archaeologist will immediately notify the Project Supervisor.

3) Upon receiving notice, the project supervisor shall immediately notify the Port Angeles City Police and the Clallam County Coroner and request that the Coroner determine if the remains are Native American and if the site is a crime scene.

4) Contemporaneous with notifying law enforcement and the Coroner, the Project Supervisor shall also notify the DAHP and the Lower Elwha Klallam Tribe (LEKT) of the discovery.

5) The project supervisor and the Supervising Professional Archaeologist will work with the responsible law enforcement designee and the Coroner and request they handle the remains and disturb the site only to the extent needed to determine if the remains are Native American and if the setting is a crime scene.

6) If the human remains are determined by the Coroner to be Native American, then the Project Supervisor shall consult with the Lower Elwha Klallam Tribe (LEKT) and DAHP to determine treatment and disposition.

7) If the human remains are determined by the Coroner not to be Native American, and the Lower Elwha Klallam Tribe (LEKT) does not reasonably object to that determination, then neither the Project Supervisor nor the LEKT shall have any further obligation to one another for the handling of such remains under this agreement.

8) If human remains, funerary objects, ceremonial objects, or artifacts are inadvertently collected during any archaeological investigation on behalf of the Project Proponent and identified as Native American in the field or in the laboratory, the Project Proponent in

consultation with DAHP and LEKT, will notify and return the remains, objects or artifacts to the LEKT within twenty-four (24) hours of the identification, or if that is not practical, then at a time acceptable to the LEKT. Such human remains, funerary objects or artifacts shall remain unwashed and without further analysis, and shall remain onsite with 24-hour security.

CONFIDENTIALITY

All parties recognize that 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 RCW 42.56.300.

All information indicating the location of known suspected archaeological properties from this Project shall be turned over to DAHP. While any party is in possession of this confidential information, such party shall limit access to these records to authorized persons with a need to know the information and shall keep a log identifying all persons who access the record, that person's governmental agency or private affiliation, the date the access was permitted, any materials copied, and the purpose and for whom such records were copied. DAHP will keep all information received permanently secured and confidential.

All parties shall ensure that its personnel, contractors, and permittees keep the discovery of any found or suspected human remains, other cultural items, and potential historic properties confidential, including but not limited to, refraining such persons from contacting the media or any third party or otherwise sharing information regarding the discovery with any member of the public. All parties shall require its personnel, contractors and permittees to immediately notify the Project Proponent of any inquiry from the media or public. The Project Proponent shall immediately notify DAHP of any inquiries it receives. Prior to any public information release, the Project Proponent, DAHP, and LEKT shall concur on the amount of information, if any, to be released to the public, any third party, and the media, and the procedures for such a release.

REPORTING

The LEKT will prepare a report documenting the results of the archaeological monitoring within 60 days of the conclusion of monitoring activities and no later than 13 months after the issuance of the construction contract. The report will include the following elements, and will be provided to all of the consulting agencies. Inventory of cultural resources results, if any; Analysis of cultural resources, including a discussion of the integrity of the resources and determination of whether a resource is eligible for inclusion on the National Register of Historic Places or the Washington Heritage Register; Documentation of consultation with the LEKT regarding significance of any cultural resources encountered during the construction.

APPENDIX A

CONTACT PERSONS

Revised – July 11 2013

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DOCUMENT TITLE: SETTLEMENT AGREEMENT

State of Washington
Lower Elwha Klallam Tribe
City of Port Angeles
Port of Port Angeles

August 14, 2006
Settlement agreement
With (3) Exhibits

SETTLEMENT AGREEMENT AMONG THE STATE OF WASHINGTON, LOWER ELWHA KLALLAM TRIBE, CITY OF PORT ANGELES, AND PORT OF PORT ANGELES

THIS **SETTLEMENT AGREEMENT** ("Agreement") is entered into effective as of August 14, 2006, by and among the State of Washington ("State"); the Lower Elwha Klallam Tribe, a federally-recognized sovereign Indian tribe ("Tribe"); the City of Port Angeles ("City"); and the Port of Port Angeles, a special purpose district of the State of Washington organized and existing pursuant to RCW Title 53 ("Port") – hereinafter singularly referred to as a "Party" or collectively referred to as the "Parties."

In consideration of the real property transactions described herein and the mutual benefit to the Parties arising from the agreements and undertakings hereinafter set forth, the Parties hereby recite, covenant, and agree as follows:

Section 1. Recital of Principles.

1.1. This Agreement is not intended to create new or supersede existing law; provide any new causes of action under existing law; or imply that the Tribe's interests are not protected under or derived from federal, state, local, tribal and/or common law.

1.2. The Parties acknowledge, reference and intend to abide by existing and future applicable law. *See* § 7 below.

1.3. That portion of Tse whit zen that sits astride the former Graving Dock site and is delineated in Section 2 below should be protected and promoted in perpetuity as a cemetery and place for cultural and historic preservation.

1.4. The circumstances and the consequences of the discovery of Tse whit zen are unique and the events at the former Graving Dock site do not represent the normal process, and do not set precedent for any other situation. The decisions and actions of the State with regard to the Graving Dock and Tse whit zen are not precedent, and do not represent desirable, required or appropriate procedure or outcome.

1.5. The Parties agree that the property delineated at Section 3 below will be buffered from uses on adjoining property. Buffering will be the responsibility of the Tribe and will be inside the boundaries of that property.

1.6. The Parties intend that appropriate commercial and industrial use and development will continue on property adjacent to the property delineated at Sections 2 and 3 below, and all other property within the City limits, including designated Urban Growth Areas.

