TERMINAL 108 – ENVIRONMENTAL CONDITIONS REPORT

FINAL

For submittal to:

Washington State Department of Ecology
3190 160th Avenue SE
Bellevue, WA 98008

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Acronyms

AGI	Applied Geotechnology, Inc.
APN	assessor's parcel number
AST	aboveground storage tank
BBP	butyl benzyl phthalate
BEHP	bis(2-ethylhexyl) phthalate
bgs	below ground surface
BMP	best management practice
Boeing	The Boeing Company
BTEX	benzene, toluene, ethyl benzene, and xylene
CB	catch basin
CCI	Container Care International
CFC	chlorofluorocarbon
CFR	Code of Federal Regulations
Chevron	Chevron USA Products Company
Chiyoda	Chiyoda Corporation International
City	City of Seattle
ConGlobal	ConGlobal Industries
County	King County
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CSL	cleanup screening level
CSO	combined sewer overflow
cy	cubic yard
EAA	early action area
EBI	Elliott Bay Interceptor
Ecology	Washington State Department of Ecology
EOF	emergency overflow
EPA	US Environmental Protection Agency
ESA	environmental site assessment
FBI	Federal Bureau of Investigation
GSA	General Services Administration
HPAH	high-molecular-weight polycyclic aromatic hydrocarbon
ICR	independent cleanup report
Lafarge	Lafarge Canada, Inc.

LDW	Lower Duwamish Waterway
LDWG	Lower Duwamish Waterway Group
LPAH	low-molecular-weight polycyclic aromatic hydrocarbon
LUST	leaking underground storage tank
mgd	million gallons per day
mgy	million gallons per year
MLLW	mean lower low water
MTCA	Model Toxics Control Act
MT/yr	million tons per year
NPDES	National Pollutant Discharge Elimination System
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PGG	Pacific Groundwater Group
Pioneer	Pioneer Construction Materials Company
Port	Port of Seattle
ppm	parts per million
RCB	right-of-way catch basin
RCRA	Resource Conservation and Recovery Act
ROW	right-of-way
SCAP	source control action plan
SCSP	source control strategy plan
SD	storm drain
SMS	Washington State Sediment Management Standards
SPCC	spill prevention control and countermeasure
SPU	Seattle Public Utilities
SQG	small-quantity generator
SQS	sediment quality standard
STP	sewage treatment plant
SWPPP	stormwater pollution prevention plan
T-108	Terminal 108
T-106	Terminal 106
TEQ	toxic equivalent
TPH	total petroleum hydrocarbons
TPH-D	diesel-range total petroleum hydrocarbons
TPH-O	oil-range total petroleum hydrocarbons

TSCA	Toxic Substances Control Act
TSS	total suspended solids
USACE	US Army Corps of Engineers
UST	underground storage tank
VCP	voluntary cleanup program
VOC	volatile organic compound
WAC	Washington Administrative Code
WSLCB	Washington State Liquor Control Board
WWTP	wastewater treatment plant

1 Introduction

The Lower Duwamish Waterway (LDW) is an approximately 5.5-mile waterway located in Seattle, Washington. In 2001, the US Environmental Protection Agency (EPA) added the heavily used industrial waterway to the nation's Superfund list. Contaminants identified in the waterway's sediments that led to its listing include polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), various metals, and phthalates. These identified contaminants may threaten both humans and wildlife.

The Port of Seattle's (Port) Terminal 108 property (T-108) is located on the eastern shore of the LDW, just upstream of Harbor Island (Map 1). T-108 has been owned by or leased to various entities during its history of industrial and commercial use. For the purposes of this report, T-108 will be referred to as the subject property. During the course of recent investigations on the waterway, the subject property, along with neighboring properties, has been identified as a property of potential interest for source control with respect to the LDW.

In support of these ongoing investigation efforts, the Port is developing independently a source control strategy for the terminal property. To help develop and focus the strategy on potential source control issues at the subject property, the Port is preparing this comprehensive Environmental Conditions Report detailing property-specific investigation information along with the operational history and development of the property over the course of the last hundred years. This report's conclusions and recommendations will assist in the development of a source control strategy for the subject property, to be discussed in future documentation.

1.1 Project Background

In December 2000, EPA and the Washington State Department of Ecology (Ecology) entered into an Agreed Order on Consent with King County (County), the Port, the City of Seattle (City), and The Boeing Company (Boeing). The purpose of the order was for the completion of a remedial investigation and feasibility study (RI/FS) to address the waterway's sediment contamination. Subsequent to signing of the agreement, the County, the City, the Port, and Boeing formed the Lower Duwamish Waterway Group (LDWG) to manage and coordinate the ongoing investigation and remediation strategy efforts.

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N

0 0.25 0.5 Miles

0 0.5 1 Kilometers

Map 1. Terminal 108 location

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Prepared by CEH, 12/06/07; MAP #3120; W:\Projects\06-14-01 Marine Environmental Source Control\Data\GIS\T-108

Preventing recontamination to levels that exceed the Washington State Sediment Management Standards (SMS) (per Washington Administrative Code [WAC] 173-204) and the LDW sediment cleanup goals is the ultimate focus of Ecology's source control strategy. The LDW source control program, under Ecology's lead, is designed to identify and manage sources of contamination to LDW sediments in coordination with sediment remediation activities. This program provides the framework for identifying source control issues and implementing effective controls, potentially including various levels of remedial action. To support this effort, Ecology is preparing source control action plans and data gaps analysis reports to establish current environmental conditions and evaluate historical and ongoing sources of contamination.

In 2003, seven candidate sediment sites for early action (subsequently referred to as early action areas [EAAs]) were identified in the LDW. One of the recommended EAAs, EAA 1, includes the adjacent Duwamish/Diagonal combined sewer overflow (CSO) and storm drain (SD) area on the east side of the LDW at the end of the Oregon Street right-of-way (ROW). The subject property borders these outfall locations to the south and directly abuts EAA 1.

In December 2004, Ecology published a Source Control Action Plan (SCAP) for the Duwamish/Diagonal Way Early Action Cleanup Area (EAA 1) which strategized the approach to ongoing evaluation and control of sources of contamination to the sediment area. In that strategy document, the subject property was included as a property of potential concern relative to identified sediment contamination associated with EAA 1 (Ecology 2004). In June 2008, Ecology published several property reviews for individual properties of potential concern relative to EAA 1, including T-108, T-106 West (T-106W), T-106 Northwest (T-106NW), T-106 East (T-106E), and Federal Center South. Relevant information from Ecology's property reviews is included in the subsequent sections of this report.

Ecology has requested that the Port provide documentation of the subject property's environmental conditions and develop a long-term Source Control Strategy Plan (SCSP). The SCSP will be implemented and managed on a independent basis. Work to be performed at the site, including any potential remedial activities or engineered mitigation measures, will be managed as outlined under the Model Toxics Control Act (MTCA), the National Pollutant Discharge Elimination System (NPDES) requirements, and other established regulations.

This Environmental Conditions Report will help establish the basis for the development, implementation, and management of the SCSPs for the subject property. The SCSPs will take into consideration current operations and the recommendations of this report. The SCSPs will also consider remedial action alternatives, if appropriate, based on the conclusions of the environmental conditions documentation and the approaches deemed to be most effective for the potential issues at the subject property. Any remedial action at the subject property will be completed as an independent remedial action in accordance with Ecology's MTCA. However, the Port acknowledges that Ecology may consider an Agreed Order for the subject property in the future.

1.2 Purpose and Organization of Report

The purpose of this report is to present and discuss the subject property's relevant operational and development history, evaluate existing environmental data, and identify potential source control issues, focusing on long-term source control strategy efforts at T-108.

This Environmental Conditions Report is organized as follows:

- Section 2.0, Site Description
- Section 3.0, Property Ownership and Operational History
- Section 4.0, Environmental Conditions and Source Information
- Section 5.0, Potential Pathways of Contamination and Source Control Management
- Section 6.0, Conclusions and Recommendations
- Section 7.0, References

2 Site Description

T-108 is located at 4525 Diagonal Avenue S in Seattle, Washington (Map 2). It is owned by the Port of Seattle and currently leased to ConGlobal Industries (ConGlobal), an international company that operates container and chassis depots. T-108 is located on the LDW which bounds the property to the west. It is bounded to the east by a King County pumping station and E Marginal Way S, to the west by the LDW, to the south by Diagonal Avenue S and the Federal Center South facility, and to the north by the Oregon Street ROW, Terminal 106 W (T-106W), and the Washington State Liquor Control Board (WSLCB) facility.

2.1 General Property Description

T-108 currently consists of two parcels totaling approximately 20 acres. The Western Parcel (Assessor's Parcel Number [APN] 7666700510) is approximately 9 acres in size, and the Eastern Parcel (APN 7666700515) is approximately 11 acres in size (King County 2008). Currently, ConGlobal leases both parcels of the subject property: the Eastern Parcel is used as a container storage facility and truck chassis storage and repair area, and the Western Parcel is used as a chassis lay-down area.