1.7. Development, commercial activities or industrial operations on property within the City limits that may possibly contain archaeological resources shall be allowed so long as those archaeological resources are not displaced or disturbed as a result of such activities or operations.

1.8. The Parties intend that if any phenomena of possible archaeological interest are uncovered during any excavation subject to the City's Shoreline Master Program, work shall immediately stop and the developer shall immediately notify the City and Tribe, and the City shall notify the State Department of Archaeology and Historic Preservation (DAHP). *See* § 10.7 below.

1.9. The Parties pledge to institute and maintain active communication with each other for the purposes of assuring cooperation, coordination and collaboration with regard to issues of archaeological, cultural and historic significance.

1.10 For all purposes of this Agreement, "archaeologist" means a trained, professional archaeologist meeting federal qualifications.

1.11. These recitals are a substantive manifestation of the Parties' collective intent.

Section 2. Transfer to Port.

The State will assign its lease of or relinquish its interest in 2.5 acres connecting the harborfront with the former Graving Dock site (the so-called "DNR leased land"), to the Port, which will make contiguous Port-owned property to the "north" and "east" of the site. The State will also convey to the Port fee title to all acreage north of the sheet pile wall known as the "5 Line" to the former Graving Dock. The Tribe will dedicate about 50 feet of the property identified in Section 3 below as a buffer between the Port's property and the historic shoreline. The State, Port and Tribe will cooperate with regard to the preservation and use of the stormwater treatment ponds along the west boundary of the property identified in Section 3 below, which could include the buffers contemplated by Section 4.1 below. *See* the area depicted in **Exhibit A** hereto. An easement allowing ingress and egress to and from the harbor shall be granted by the State and/or the Port to the Tribe for ceremonial use (*see* § 5 below). Said easement shall be on and across the area depicted in **Exhibit B** hereto. The Tribe shall be entitled to use the easement four times per year for up to a total of 12 days per year. The Tribe shall give at least two weeks notice, whenever practicable, and no less than 48 hours notice, to the Port Executive Director of intended use to facilitate rescheduling of Port uses in the easement area depicted in **Exhibit B**. In special circumstances, the Tribe may request, on at least two weeks written notice, use of the easement in excess of these limits, and the Port shall consider such requests in good faith but may decline additional use if such use shall significantly disrupt Port Terminal activities in the easement area.

Section 3. Transfer to Tribe.

The State will convey to the Tribe fee title, subject to reversion, to property "south" of the "5 Line," to a line 200 feet "north" of the "north" right of way line of Marine Drive, with an easement allowing ingress and egress to and from Marine Drive and restrictions that such property be used exclusively for cultural and historic preservation purposes. *See* the area depicted in **Exhibit A** hereto. That State conveyance will be premised upon findings from the Federal Highway Administration (FHWA) under 23 CFR part 710.403 and Section 106 of the National Historic Preservation Act that Tribal ownership and such restricted Tribal use is reasonable mitigation for that portion of Tse whit zen that sits astride the former Graving Dock site, and a reasonable expenditure of public funds for that purpose. The Tribe, with written support from the State, City and Port, will seek to accomplish the following, in decreasing order of priority: (1) conversion of all or part of that property described in this Section from fee to trust under federal law, subject to the same land use restrictions; (2) designation as a National Historic Site under the Historic Sites Act of 1935 and other applicable federal laws; and (3) inclusion on the National Register of Historic Places.

Section 4. Land Retained by State & Leased to Tribe.

The State will retain fee title to the property south of that line 200 feet "north" of the "north" right of way line of Marine Drive, and lease that acreage to the Tribe subject to cultural and historic preservation use restrictions that are effectuated through a consultative process with the Tribe, City and Port. *See* the area depicted in **Exhibit A** hereto. That State lease would also be premised on FHWA mitigation and permissible public expenditure findings, as set forth in Section 3 to this Agreement.

Section 5. Land Use Restrictions.

The State and Tribe will expressly restrict use of the land to be owned or leased by the Tribe as described in Sections 3 and 4 for cultural and historic preservation, which for purposes of this Agreement means: site restoration; reburial of Klallam ancestors; maintaining ancestral burial grounds; ceremonial uses; and developing a facility to promote cultural heritage and create significant local economic benefit related to the uses (so long as archaeology supports development); to be effectuated through a collaborative process with the Tribe, City and Port. The Parties agree that the Tribe's use of the land described in Sections 3 and 4 shall specifically preclude gaming activities, whether such activities are subject to compacting requirements or not. The State, City and Port do not foresee any public purpose reason for exercising public condemnation authority on the property described in Section 3 (to the extent not acquired by the federal government in trust for the Tribe) and Section 4. The State, City or Port will cooperate with the Tribe's reasonable efforts to minimize any taxation of that property, including but not limited to seeking tax exemptions and structuring of an entity or entities that will own and/or lease the land. The City will provide utility services to and on that land, and the Tribe will pay all necessary utility fees and assessments.

5.1 The Tribe shall determine and install appropriate buffers for its cultural and historic preservation uses, and those buffers shall be within the property described in Section 3 to insulate the Tribe's uses from surrounding uses; provided that the Tribe will not be required to remove any archaeological resources to create such buffers.

5.2 The Tribe acknowledges that the property surrounding the property that will be conveyed or leased to the Tribe under Sections 3 and 4 to this Agreement, will be utilized for heavy industrial and maritime use creating noise, dust, vibration and other similar impacts typical of such uses. The Tribe accepts the property delineated in those Sections 3 and 4 with knowledge of that surrounding land use activity and agrees to not take any action opposing such use as long as such use complies with existing and future applicable law and this Agreement.