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Map 2. Terminal 108 vicinity and current site layout

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Prepared by CEJ, 07/08/08; MAP #3288; W:\Projects\06-14-01 Marine Environmental Source Control\Data\GIS\T-108

T-108 has been used by several parties for a variety of purposes since its development in the early 20th century. Detailed information on the subject property's ownership and operational history is discussed in Section 3.0. A timeline that provides a visual presentation of the property's ownership, operation, and environmental-related investigation history is also provided in Section 3.0.

Brief highlights of the ownership history of the T-108 property include:

- Diagonal Avenue S sewage treatment plant (STP) – Operated by the City of Seattle from 1938 to 1962 and then by King County Metro from 1962 to 1969 in the central portion of T-108 Eastern Parcel.
- Chiyoda Corporation International (Chiyoda) owned the property in the mid-1970s; EPA and the US Army Corps of Engineers (USACE) controlled the property for a portion of the Chiyoda ownership period.
- In the early 1980s, the T-108 property was subdivided for the first time when the Port acquired the property; the Port maintained ownership of the Western Parcel and sold the Eastern Parcel to Chevron in approximately 1984. The Port subsequently repurchased the Eastern Parcel in 1992.
- The Lafarge Cement Company leased the Western Parcel from 1989 to 1998; Lafarge constructed and operated a bulk cement terminal on the property.
- In the mid-1990s, the Eastern Parcel was redeveloped for use as a container storage and transfer yard by Container Care International (CCI). CCI is a predecessor to ConGlobal Industries.

Presently the majority of T-108 is operated as a container storage facility by ConGlobal Industries. The primary container storage area is located on the Eastern Parcel of the property, and portions of the Western Parcel are used for chassis lay-down and storage. A Port of Seattle public access and habitat mitigation area is located along the southern shoreline of the Western Parcel, adjacent to the LDW. The park area is one of approximately 12 habitat mitigation areas along the LDW shoreline, and public access to the site is provided in accordance with the Port's public access plan (Port of Seattle 1985a). Select photographs of the subject property used as reference for the following sections are included in Appendix A. Appendix B includes copies of historical aerial photographs of the immediate vicinity of the T-108 that were used as a resource for this discussion.

2.2 Physical and Ecological Features

T-108 is located in what was once a tidal marsh area associated with the Duwamish River delta. Much of this marsh area was filled in the early 1900s during engineering of the LDW. The present topography of the site is generally flat with gradual slopes downward to the east and northwest, away from the central part of the site (Port of

Seattle 1992a). The average ground surface elevation is approximately 19 feet mean lower low water (MLLW).

The majority of the container yard on the Eastern Parcel of T-108 is paved, however some portions are covered with gravel (Map 2). The southern half of the Western Parcel of T-108 is paved or covered with gravel. The paved and graveled areas on the Western Parcel were formerly used as part of the Lafarge bulk cement terminal and as a parking lot associated with the Diagonal Avenue S STP (discussed in Section 3.5). Currently, a thick layer of soil covers much of the paved/graveled portion of this parcel, and ConGlobal uses some of the area for chassis lay-down and storage (Appendix A, Photos 5, 7, and 8). The majority of the northern portion of the Western Parcel is unpaved and is covered with vegetation including grass, low lying shrubs (predominantly blackberries) and trees (Appendix A, Photo 6).

The T-108 shoreline is approximately 1,200 ft (or 0.23 mi) long. The bank elevation of the northern and central portions of the shoreline varies from 0 to 10 ft (Port of Seattle Datum) (Port of Seattle 1993). The bank elevation of the southern portion of the shoreline, which includes the mitigation area, varies from approximately 4 to 18 ft (Port of Seattle Datum). The northern and central portions of the T-108 shoreline are armored with riprap, gravel, and other materials (Appendix A, Photo 15). Along the south-central portion of the shoreline, to the north of the mitigation area, the shoreline is partially armored with riprap and a wooden bulkhead which runs parallel to the shoreline. The bulkhead is not well-anchored and is slanted away from the shoreline (Appendix A, Photos 12 and 13). Within the park and mitigation area, the T-108 shoreline is primarily unarmored, with the exception of gravel (habitat mix) scattered along the perimeter (Appendix A, Photo 10).

Two outfalls points are located along the T-108 shoreline boundary. One is an active storm drain outfall that drains the southern portion of the Western Parcel (Port of Seattle outfall 2225 on Map 2), located in the vicinity of the wooden bulkhead (Appendix A, Photo 13). The second is an abandoned outfall formerly associated with the Diagonal Avenue S STP, located to the north of the active outfall (former Diagonal Avenue S STP outfall 2002 on Map 2; Appendix A, Photo 14). In addition, a wooden box frame structure in an extreme state of disrepair was observed in approximately the middle of the shoreline. The former purpose of this structure is not known.

The intertidal portion of the shoreline (ranging between elevations 5 and -10 MLLW depending on location along the subject property's shoreline) is composed predominately of mudflats that gently incline toward the navigation channel. Debris including wood, metal, brick, plastic, glass, and wiring is visible in the shoreline banks and in the mudflat area.

The T-108 public access and habitat mitigation area was constructed in the late 1980s by excavating the bank shoreline. It is approximately 1 acre in size and includes approximately 420 ft of shoreline, at an elevation ranging from 8 to 18 ft. A vegetated buffer surrounds a U-shaped mudflat area that extends into the LDW (Appendix A, Photos 9 and 10). A buoy line is present along the mouth of the mitigation area to prevent debris from washing into the site. Vegetation within the public access and mitigation area is routinely maintained by Port maintenance crews and appears to be healthy, and the area provides fish and wildlife habitat. The public access area extends to a public parking area located at the end of Diagonal Avenue S which also includes a lawn area, picnic tables, a launch for hand-carried boats, and interpretive signage. Existing trees on the eastern perimeter of the public access area provide visual screening from the rest of T-108 and E Marginal Way S (Appendix A, Photo 9).

2.3 Geology and Hydrogeology

The following section provides a brief overview of the subsurface conditions at the subject property and discusses the basics of the property's hydrogeological features. A more detailed discussion is available in the various site investigation reports cited as reference throughout the section.

2.3.1 Geology

T-108 is located within the Duwamish River valley which was formed approximately 15,000 years ago by the retreat of the glaciers that covered the Puget Sound region (Booth and Herman 1998). Sediment originating from the Osceola mudflow off Mt. Rainier as well as other sources from surrounding mountains and hills was carried into the valley by the ancestral White River over a period of several thousand years. Between 1913 and 1917, the LDW was created by dredging a channel for the waterway and filling adjacent floodplain areas. Fill was placed using both mechanical and hydraulic methods, and consisted primarily of dredge spoils produced during channelization of the LDW. Fill materials may have included soil and other geologic materials that were a by-product of other land development projects inland from the Duwamish River, such as re-grading projects, as well as other waste materials of the time including refuse. Glacial scouring, natural sedimentation, earthquakes, and human engineering projects have all influenced the geology of T-108 and surrounding areas. Numerous subsurface investigations have been completed which have identified the various hydrogeologic components that comprise the subject property.

A review of soil borings logged during development of monitoring wells on the property indicate that the shallow hydrostratigraphic units present at T-108 consist of fill materials underlain by tidal marsh deposits (Pacific Groundwater Group 2007a). The fill material was reported as a predominantly heterogeneous deposit extending from the ground surface approximately 10 to 15 feet to the top of the tidal marsh deposits (Pacific Groundwater Group 2007a; Dames & Moore 1988). The upland fill is described as brown to black, loose to medium dense, moist to wet, very fine to medium-grained sand and silty sand (AGI 1992a; Pacific Groundwater Group 2006c). The fill includes zones of significant organic content, localized cementation, and variations in percentage of silt and gravel content. During subsurface investigation at the property, the fill was usually identified by the presence of significant volumes of sand and anthropogenic materials, with a lack of peaty material. The fill potentially consists of hydraulic fill, dredge spoils from the former river channel, and potentially some volume of sewage sludge (Port of Seattle 1992a).

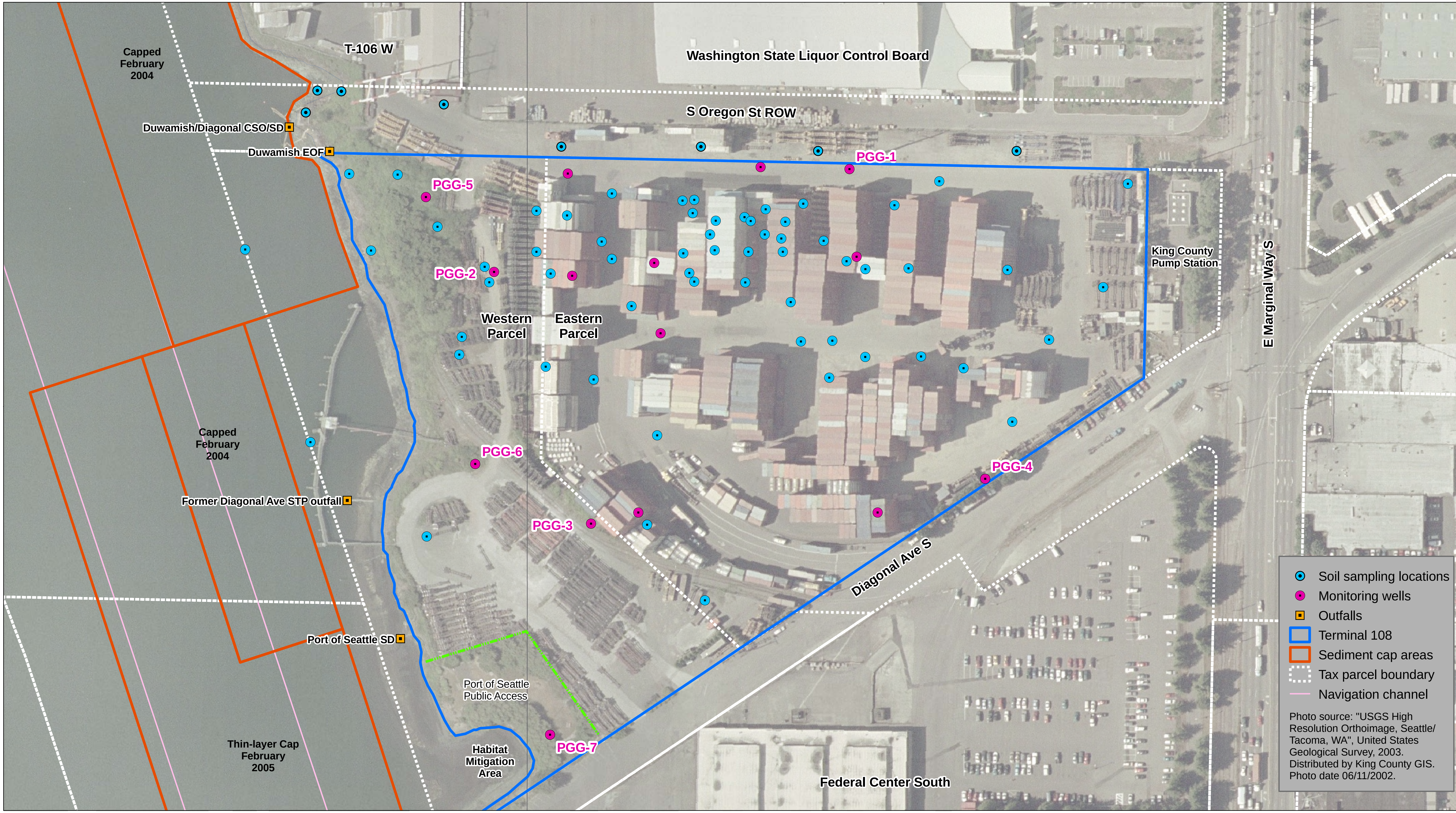
During advancement of monitoring wells on the property in 2006, tidal marsh deposits were distinctive and easily identified as compact silts intermixed with peaty grass and root materials (Pacific Groundwater Group 2006c). The tidal marsh deposits were described as compact sandy silt with peat (organic material). Outcrops of tidal marsh deposits are visible along the shoreline near mean sea level (Appendix A, Photo 14). In the observed outcroppings, the deposits consist of sandy silt with a high organic content (peat). The tidal marsh deposits underlie the fill material at T-108 from between 10 to 20 ft below ground surface (bgs). These deposits are brown to gray, very soft to soft, moist to wet, and composed of organic silts and clays.

Along the T-108 shoreline, various outcrops of fill that lacked peaty material was identified. The fill was described as silty sand predominantly gray in color containing significant amounts of sand and anthropogenic materials. Tidal marsh outcrops were also identified near mean sea level along the shoreline. These deposits are generally light brown in color and peat material is often visible. Boring logs from past subsurface investigations for the T-108 subject property are contained in Appendix C.

Several previous investigations have identified and described the alluvial deposits that underlie the marsh deposit layers. The alluvial deposits represent remnants of the former Duwamish River channel, of which the subject property was a part prior to development of the LDW. The alluvial materials range from black, loose, wet, fine grained sands to gray, medium stiff, wet, and very fine grained sandy silts (Pacific Groundwater Group 2006c).

2.3.2 Hydrogeology

The fill layer discussed in Section 2.3.1 is the uppermost water-bearing unit of the subject property. This unit is often referred to as the shallow aquifer in investigation documentation. Monitoring wells installed on T-108 have been completed in this shallow aquifer unit (Appendix A, Photo 6 is a representative groundwater well at T-108); groundwater is typically observed in this unit at approximately 10 ft bgs. Groundwater near the LDW within this shallow unit is tidally influenced. Groundwater flow patterns in the shallow aquifer have been observed over the course of several years of investigation; groundwater appears to flow radially from a relative high in the north-central portion of the subject property (roughly between groundwater monitoring wells PGG-1 and PGG-2 on Map 3).



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Map 3. Groundwater well and soil sampling locations

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Table 1 provides a summary of water level measurements over time for PGG wells 01 through 07 at the subject property. These seven wells are the most recently completed wells at the property and analytical information from these well locations is considered the most representative of current conditions at the subject property relative to source control. A groundwater contour map based on levels from these wells locations is provided as Map 4. Successive mapping of the groundwater contours at the subject property derived from years of investigations have indicated that groundwater in the shallow aquifer in the Western Parcel generally flows toward the LDW. However, in the Eastern Parcel, groundwater moves from a relative high in the center of the Eastern Parcel radially in all directions, but predominately to the north and east.

Table 1. T-108 groundwater and shoreline soil investigation monitoring well construction and water level summary

PARAMETER	PGG-1	PGG-2	PGG-3	PGG-4	PGG-5	PGG-6	PGG-7
General							
Ecology unique ID	APQ 005	APQ 002	APQ 004	APQ 006	APQ 007	APQ 003	APQ 001
Installation dates	6/6/2006	6/5/2006	6/5/2006	6/6/2006	6/6/2006	6/5/2006	6/5/2006
Development volume, gallons (approx.)	1.75	6.25	35	<0.5	15	25	20
Bailed dry at, gallons (approx.)	1	3.75	NA	<0.5	NA	NA	NA
Coordinates[a]							
Northing	209009.5	208857.2	208484.3	208550.9	208967.95	208572.9	208171.9
Easting	1267978	1267451	1267595	1268180	1267349.68	1267423	1267534
Elevations[b]							
Monument elevation (north rim)	15.4	19.25	13.68	15.59	23.45	15.53	12.59
Measuring point (PVC) elevation	15.04	18.82	13.26	15.21	22.81	15.03	12.24
Top of screen elevation	11.9	15.8	10.2	12.1	12.6	12	8.6
Bottom of screen elevation	5.4	8.8	2.7	5.6	2.6	3	2.1
Depths							
Top of screen, feet bgs	3.5	3.5	3.5	3.5	8	3.5	4
Bottom of screen, ft bgs	10	10.5	11	10	18	12.5	10.5
Depth of borehole, ft bgs	10.5	14	13.5	10.5	20	13	14
Round 3 Water Level Snapshot – 2/19/07							
Time of measurement	9:19 a.m.	10:12 a.m.	NA	9:33 a.m.	10:22 a.m.	10:04 a.m.	9:45 a.m.
Depth to water (ft bgs)	8.84	7.39	NM	8.34	17.9	9.17	5.99
Groundwater elevation [b]	6.2	11.43	NM	6.87	4.91	5.86	6.25
Time of tide observation[c]	9:18 a.m.	10:12 a.m.	NA	9:30 a.m.	10:24 a.m.	10:06 a.m.	9:42 a.m.
Tide elevation [b]2	8.29	6.19	NA	7.83	5.73	6.41	7.34

Round 4 Water Level Snapshot – 5/29/07							
Time of measurement	8:54 a.m.	9:35 a.m.	NA	9:08 a.m.	9:25 a.m.	9:45 a.m.	10:01 a.m.
Depth to water (ft bgs)	9.13	9.22	NM	8.96	18.93	9.69	6.74
Groundwater elevation[b]	5.91	9.6	NM	6.25	3.88	5.34	5.5
Time of tide observation[c]	8:54 a.m.	9:36 a.m.	NA	9:06 a.m.	9:24 a.m.	9:42 a.m.	10:00 a.m.
Tide elevation[b]	0.33	-0.46	NA	0.04	-0.31	-0.54	-0.68

[a] Horizontal datum: NAD 83/(91), Washington Coordinate System, North Zone, based on the published coordinate values of WSDOT Monument No. 3295 and WSDOT No. 3294 as published on the WSDOT Website during September 2006.