5.3 Within sixty (60) days of execution of this Agreement, the State, at its own expense, shall prepare legal descriptions of the property and easement described above in Sections 2, 3 and 4, and depicted in **Exhibits A and B**. The State shall deliver the legal descriptions to the Port and Tribe for review. Any review costs shall be borne by the Port and Tribe. Thereafter, under the terms of separate but related agreements between the State, City and Port, and the State and Tribe, respectively (*see* § 15 below), the State shall convey title or lease that property to the Port and Tribe, respectively, as contemplated by Sections 2, 3 and 4.

Section 6. Land Use Regulations.

The State, City and Port will initiate the process to modify, as needed, their respective current land use designations, policies and regulations that presently apply to the acreage that will be conveyed and leased to the Tribe for cultural and historic preservation to remove any conflicts with the intended uses of these properties, as envisioned in Section 12 below; and agree to support proposed changes that effectuate this Section and Section 12.

Section 7. Applicable Law.

The Parties shall abide by and do not intend to alter existing and future applicable law relating to discovery and treatment of historic properties, including artifacts, features and human remains, as applied by the terms of this Agreement to property within the jurisdiction of the City. *See* § 1.2 above. The Parties acknowledge the existence of tribal law, and that certain property and other rights derived from tribal law are recognized and enforced by state and federal courts. This Agreement does not intend to alter existing law. The State, City and Port reserve the right to assert that tribal law does not apply.

Section 8. Archaeological Analysis.

8.1 The City shall hire as its employee an archaeologist for a five year period. The State shall bear all the costs for employing the City Archaeologist, as well as appropriate consultants, and the cost of the archaeological analysis contemplated by this Section, subject to the provisions of subsection 8.1.1 below.

8.1.1 The Parties acknowledge that the State, through this Agreement, cannot budget at one time five years of funding for the City Archaeologist, consultants, and analysis contemplated in this Section. Therefore, the Parties agree that the City will develop budgets for the City Archaeologist, consultants, and analysis, in coordination with the State's biennial budget cycle. The City will develop each budget and submit it to the State in adequate time for the State to include the funding in the regular or supplemental budget cycle, as appropriate. The State covenants that it will initiate and take all reasonable means to support and include in the State's budget authorization to pay to the City sufficient funds for the archaeologist, consultants, and analysis contemplated in this Section.

8.1.2 The Tribe, State, and Port shall be consulted during the City's interview process for the City Archaeologist position and their representatives shall be allowed to participate in candidate interviews, but the final decision about whom should fill that position shall rest solely with the City.

8.2 On land identified in Section 8.9 below, the City Archaeologist, in consultation with the Tribe, State, Port and other interested parties, will conduct, administer and manage an archaeological analysis designed to determine the potential locations of archaeological resources. Subject to available state funding, the predictive analysis will include one or more of the following methods: ethnographic studies, statistically-based archaeological predictive modeling, geomorphological studies, remote sensing methods, forensic canines, and/or other scientifically appropriate methods. Based on these methods, the City Archaeologist, in consultation with the Parties, will establish the appropriate archaeological fielding testing methods, which will include pedestrian surveys, subsurface test units, backhoe trenching, augering, coring, geoslicing, and/or other scientifically appropriate methods appropriate to the environmental conditions of the field inventory area and probability designation.

8.3 The analysis shall be conducted expeditiously and in good faith and completed as soon as possible, but not later than two years after State funding or City hiring of the City Archaeologist, whichever is later. Permitting processes will proceed in the normal course of business and under existing and future applicable law while the analysis is conducted. Mitigation plans will be subject to the protocols set forth in Sections 9 and 10. Completion of the analysis is not a prerequisite to permit processing.

8.4 As part of the analysis, the Tribe agrees to cooperate with the State, City and Port for purposes of allowing them access to the Tribal repository of history and information, which would aid in the thoroughness and accuracy of the analysis. The State, City and Port agree to consult with the Tribe regarding the design, implementation and results of the analysis, including data quality and data analysis.

8.5 The analysis is intended to help reduce uncertainty, which will promote predictable development by informing governmental permitting personnel how to devise appropriate mitigation in accordance with this Agreement.

8.6 The end product of the archaeological analysis will be detailed maps designating areas as having high, medium or low probability for the presence of archaeological resources. Buffers and other protections for identified archaeological resources will be determined by the City Archaeologist, in consultation with all the Parties, based on the nature and size of the resource, the environmental conditions, nature and extent of the proposed development project, confidence in the delineation of the site boundaries, and any other factors the City Archaeologist deems necessary to provide reasonable protection to the archaeological resources. Section 11 below discusses the confidential treatment of these reports, maps and other documents.

8.7 These maps will also depict recorded archaeological sites, districts, traditional cultural properties and isolated features, as well as sacred areas, to aid in predictability and appropriate mitigation as development occurs. This information will be considered confidential and exempt from public disclosure by state and local government under RCW 27.53.070 and RCW 42.56, except as necessary to carry out government activities to manage, mitigate, or protect these archaeological resources, and consistent with Section 11 below.

8.8 The City and Tribe will continually update these maps as new information is discovered, and will provide this information to the Tribe and DAHP.

8.9 The archaeological analysis contemplated herein shall encompass the following areas and the uplands contiguous to those areas: all of Ediz Hook, and along the shoreline from the base of Ediz Hook to the Rayonier mill site from the toe of the bluff line as it currently exists to the existing shoreline.