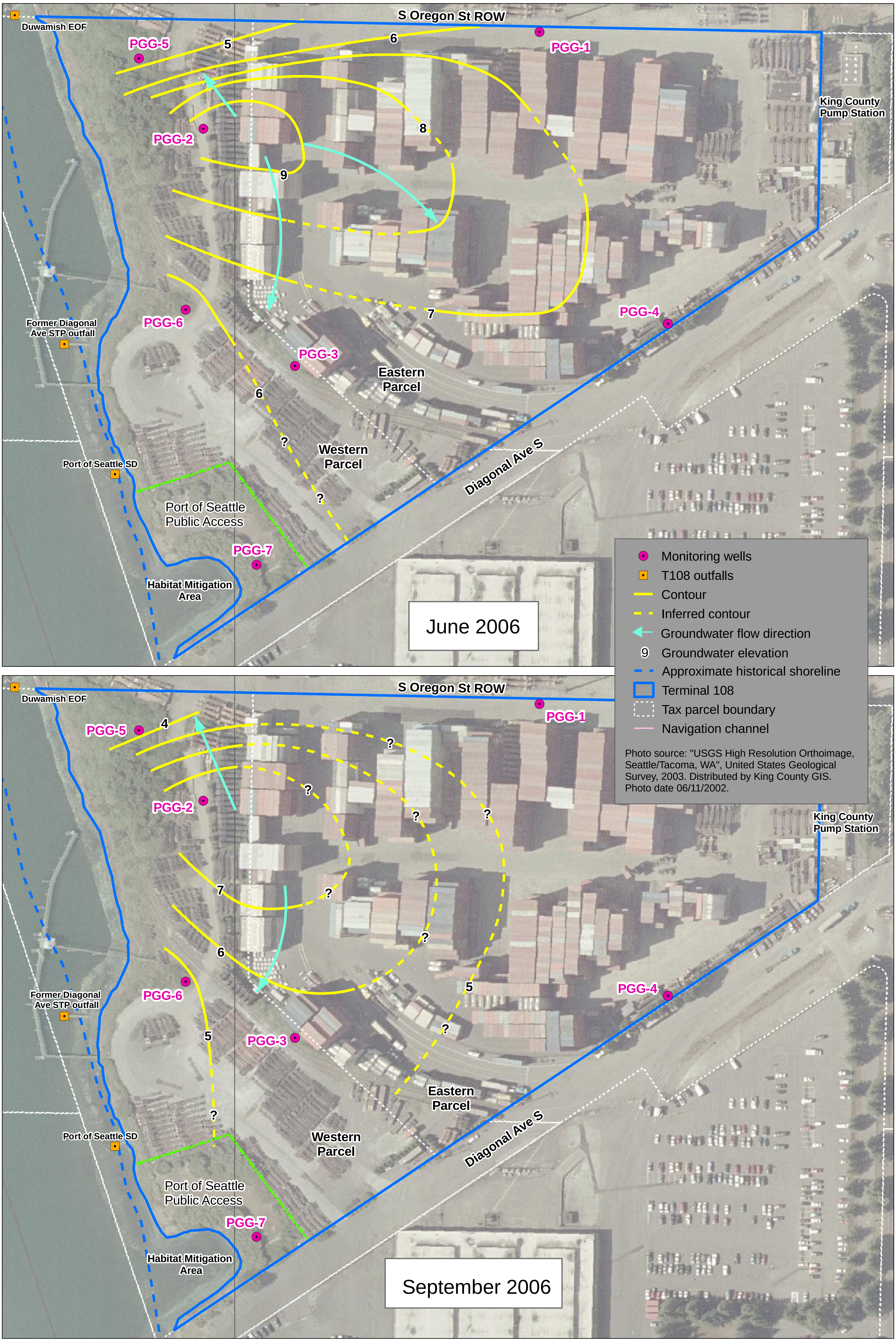
[b] Vertical Datum: MLLW. Elevations (monument, measuring point, top of screen, bottom of screen) presented in this table are correctly reported to MLLW and should replace elevations incorrectly presented in the Interim Report (PGG, 2006).

[c] Observed tide at Seattle Station ID 9447130 (ferry terminal) as reported by NOAA.

bgs – below ground surface; NM – not measured, PGG-3 wellhead damaged before Round 3

ID – identification

PVC – polyvinyl chloride



0 100 200 Feet

0 20 40 Meters

N

Scale is the same for each inset map

Map 4. Groundwater contour maps, Pacific Groundwater Group wells (June and September 2006)

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Historical aerial photographs of the subject property (see Appendix B) identify a former tidal channel that extended from the LDW, along or adjacent to the north of the present day S Oregon Street ROW, and into the subject property (AGI 1992a). It is unclear where the channels exact terminus existed, but some of the aerial photographs indicate it may have extended to E Marginal Way S and potentially received runoff from the street and areas farther east. One source reported that the channel received untreated sewage discharge from small sewer system that was located to the northeast of T-108 (King County et al. 2005a). The aerial photograph from 1946 (Appendix B) shows a facility located to the northeast of T-108 along Diagonal Avenue S that may represent this reported sewer system; however, this could not be confirmed during the course of this investigation.

The tidal channel entered the subject property along the eastern boundary and extended through the northeast portion of the Eastern Parcel, passing outside of the property boundary near the center of the northern boundary of the parcel (near PGG-1; see map 3 for reference). Based on available information, the channel was likely filled between 1962 and 1976 (Pacific Groundwater Group 2006a); the channel was most likely backfilled when the Duwamish/Diagonal CSO/SD stormwater and sewer lines were installed in 1966 and 1967 (King County et al. 2005a).

Assuming that coarse-grained materials were used as backfill, the relic channel may be locally influencing groundwater flow in the shallow aquifer unit by providing a preferential pathway for flow. Ultimately the discharge point for this flow path is most likely the LDW, near the present day location of the Duwamish/Diagonal CSO/SD and the Duwamish emergency overflow (EOF).

2.4 INFRASTRUCTURE AND CONSTRUCTED SITE FEATURES

Current T-108 site features are associated with the existing container storage and maintenance facility on the Eastern Parcel and a former parking lot and bulk cement terminal on the Western Parcel, plus areas of chassis and miscellaneous material storage. The container storage and maintenance facility on the Eastern Parcel includes a paved and graveled container storage yard, a paved maintenance area, and access roadways and railway spurs for loading and unloading cargo. In total, approximately nine acres of paved area are used for cargo container storage operations and approximately five acres are graveled (the nine acres of paving includes areas in the S Oregon Street ROW and T-106W not included in the acreage of the subject property).

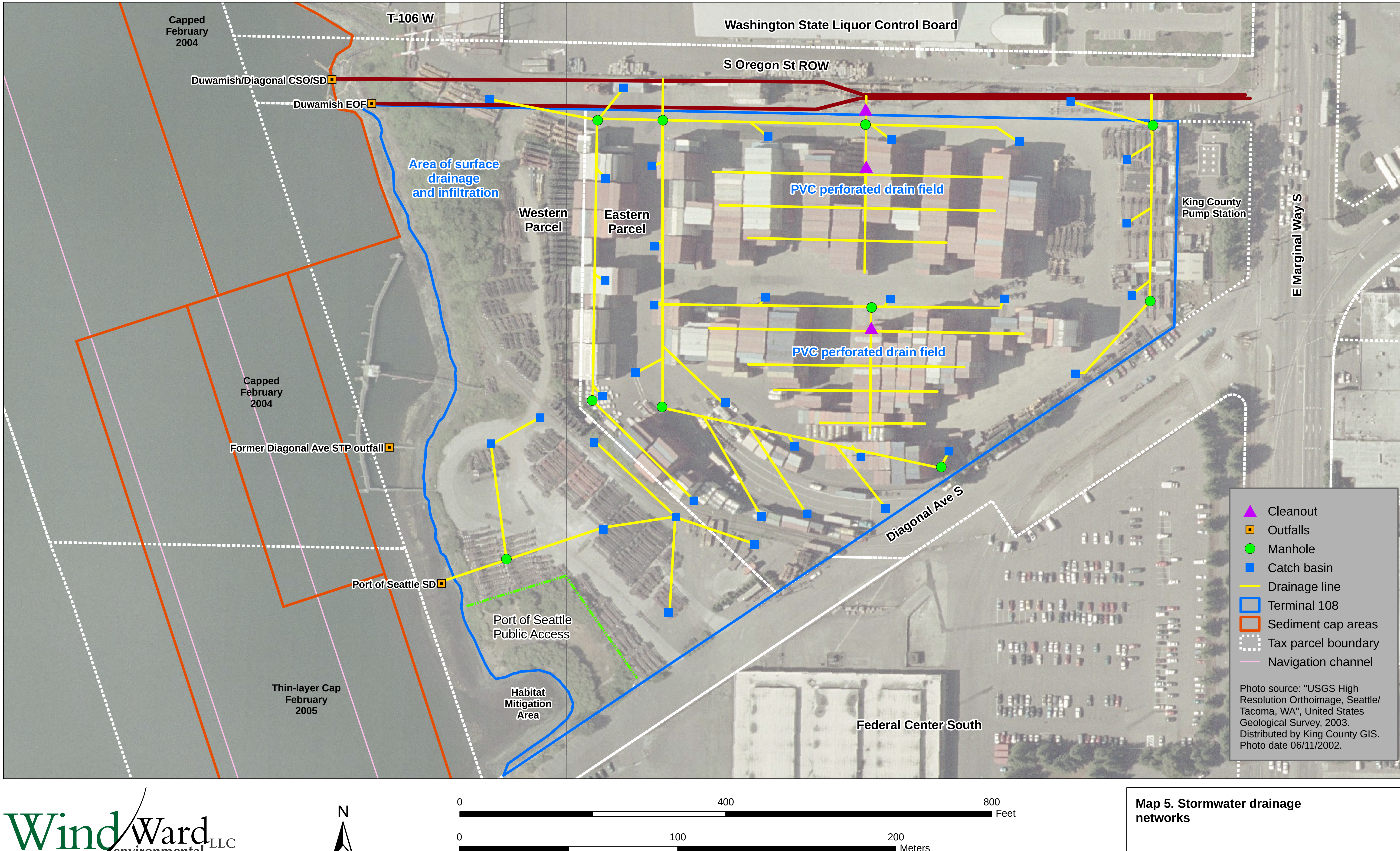
A four-lane entry extends from Diagonal Avenue S into the southern portion of the Eastern Parcel (Map 2). Access to the northern portion of the T-108 cargo yard can be gained from the Diagonal Avenue S ROW. The T-108 container storage and maintenance facility is linked to the adjoining T-106W, located to the north, by an access roadway extending the S Oregon Street ROW. An office trailer is located in the southeast corner of the maintenance yard in the Eastern Parcel but no permanent structures have been constructed on the Eastern Parcel. The Eastern Parcel is surrounded by chain-linked fencing and light posts are dispersed throughout the container yard.

A network of storm drainage lines, catch basins, manholes, and oil/water separators support drainage for the paved and graveled areas of the Eastern Parcel. The drainage system was installed in 1993 by the Port when the Port redeveloped the property for use as a container storage yard. The drainage system consists of City of Seattle-approved catch basins in a 100-ft by 150-ft grid pattern. Lines of highway grade perforated polyethylene pipe were installed beneath the areas of gravel during redevelopment of the property to collect stormwater that infiltrates in the areas where the cargo containers are stored. The perforated pipes are located approximately 2.5 ft bgs (note that the highest groundwater level measured at T-108 in 2007 was 5.99 ft bgs [Table 1]); therefore, groundwater is not expected to infiltrate the perforated piping). The perforated pipes interconnect with a combination of 18- and 24-inch-diameter pipes that collect stormwater runoff in the paved areas supported by the catch basins. All stormwater collected in the Eastern Parcel is routed through an approved oil/water separator prior to discharge into the Duwamish/Diagonal SD piping beneath the S Oregon Street ROW. This piping ultimately discharges into the LDW 100 ft northwest of the subject property. Surface runoff from the Eastern Parcel tends to collect in the eastern portion of the site (within the area of the maintenance yard) which is topographically lower than the remainder of the property (Pacific Groundwater Group 2006c).

ConGlobal maintains an industrial stormwater NPDES permit (No. SO3-010569) and has prepared a stormwater pollution prevention plan (SWPPP) to manage stormwater discharges to the Duwamish/Diagonal CSO/SD system. Additional information on the NPDES permit and SWPPP is included in Section 3.6.

Improvements on the Western Parcel of T-108 are primarily associated with its former uses. The southern portion of the Western Parcel was paved in the early 1960s for use as a parking lot (Port of Seattle 1988). A drainage system consisting of catch basins and a storm drain (Port outfall 2225) was also installed at this time to drain stormwater from the parking lot (Map 5).

In the early 1990s, Lafarge Canada, Inc. (Lafarge) installed a bulk cement terminal on the Western Parcel. The terminal was installed on existing paved areas (a former parking lot) which drained to an existing SD outfall. A catch basin was installed by Lafarge for the truck wash-down area; this catch basin was plumbed to the sanitary sewer (Port of Seattle 1988). The paved areas and catch basins, as well as remnants of the truck wash-down area, remain on the Western Parcel. In addition, Lafarge constructed a pier and pneumatic conveyor system offshore of T-108 in approximately the center of the shoreline. These features are still present although not currently in operation (Map 2).



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Map 5. Stormwater drainage networks

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A railroad spur, approximately 1,100 feet long, spans both the Eastern and Western Parcels of T-108. The spur extends from the southern property boundary and crosses Diagonal Avenue S before joining the existing Union Pacific Railroad track on the south side of Diagonal Avenue S. On T-108, the spur extends west and north to a loading platform in the northwest corner of the Western Parcel. On the Eastern Parcel, the rail spur runs along the boundary between the two parcels and terminates near the northern property border. The rail spur is not currently in use. Chain link fencing borders the majority of T-108 (both the Eastern and Western Parcels).

3 Property Ownership and Operational History

The area currently comprising T-108 was created from the flood plain of the Duwamish River between 1913 and 1917, at the time of construction of the LDW; however, based on historical aerial photographs, the site was otherwise undeveloped as of 1936 (Appendix B). The first documented development and use of the site occurred in 1938 when the property was developed as the Diagonal Avenue S STP.

Over the years the property has been used for various industrial purposes and has had several different owners and operators. Since 1980, ownership and operation of the property has been split between two parcels, an Eastern Parcel and a Western Parcel (Map 2). Both parcels are currently owned by the Port. The Eastern Parcel is approximately 11 acres in size and the Western Parcel is approximately 9 acres in size.

Information in this section is derived from documents on file at Ecology and the Port, as well as historical documentation of the Diagonal Avenue S STP (Brown and Caldwell 1958), documents prepared in association with the Duwamish/Diagonal CSO/SD sediment area cleanup, and documents prepared as part of the source control strategy for the LDW. Information from documentation on site use at T-108 prior to the Port's ownership period (beginning in 1980) is included when available. Several of the documents reviewed for information on property development and use were planning documents prepared for the purposes of acquiring permits. In some cases it is unknown whether all planned development activities were completed. Several historical sources provided conflicting or incomplete information. The property ownership and operational history presented for T-108 in this report are intended to be as complete and accurate as possible; however some inaccuracies and uncertainties may be present and are identified accordingly. Figure 1 provides a visual timeline of the subject property's ownership, operational, and environmental investigation history.

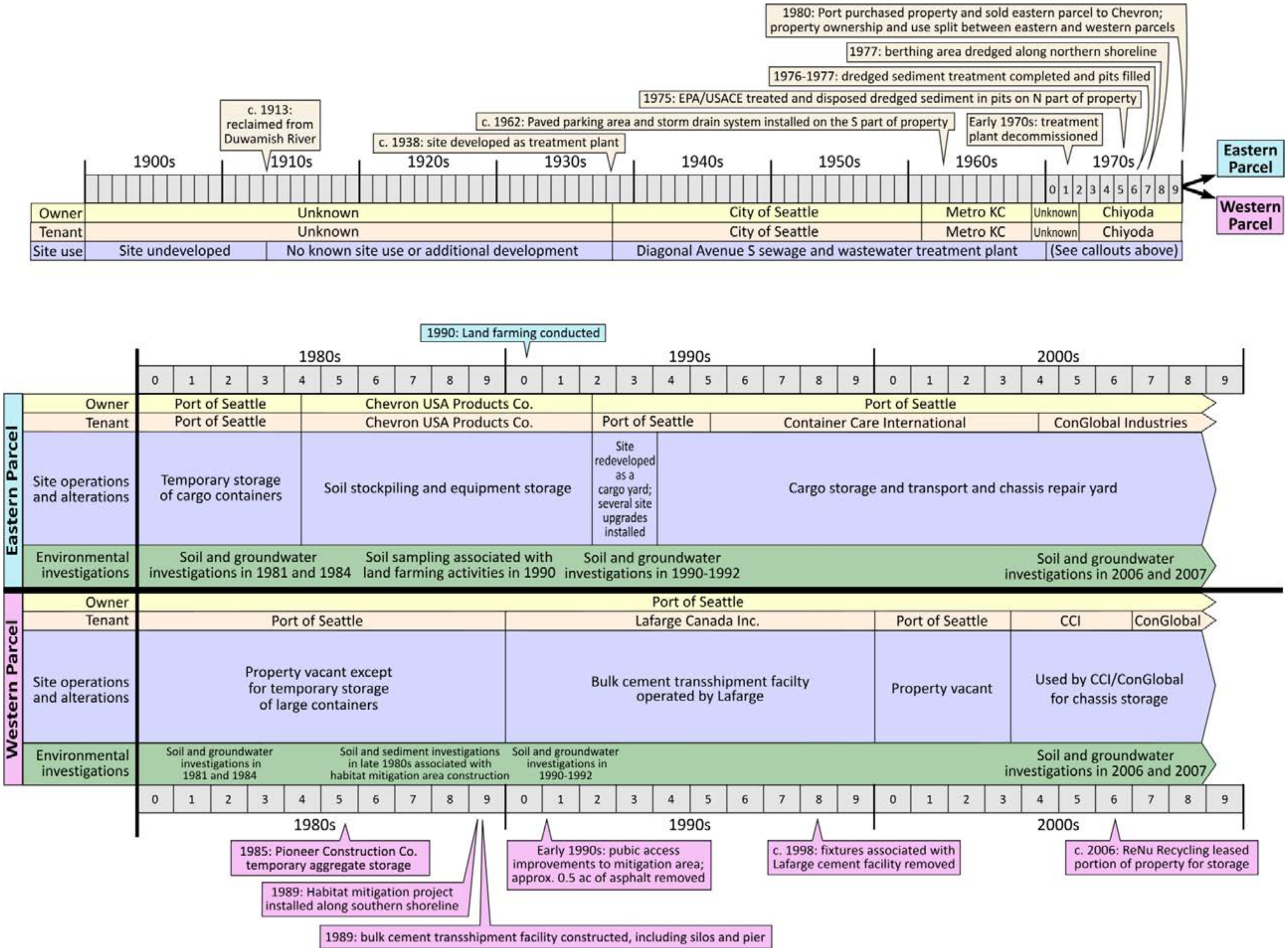


Figure 1. T-108 timeline: ownership, operations, and environmental investigations