8.10 The Parties recognize that the site of the former Rayonier pulp mill is subject to a Superfund deferral agreement and a clean-up process under authority of the State's Model Toxics Control Act. For that reason, operations and activities on that property are already subject to strict review and regulation and are subject to different laws and considerations than other properties on the Port Angeles waterfront. For these reasons, the Parties agree that no term or condition of this Agreement shall apply to the Rayonier property. If the federal Environmental Protection Agency ever (1) removes that site from the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS), or (2) revokes deferral of the National Priorities List (NPL) listing process or otherwise reasserts authority over the investigation and/or cleanup of the Rayonier site, then Rayonier (or its successor), the Tribe and any other party with a legally recognizable interest in that site may elect by written agreement to apply the terms and conditions of this Agreement to the site. Additionally, those parties may elect by written agreement to apply the terms and conditions of this Agreement to that site at any time of their choosing. However, nothing in this Agreement shall be read to compel those parties to effect such an agreement. The exclusion of Rayonier property, provided above, is not intended to restrict or abridge the jurisdiction of the City as permitting authority over that property.

Section 9. Project Permitting

9.1 The Port and City will prepare and implement permitting and planning procedures consistent with this Agreement.

9.2 The Port and City will provide training on these procedures to all City and Port personnel who are involved with approving or conducting ground-disturbing work, and the State, City, Port and Tribe will collaborate to produce educational materials for the public, landowners, and developers about the sensitive nature and protection of archaeological resources.

9.3 The City, Port and State permitting staff will promptly consult the analysis maps described in Section 8 when they are contacted by landowners or developers with potential ground-disturbing projects, whether within or outside of Shoreline Management Act jurisdiction, and will use the maps to devise appropriate mitigation.

9.3.1. For purposes of this Agreement, "ground-disturbing" means operations, such as digging, trenching, boring, excavating, and drilling, that cause physical penetration of the surface of the ground by tools or equipment.

9.4 The State, City, Port and Tribe will identify or establish inter-governmental liaison positions for purposes of providing the verbal and written notice envisioned in this Agreement.

9.5 The Tribe will designate a person to serve as the agent for the Tribe in all matters relating to discoveries of archaeological resources. The City, Port and State permitting staff will provide oral and written notification to Tribal and DAHP contact persons as early in the process as possible, to inform the Tribe and DAHP when ground-disturbing projects are proposed within or near culturally sensitive areas. The names and phone numbers of the Tribal, City, Port and DAHP contact persons contemplated by this Section and Section 10.6 below are set forth in **Exhibit C** hereto, which shall be annually updated by the Parties' inter-governmental liaisons upon the anniversary of the effective date of this Agreement.

9.6 Mitigation.

9.6.1 As allowed by law and as provided herein, the Parties will mitigate development-related impacts to archaeological resources consistent with this Agreement and the order of preference for mitigation measures set forth in the State Environmental Policy Act (SEPA) and Shoreline Management Act (SMA), including those statutes' respective regulations, and other applicable law.

9.6.2 Under appropriate circumstances, the local government may deny a permit or other approval.

9.6.3 If ground-disturbing work is to occur in a culturally sensitive area of interest to the Tribe, to be determined through the archaeological analysis contemplated by Section 8 (*see* § 8.4), the Tribe shall be consulted with regard to a proposed mitigation plan before work commences, with the goal being development of a mitigation plan acceptable to all parties. By way of example, the agreed-upon mitigation plan could dictate that an on-site archaeologist and/or Tribal members or staff persons may monitor the work, and that the City, Port or State will take all reasonable means to ensure the Tribal representatives access to the site.

Section 10. Disposition of Discovered Artifacts and Human Remains

10.1 Under RCW 27.53 and subject to Section 10.3 below, archaeological resources may not be disturbed without a permit from DAHP. The City and Port will work with the Tribe and DAHP to ensure that cultural artifacts removed from government-owned lands are provided to the Tribe for appropriate curation or use. In addition, the City and Port will work with the Tribe, DAHP and landowners to encourage the transfer of cultural artifacts removed from private lands to the Tribe.

10.2 Based upon the Tribe's interests in human remains and funerary objects that are affiliated with the Tribe, if testing reveals human remains of five or less associated individuals (defined in Section 10.4 below) and if a different arrangement is not agreed to by the landowner, the human remains and associated funerary objects will be reinterred on the property described in Section 3 under the Tribe's supervision. Development may proceed within the area from which the remains and funerary objects were discovered.

10.3 Based upon the Tribe's interests in human remains and funerary objects that are affiliated with the Tribe, if testing reveals human remains of six or more associated individuals (defined in Section 10.4 below), the Parties will follow existing and future applicable law to determine, on a case-by-case basis and subject to such law, the disposition of the remains and associated funerary objects. This Section is not intended to create any new or additional right of action for any party. *See* § 7 above.

10.4 For purposes of Sections 10.2 and 10.3, "associated individuals" shall be determined collectively by the Parties' archaeologists or designees, applying generally accepted archaeological methods, with the goal being a determination that is acceptable to all parties. In the event the archaeologists or designees collectively cannot agree within fourteen (14) days of their and the Parties' inspection of the site under Section 10.6 below, the City Archaeologist shall make the determination and the Parties shall defer to that determination unless inconsistent with generally accepted archaeological methods.

10.5 To the extent allowed by law, the applicable terms of this Agreement will be incorporated into federal, State and local permits and other approvals.

10.6 As a local permit condition, the permittee will immediately notify the Tribal Chair and specified Tribal staff by both letter and telephone (work and cellular), as well as the City, when new artifacts, features or human remains are discovered. In turn, the City will immediately notify DAHP, as required in RCW 27.44 and 27.53.