3.1 PRE-INDUSTRIAL HISTORY

Until the 1850s, the Duwamish River and surrounding areas supported fishing, hunting, and trapping activities of various Native American Tribes. Historically, the Black, Green, and White Rivers all contributed to the flow of the Duwamish River, with the Black and Green Rivers being tributaries to the White River, which was tributary to the Duwamish. The original Duwamish drained an area of approximately 1,640 square miles as it meandered through grasslands, floodplains, wetlands, and tidal marshes prior to emptying into Elliott Bay.

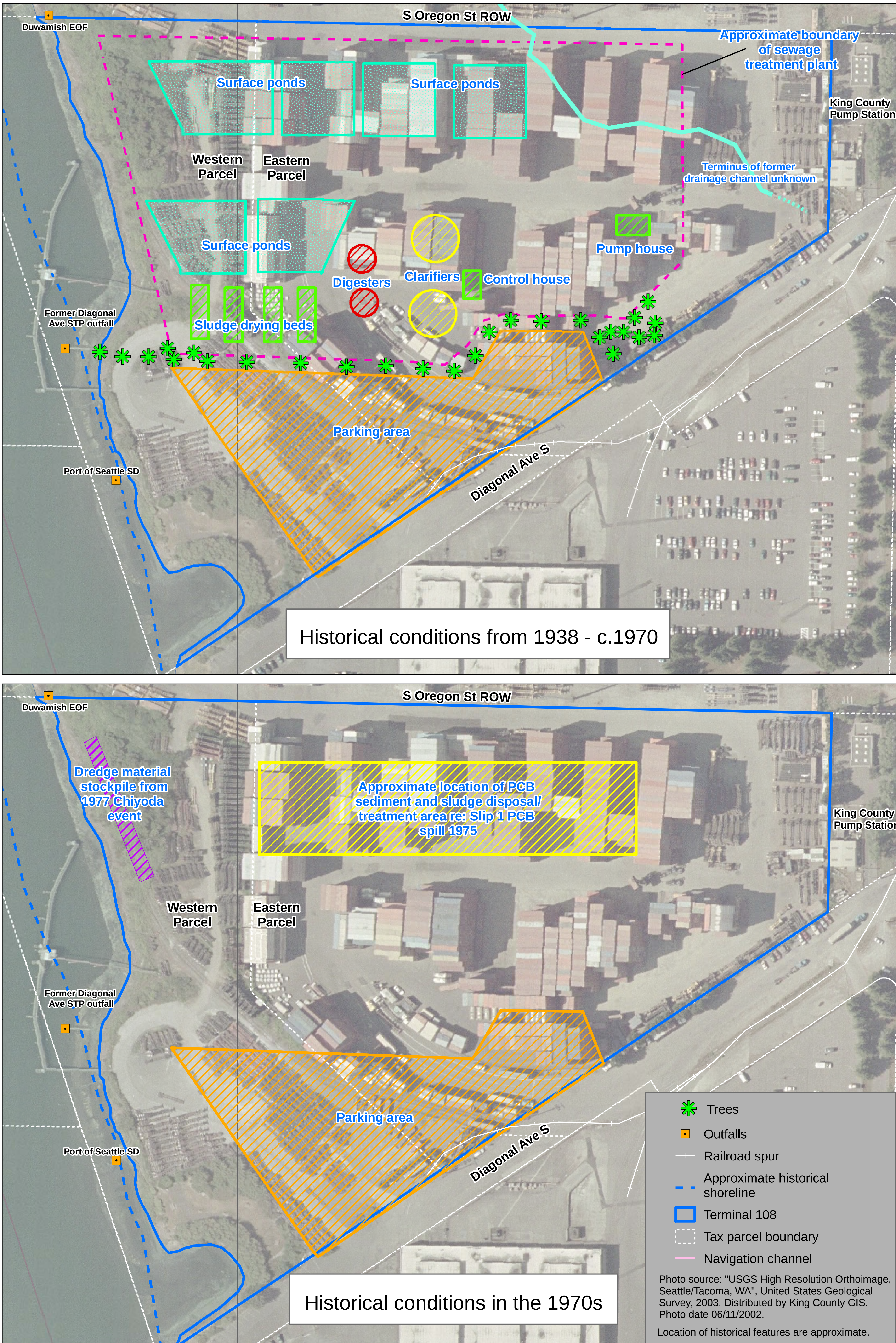
People of European descent arrived in the region in the 1850s and began clearing the shoreline and draining the adjacent freshwater and tidal marshes to facilitate farming activities. Logging emerged as a profitable venture, and docks and shipping infrastructure were built along the banks of the Duwamish. Because flooding in low-lying areas remained a concern in the early 1900s, levees and dams were installed to control water flow. Additional efforts to control river flooding led to several changes in the hydrology of the Duwamish River. The White River was diverted to the Puyallup River, the Cedar River was rerouted to flow into Lake Washington, and the Black River was reduced to a small stream with the construction of the Lake Washington Ship Canal and the resulting lowering of the water level in Lake Washington. The Green River remained as the only tributary to the Duwamish River.

Between 1913 and 1917, the Duwamish River was channelized and dredged to form the LDW. The land on which T-108 now exists was once tidal marsh that was reclaimed through the placement of fill materials during this time period (AGI 1992b, citing Dames and Moore 1981). Channelization and dredging of the river increased the levels of industrialization of the area as berthing of large ocean-going vessels became possible. Commercial interest of the waterway's shoreline expanded, and residential areas sprung up in what had been farmland adjacent to the river.

The first known use of the T-108 property was as the Diagonal Avenue S STP, owned and operated by the City of Seattle until 1962. The plant began operations in 1938 (Ecology 2004a). Documentation regarding the use of the T-108 property prior to 1938 has not been identified.

3.2 DIAGONAL WAY SEWAGE TREATMENT PLANT

From 1938 to 1962, the City of Seattle operated the Diagonal Way STP on the current location of the T-108 subject property. Between 1962 and 1969, Metro assumed operation of the facility and made improvements to the plant (King County et al. 2005a). This facility had the capacity to receive eight million gallons of sewage and stormwater per day (mgd) and was the primary sewage treatment and discharge facility for the industrialized and downtown portions of the City of Seattle. The location of the treatment plant is shown on Map 6 (approximate locations of major facility features) and in aerial photos from 1946, 1953, 1961, and 1970 (Appendix B).



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0 100 200 Feet
0 20 40 Meters

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Map 6. Historical site features 1938 – c. 1970, 1970s

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Treatment facilities comprising the treatment plant included two large clarifiers and two digesters located in approximately the center of the subject property, glass-covered sludge drying beds to the west of the clarifiers and digesters, a control house adjacent to the east of the clarifiers and digesters, and a pump house on the eastern portion of the property (TAMS 1992; Brown and Caldwell 1958) (Map 6; Appendix B – 1946 aerial). The pump house associated with the Diagonal Avenue S STP is different from the current King County pumping station located adjacent to and east of present day T-108.

As mentioned previously, historical aerial photographs identify a former tidal channel that extended from the LDW, along or adjacent to the north of the present day S Oregon Street ROW, and into the subject property (AGI 1992a). According to information on the construction and operations of the Diagonal Avenue S STP, this drainage channel was not used for water intake or effluent discharge from standard plant activities. The channel may have received untreated sewage from a small sewer system located to the northeast of T-108 (King County et al. 2005a), not associated with the Diagonal Avenue S STP.

Historically, a raw sewage trunk line extending west from E Marginal Way S carried wastewater to the former control house and clarifiers. Wastewater was treated in the clarifiers and digesters and the sludge was then pumped into open ponds and drying beds on the northern portion of the property (Dames & Moore 1988). The size, location, and configuration of the sludge ponds changed over the years as observed in aerial photographs (Appendix B). Primary-treated effluent was discharged into the LDW through a 30-inch steel outfall located approximately mid-way along the property shoreline (see former Diagonal Avenue STP outfall 2002 on Maps 2 and 6; Appendix A, Photo 14; and Appendix B). A parking lot area was constructed on the southern portion of the property around 1962 (Port of Seattle 1988). A drainage system was installed in association with the parking area, including an 18-inch concrete outfall (Port outfall 2225 on Map 2).