10.7 If archaeological resources are discovered, no further ground-disturbing activity will occur and no materials will be removed in an area around the discovery to be determined collectively by the Parties' archaeologists or designees, applying generally accepted archaeological methods with the goal being a determination that is acceptable to all parties, until such time as the requirements of subsections (1) through (5) below are satisfied; provided that in the event those archaeologists or designees cannot collectively agree on that initial "stop work" area within fourteen (14) days of the discovery, the City Archaeologist shall make the determination, and the Parties shall defer to that determination unless inconsistent with generally accepted archaeological methods.

(1) The notices contemplated by Section 10.6 are given;

(2) They and the Parties inspect the site along with the affected landowner;

(3) They determine the full extent of the culturally sensitive area affected by the project;

(4) An acceptable mitigation plan is developed and implemented in accordance with Section 10 and consistent with Sections 10.1 above regarding disposition of artifacts, and 10.2 and 10.3 regarding treatment of human remains, and applicable law; and

(5) A permit is obtained from DAHP, as required in RCW 27.44 and RCW 27.53, which may impose additional or different conditions on ground-disturbing activities.

If the Parties' archaeologists or designees collectively cannot agree on the matters in subsections (3) and/or (4), within fourteen (14) days of their and Parties' inspection of the site under subsection (2), determinations on such matters shall be made by the City Archaeologist applying generally accepted archaeological methods. The Parties shall defer to such determinations unless inconsistent with generally accepted archaeological methods.

With regard to subsection (5), any disturbance, excavation, or removal of archaeological resources or sites must comply with the conditions imposed in such permit. Alternatively, if ground-disturbing activities occur as part of a federal undertaking, as that term is defined in Section 301(7) of the National Historic Preservation Act (NHPA), 16 U.S.C. § 470w(7), any disturbance, excavation, or removal of archaeological resources or sites must comply with the requirements of Section 106 of the NHPA, 16 U.S.C. § 470f.

The provisions of Section 9 and 10 of this Agreement shall be applied in those areas which are subject to archaeological analysis pursuant to Section 8.9 hereof, and shall also be utilized as guidelines for permitting and construction activity in other areas of the City of Port Angeles and its Urban Growth Areas as now established or hereafter defined.

Section 11. Confidentiality

11.1 To the extent authorized by law, those portions of all reports, maps, or other information identifying the location of archaeological sites, objects, or human remains will be treated as confidential and exempt from public disclosure, to discourage looting and depradation.

11.2 To the extent authorized by law, those portions of the reports, maps, or other information identifying the location of archaeological sites or objects or human remains will be shared with state and local governmental permitting personnel. These portions of the reports, maps, or other information will be shared with landowners and their consultants only as absolutely necessary and with confidentiality procedures firmly in place, including, but not limited to: (1) maintaining a registry of names, addresses, and telephone numbers of those who view the information; (2) restricting copying; (3) notifying the Tribe if copies are requested or released; and (4) requiring that all copies are eventually returned or destroyed. These restrictions will be incorporated into all federal, State, and local permits and other approvals. Information identifying the location of archaeological sites or objects or human remains located on a particular parcel may be shared with the owner of that parcel during permitting activities or as otherwise required under law.

11.3 The State, City and Port may share with the public the non-confidential and non-exempt portions of the reports, maps, or other information for purposes of: (1) educating the public as to the sensitive nature of the cultural resources and the Tribe's cultural affiliation with the cultural resources; (2) encouraging repatriation (as described in Section 10); and (3) avoiding similar damage to cultural resources in the future; so long as the sharing of such information does not reveal the specific location of artifacts, human remains, features and sites, consistent with RCW 42.56.

Section 12. Future Planning

As necessary, the City will initiate and take all reasonable means to support the process to amend the Shoreline Master Program, and the City, Port and State will amend any plans or authorities, to reflect and implement this Agreement, and to provide notification to the public, landowners, and developers.

Section 13. State and Federal Designations

Under Sections 10.1 and 10.3 but not 10.2, the Tribe may seek the listing of historic properties under federal and state law for all qualifying properties, and take other action necessary to protect such properties.

Section 14. Dispute Resolution

14.1 The Parties agree that they shall attempt to resolve any dispute arising under this Agreement according to the following sequence of dispute resolution measures, until the dispute is finally resolved: (1) government-to-government consultation between the State, City, Port and Tribe through their inter-governmental liaisons designated pursuant to Section 9.4 above; (2) government-to-government consultation between the City Mayor, President of the Port Commission, Tribal Council Chair and designated representative of the State; and (3) mediation between the State, City, Port and Tribe facilitated by John Bickerman or some other mediator to be mutually agreed upon by the Parties.

14.2 If the measures in Section 14.1 do not result in final resolution of the dispute, any party may take such legal action as they deem appropriate. The Thurston County Superior Court will retain jurisdiction to enforce the terms of this Agreement. In the event any Party is required by the Thurston County Superior Court to file a new cause of action to enforce the terms of this Agreement, the Parties hereby waive sovereign immunity and consent to be sued to the extent necessary for such an action to proceed in the Thurston County Superior Court.

Section 15. Other Agreements

The agreement reached between the State and Tribe, and agreement reached between the State, City and Port, are each incorporated by reference as if fully set forth herein.

STATE OF WASHINGTON

By: ______________________
Christine O. Gregoire
Its Governor

LOWER ELWHA KLALLAM TRIBE

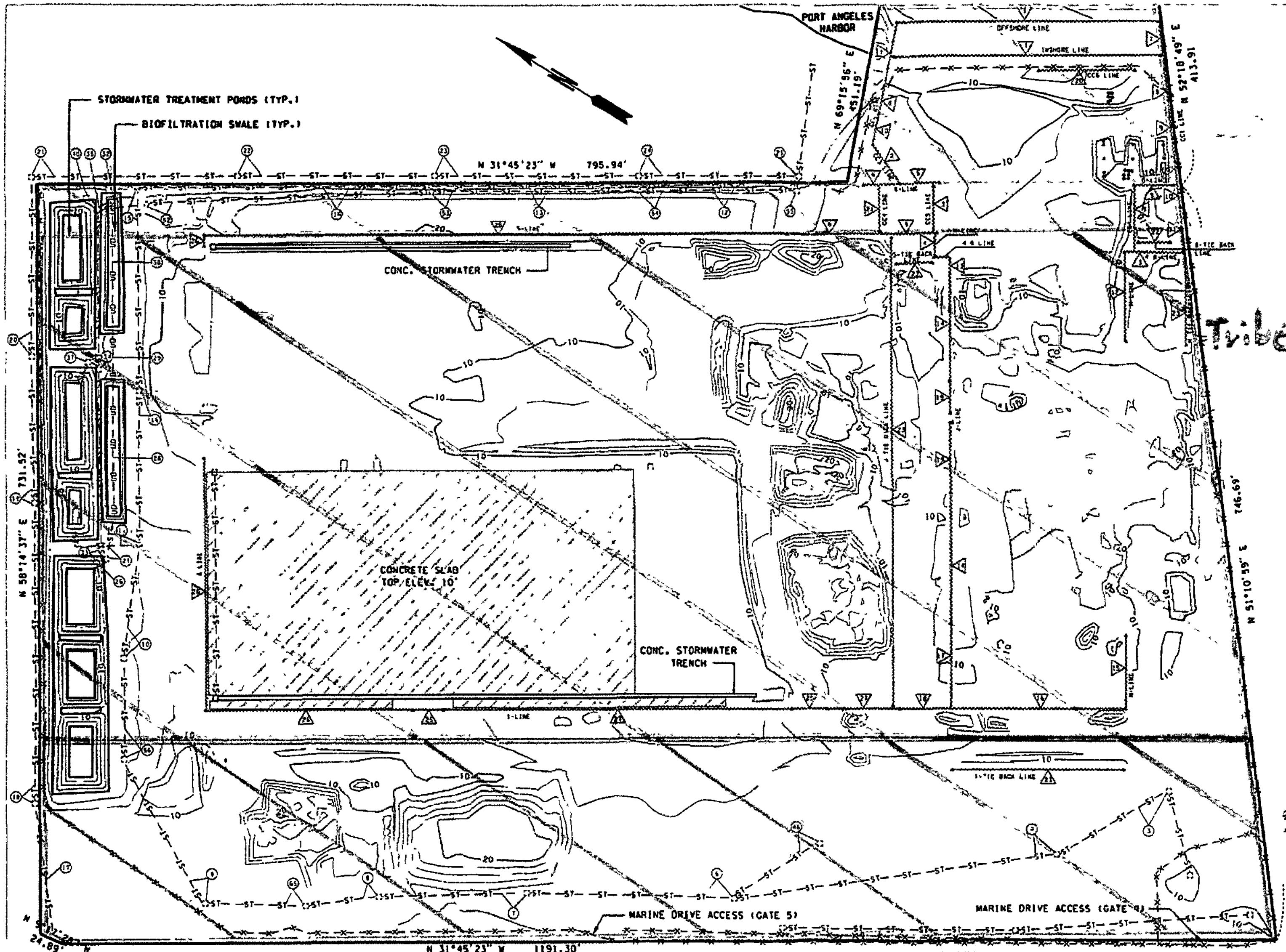
By: ______________________
Frances G. Charles
Its Tribal Chairperson

CITY OF PORT ANGELES

By: ______________________
Karen A. Rogers
Its Mayor

PORT OF PORT ANGELES

By: ______________________
W.M. "Bill" Hannan
President, Port of Port Angeles Commission



SHEET PILE CODES

△	PILE TYPE	TIP ELEVATION	PILE WIDTH
1	AZ 48	-70	45.63'
2	AZ 48	-58	45.63'
3	AZ 48	-54	45 63
4	AZ 48	-53.5	45.63"
5	AZ 48	-50	45.63"
6	AZ 48	-30	45.63'
7	AZ 36	-70	49.55"
8	AZ 36	-66	49.55
9	AZ 36	-64	49.55"
10	AZ 36	-62	49.55"
11	AZ 36	-58	49.55"
12	AZ 36	-43 TO -56	49.55
13	AZ 36	-53.5	49.55
14	AZ 36	-48	49.55"
15	AZ 36	-30 TO -44	49.55'
16	AZ 36	-42.5	49.55"
17	AZ 36	-41	49.55'
18	AZ 36	-27	49.55"
19	AZ 36	-6 TO -48	49.55'
20	PZ 40	-70	39.25
21	PZ 40	-47	39.25"
22	PZ 27	-30	36.00'
23	PZ 27	-15	36.00
24	PZ 27	-5 TO -15	36.00
25	PZ 22	-35	44.00'
26	PZ 22	-17	44.00'
27	PZ 22	-16 TO -17	44.00"
	PIPE	-62	2 DIAM.