The Diagonal Way STP was closed by 1970 when construction of the West Point Wastewater Treatment Plant (WWTP) was completed and sewage and wastewater was re-routed to that facility. As part of the construction of the West Point facility, the Duwamish Pumping Station was constructed adjacent to and east of T-108 and the Diagonal Way CSO/SD and Duwamish EOF were installed beneath the S Oregon Street ROW. The structures and above-ground clarifiers were demolished and removed in the early-1970s. The digesters were reportedly filled and left in-place (Port of Seattle 1992a). Sludge up to five feet thick was left in the sludge ponds and drying beds on the northern portion of the property and subsequently covered with fill material (Dames & Moore 1988; AGI 1992b). The source of the fill material has not been identified during the review of historical documentation.

3.3 CHIYODA CORPORATION INTERNATIONAL OWNERSHIP (C. 1972-1980)

Chiyoda acquired the T-108 subject property in the mid-1970s and planned to construct a chemical manufacturing plant with a loading dock on the site. Although shoreline dredging was conducted by Chiyoda in anticipation of the manufacturing plant, it was never constructed because the company failed to acquire the necessary permits for the shore-based dock (King County 2002).

In 1974, approximately 265 gallons of PCB oil consisting of Aroclor 1242 were spilled into Slip 1 of the LDW (upstream of T-108) when an electrical transformer owned by the United States Air Force was damaged while being loaded onto a barge owned by the Alaska Puget United Transportation Company under contract to the Navy Military Sea Transportation Service (King County et al. 2005a; EPA 1975). Neither the US government nor the Puget United Transportation Company would claim responsibility for the spill, so EPA took control as the On-scene Coordinator for the spill cleanup. The majority of the spilled PCB material (approximately 250 gallons) was dredged from the bottom of the LDW and transferred to a trailer mounted portable treatment plant stationed on the southern portion of the Federal Center South facility.

Additional dredging was conducted by EPA and USACE between 1974 and 1976 to remove LDW sediments contaminated with the residual PCB material (approximately 20 gallons not removed during the initial cleanup effort). According to the interim groundwater and shoreline soil investigation final work plan report completed for T-108 by PGG, Chiyoda agreed to allow the EPA and USACE to store and treat approximately 10 million gallons of dredged sediment slurry on the subject property (Pacific Groundwater Group 2006c). A historical record of this agreement was not identified through the course of this investigation.

To accommodate treatment and disposal of the dredged sediment, USACE excavated two pits were excavated on the northern portion of the T-108 property near the location of a large former sludge pond (see Map 6 and Appendix B). The pits were reported by the Pacific Groundwater Group (PGG) to have been excavated to depths of 10 to 12 ft deep based on a review of a 1976 topographic map (2006c). PCB-contaminated sediment slurry was pumped into the southwest corner of the western pit where solids were allowed to settle out. The liquid portion of the slurry was then decanted into the eastern pit and pumped to a holding pond and treatment unit. From there it was pumped back into the LDW. PCB Aroclor 1242 concentrations in the dredged sediment within the western pit ranged from 146 mg/kg at the slurry intake point in the southwest corner of the pit, to 33 mg/kg in the pit interior (Pacific Groundwater Group 2006c). The location of the holding pond and treatment unit are not known.

The sediment treatment process was completed and USACE filled the pits by 1977. After treatment, water was pumped back into the LDW, however the solids that had settled out within the holding pits (primarily the western pit) were left in place and the pits were subsequently covered with fill material (Pacific Groundwater Group 2006c).

The fill consisted of the material excavated during pit construction and from other sources (see paragraph that follows). It has been estimated that between 7,000 and 8,000 cy of sediment dredged during the PCB spill cleanup were buried in the holding pits, and that in total, this included approximately 170 gallons of PCBs (Pacific Groundwater Group 2006c). In 1980, Chiyoda sold the T-108 property to the Port.

In 1977, Chiyoda cut back and dredged the northern portion of the T-108 shoreline to improve berthing (see Appendix B); the new shoreline was approximately 100 ft further inland from the extent of the shoreline before dredging (King County 2002). It is estimated that 80,000 cubic yards (cy) of material was dredged from the area (King County et al. 2005a). Based on a review of historical aerial photographs, it appears that the southern extent of the dredging likely ended in the vicinity of the former Diagonal Avenue S STP outfall (Maps 2 and 6). Dredged material was stockpiled on the northern portion of the Western Parcel (see Map 6 for approximate location), and was also used to fill the dredged sediment pits, fill nearshore areas, and level the site of the former Diagonal Way STP.

3.4 Ownership and Operational History (1980-2008) – Eastern Parcel

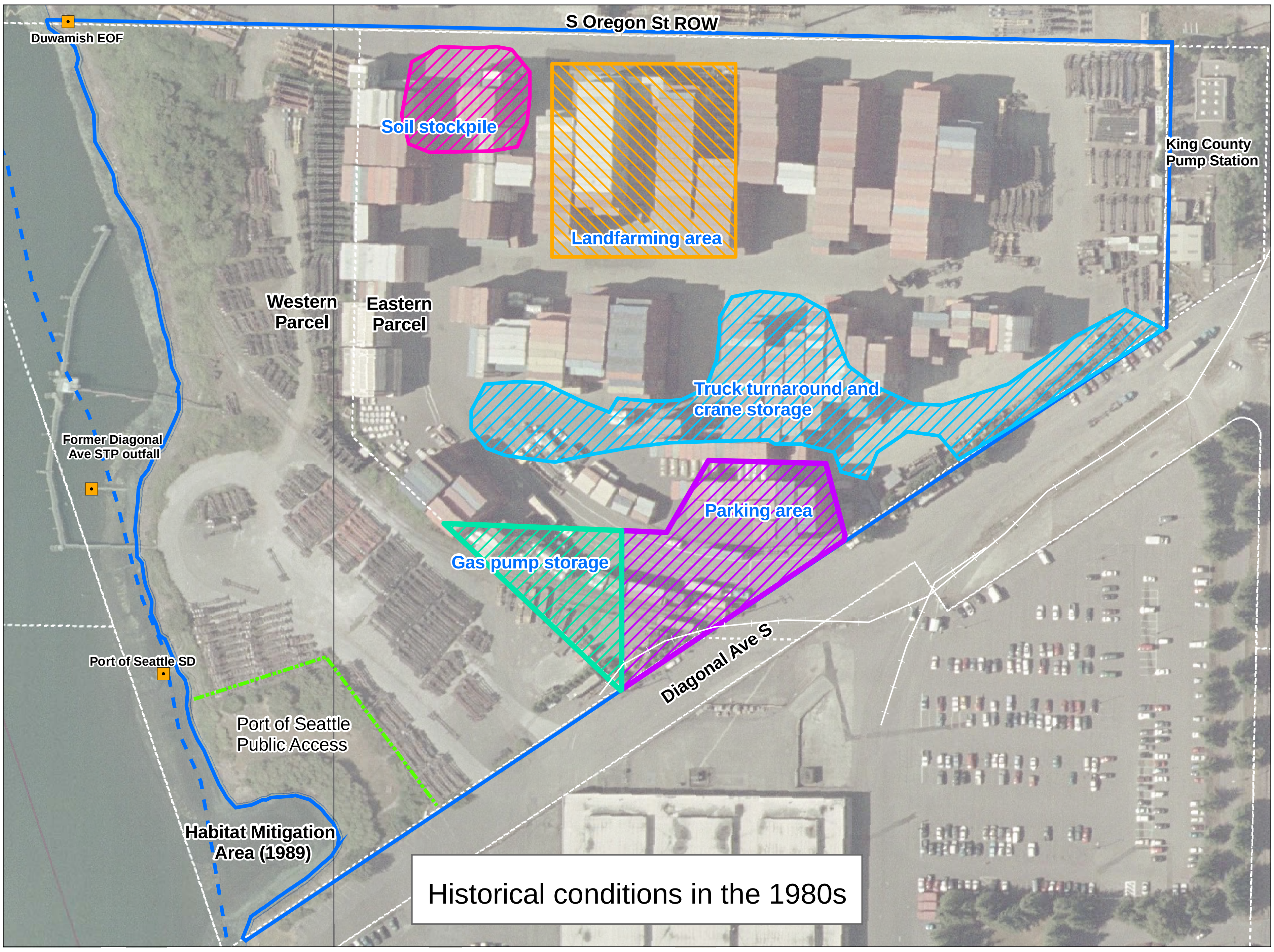
The subject property was first subdivided into the Eastern and Western Parcels in the early 1980s. Since that time, ownership of the Eastern Parcel traded between the Port and Chevron a few times in the 1980s and 1990s. Since 1992, the Eastern Parcel has been owned by the Port and leased as a container terminal.