LEGEND

- INLET
- CATCH BASIN
- MANHOLE
- DRAINAGE STRUCTURE CODE
- 2' DIAM. PIPE PILE
- SHEET PILE CODE
- SHEET PILE
- PROPERTY LINE
- STORM SEWER
- UNDERDRAIN LINE
- FENCE
- CONCRETE SLAB

BEARINGS AND DISTANCES ARE INFORMATIONAL ONLY. SEE THE PORT ANGELES GRAVING DOCK SITE SUNDRY SITE PLAN FOR MORE INFORMATION AND ACCURACY.

DATUM
PROJECT DATUM NAVD 88

0 50 100
SCALE IN FEET

FILE NAME G:\C6525 SR104, Hood CanalBridge Misc\Dgn\AS Built\As Built.dgn
TIME 07:56:55 AM
DATE 10/19/2005
PLOTTED BY
DESIGNED BY
ENTERED BY
CHECKED BY
PROJ. ENGR.
REGIONAL ADM.

REVISION | DATE | BY

REGION NO. 10 | STATE WASH | FED.AID PROJ.NO.
JOB NUMBER
CONTRACT NO. | LOCATION NO.
P.E. STAMP BOX DATE
P.E. STAMP BOX DATE

Washington State Department of Transportation

PORT ANGELES GRAVING DOCK
TSE-WHIT-ZEN VILLAGE SITE
CITY OF PORT ANGELES
CLALLAM COUNTY, WA

AS BUILT EXHIBIT

PLOT1
SHEET 1 OF 1 SHEETS

LEKT v State

EXHIBIT

A

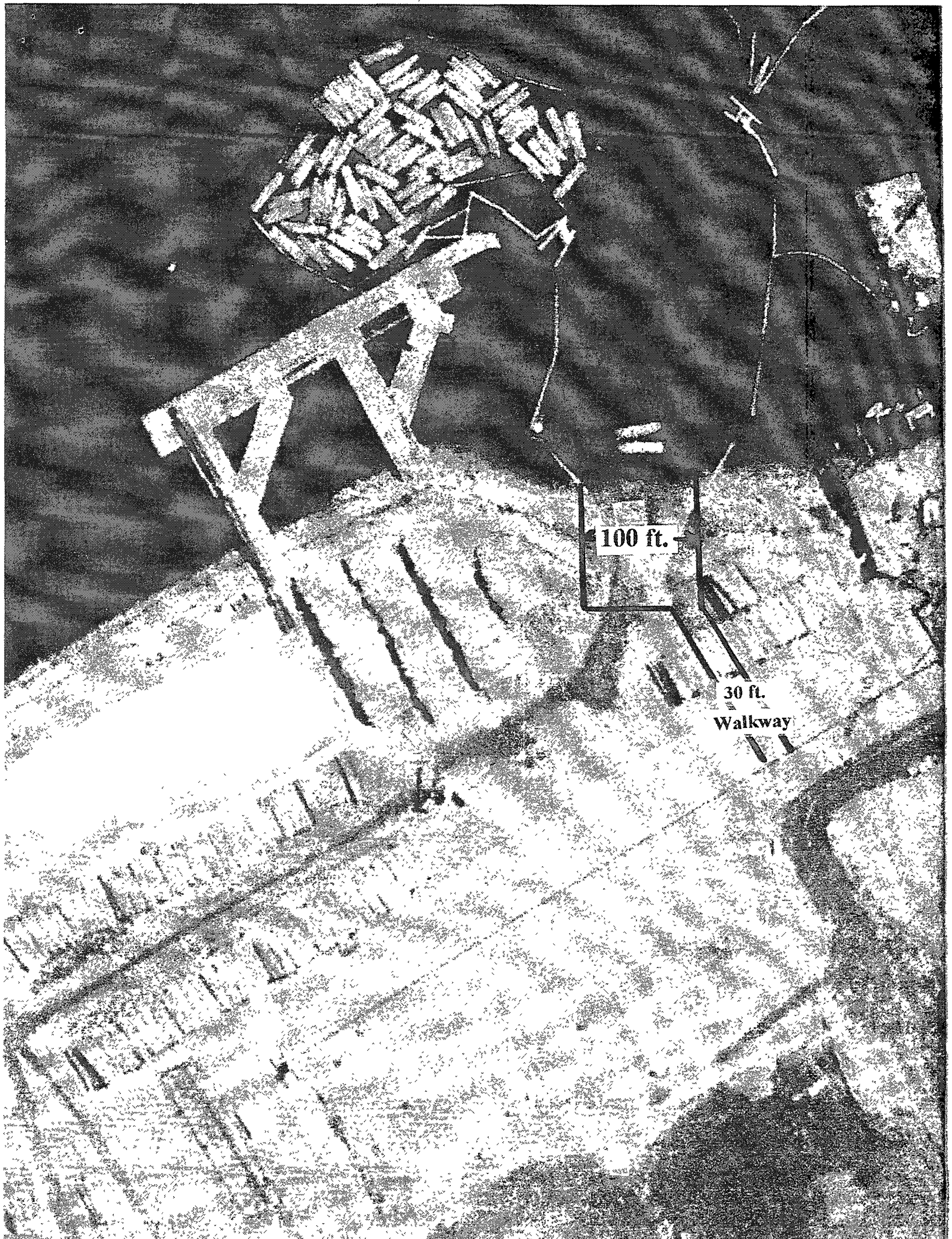


EXHIBIT B

EXHIBIT C

CONTACT PERSONS

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(Position yet to be filled)
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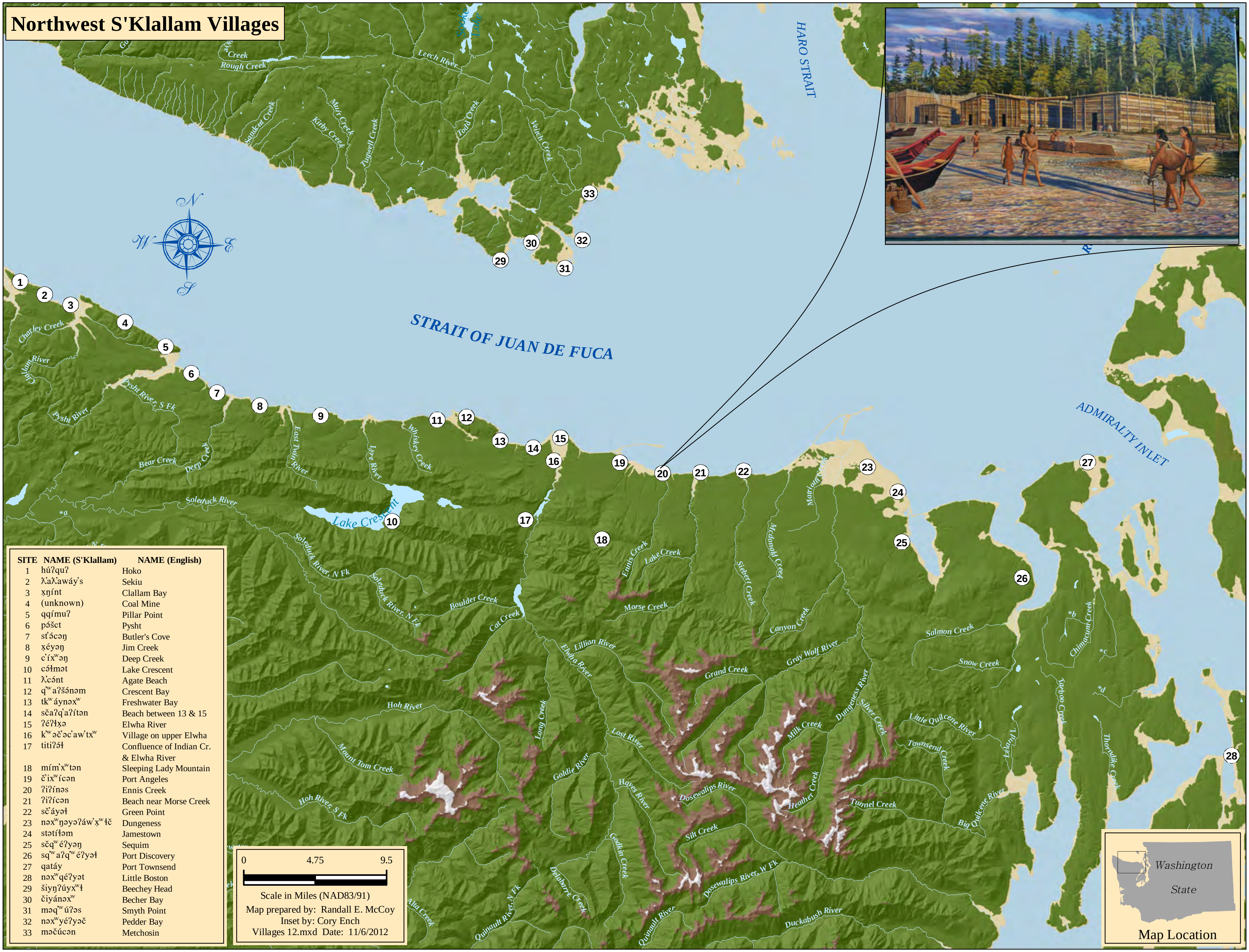
Northwest S'Klallam Villages



SITE	NAME (S'Klallam)	NAME (English)
1	húʔquʔ	Hoko
2	ƛ̓aƛ̓awáy̓s	Sekiu
3	x̣ŋínt	Clallam Bay
4	(unknown)	Coal Mine
5	qqímuʔ	Pillar Point
6	pə́šct	Pysht
7	st̓ə́cəŋ	Butler's Cove
8	x̣éyəŋ	Jim Creek
9	c̓íxʷəŋ	Deep Creek
10	cə́ɬmət	Lake Crescent
11	ƛ̓cə́nt	Agate Beach
12	q̓ʷaʔšə́nəm	Crescent Bay
13	tkʷáynəxʷ	Freshwater Bay
14	sčaʔq̓aʔítən	Beach between 13 & 15
15	ʔéʔɬx̣ə	Elwha River
16	k̓ʷəč̓əc̓aw̓txʷ	Village on upper Elwha
17	titiʔə́ɬ	Confluence of Indian Cr. & Elwha River
18	mím̓xʷtən	Sleeping Lady Mountain
19	č̓ixʷícən	Port Angeles
20	ʔiʔínəs	Ennis Creek
21	ʔiʔícən	Beach near Morse Creek
22	sč̓áyəɬ	Green Point
23	nəxʷŋəyəʔáw̓x̣ʷɬč	Dungeness
24	stətíɬəm	Jamestown
25	sčqʷéʔyəŋ	Sequim
26	sq̓ʷaʔq̓ʷéʔyəɬ	Port Discovery
27	qatáy	Port Townsend
28	nəxʷqéʔyət	Little Boston
29	šiyŋʔúyxʷɬ	Beechey Head
30	čiyánəxʷ	Becher Bay
31	məq̓ʷúʔəs	Smyth Point
32	nəxʷyéʔyəč	Pedder Bay
33	məčúcən	Metchosin

0 4.75 9.5

Scale in Miles (NAD83/91)

Map prepared by: Randall E. McCoy

Inset by: Cory Ench

Villages 12.mxd Date: 11/6/2012