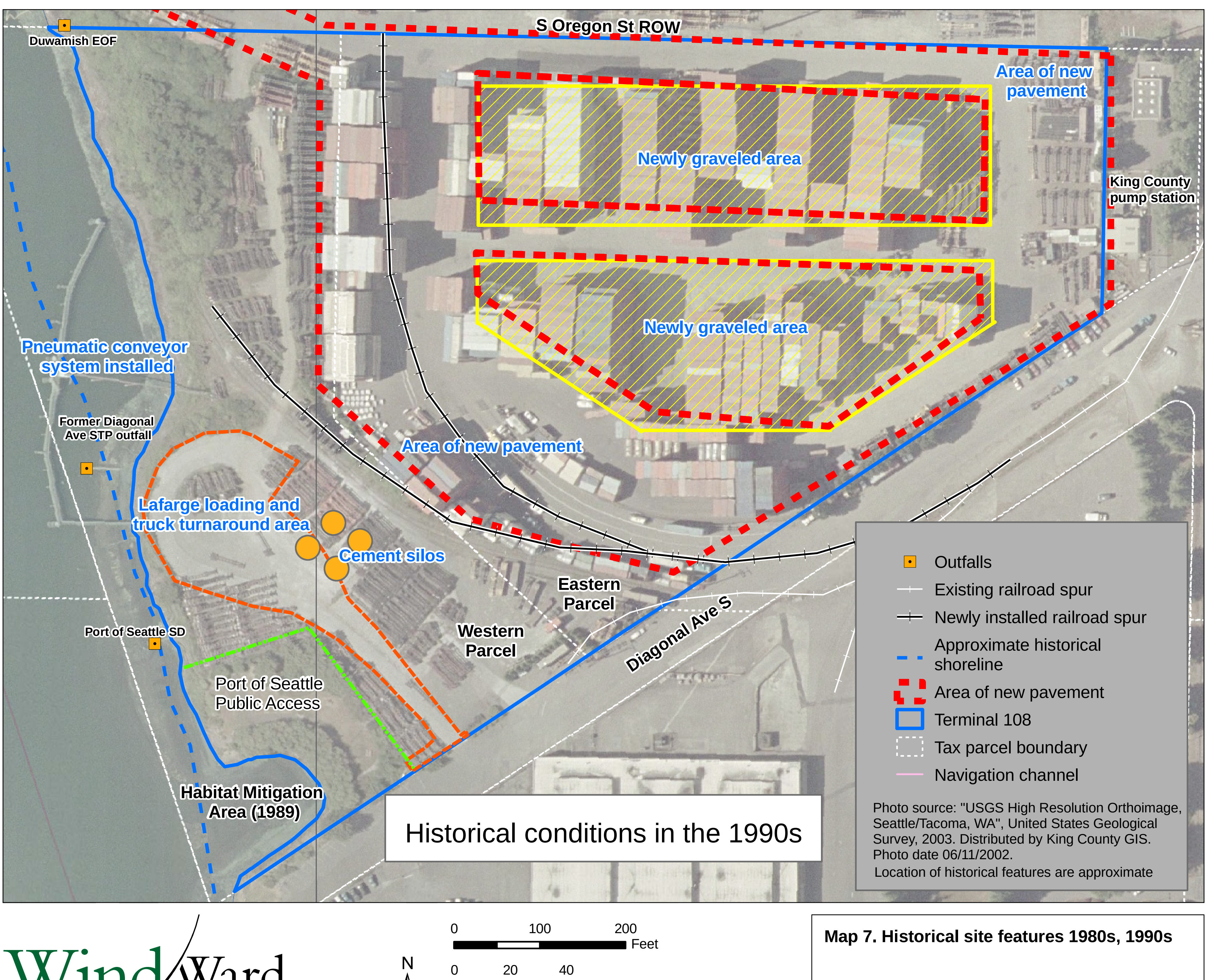
3.4.1 Port of Seattle Ownership (1980-1984)

The Port acquired the subject property from Chiyoda in 1980. Based on a historical aerial photo from 1981, the paved southern portion of the property and a small area in the central portion of the property were used for container storage (Appendix B). No additional information regarding the use of the Eastern Parcel during this time period was identified.

3.4.2 Chevron USA Products Company Ownership (1984-1992)

In 1984, Chevron USA Products Company (Chevron) acquired the Eastern Parcel of T-108 as part of a deal in which the Port acquired Pier 32 (formerly Terminal-30/Chevron). This is the first time that property ownership was split between the Eastern and Western Parcels. Chevron used the Eastern Parcel from 1984 to 1992 to stockpile soil and store equipment. Gasoline station equipment, including cranes and gasoline pumps, were stored on the southern portion of the parcel (Map 7) (Port of Seattle 1992a). The area was also used for automobile parking. One or two mobile office trailers were located on the Eastern Parcel during Chevron's ownership. Soil stockpiles and equipment storage areas are visible in aerial photographs from 1990 (Appendix B).





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Map 7. Historical site features 1980s, 1990s

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The northwestern portion of the parcel was used by Chevron to treat soil contaminated with petroleum hydrocarbons using a technique called land-farming for approximately six months in 1990. Approximately 1,400 cy of soil excavated from a local service station that had been contaminated by a leaking underground fuel storage tank was treated by land-farming (Thorne Environmental 1990); the approximate location where the land-farming activity occurred is presented on Map 7 and visible on the aerial photograph from 1990 (Appendix B).

Prior to the onset of land-farming activities, analytical samples were collected from the soil stockpile and the surface soil in the proposed land farming area. Total petroleum hydrocarbons (TPH) were detected above Ecology cleanup standards of 200 parts per million (ppm) in the soil stockpile (Thorne Environmental 1990) (Appendix C). Total xylenes, ethylbenzene, barium, and cadmium were also detected in the soil stockpile; PCBs, benzene, toluene, arsenic, chromium, lead, mercury, selenium, and silver were not detected (Thorne Environmental 1990). Gasoline and benzene, toluene, ethyl benzene, and xylene (BTEX) constituents were not detected in surface soil samples collected from the proposed land-farming location; however, PCBs were detected in five out of the six samples (with a maximum total PCB concentration of 6.90 ppm) (Pacific Environmental Group 1991).

The soil was placed in a 200-square ft area located at approximately the same location as the PCB dredge sediment disposal pits that were created to treat impacted sediment from the 1975 PCB spill at Slip 1. The aerial photo from 1990 shows the land farming area in the northern portion of the parcel (see Appendix B). Prior to placing the petroleum-contaminated soils onsite, a clay cap was installed in the designated land-farming area (Map 7) to prevent the possibility of contaminating the soils to be land-farmed with other contaminants that might have been present on the property (Dames & Moore 1988). The clay cap had a surface approximately two ft thick and varied from an elevation of approximately 15 to 17.5 ft (Dames & Moore 1992). The soil was land-farmed until petroleum hydrocarbon concentrations in the soil were below MTCA Method A cleanup screening levels. TPH concentrations of the land-farmed soil ranged from 42-190 mg/kg, TPH-gasoline concentrations ranged from non-detected to 28 mg/kg, and BTEX constituents were not detected (Pacific Environmental Group 1991) (Appendix C). The stockpiled soil was distributed on the Eastern Parcel of T-108 to a thickness of approximately 1 to 2 ft (Dames & Moore 1992).

After land-farming activities were completed, soil samples were also collected beneath the treatment area to determine whether native soil conditions had been affected by land-farming activities (Appendix C). TPH concentrations ranged from 15 to 100 mg/kg, TPH-gasoline was not detected, and BTEX constituents were not detected (Pacific Environmental Group 1991). PCB 1248 was detected at concentrations ranging from 106 to 9.3 mg/kg. These results suggest that native soil was contaminated with TPH because of land-farming activities but that the contamination was below Ecology cleanup levels.

In 1992, the Port purchased the Eastern Parcel of T-108 back from Chevron and redeveloped the property for use as a container terminal. Permitting documentation for development of the container terminal indicated that the land-farmed soils would be removed and disposed of at an approved off-site facility prior to redevelopment (Port of Seattle 1992a); therefore, it is assumed at this time that the land-farmed material is no longer present on the T-108 property.

3.4.3 Port of Seattle Ownership – Eastern Parcel (1992-1997)

In the early 1990s, the Port redeveloped the Eastern Parcel of T-108 for use as a container storage and chassis repair yard to accommodate CCI in expanding their operations from T-106W (located adjacent to the northwest of T-108). The redevelopment involved construction of a paved access road across the S Oregon Street ROW to connect the two Port properties, construction of a 4-lane truck access road extending from Diagonal Avenue S onto the southern portion of the Eastern Parcel, construction of a rail spur extending from the rail line along the south side of Diagonal Avenue S to the northwest corner of the container terminal, and re-surfacing much of the parcel with asphalt pavement and gravel for container storage and transport (Port of Seattle 1992a). These improvements are visible on aerial photographs from 1995 and subsequent years (Appendix B). Improvements were also made to the stormwater drainage system including installation of an oil-water separator, catch basins, and new subsurface piping; this drainage system is discussed in Section 2.4.

In order to ensure subsurface materials would be geotechnically suitable to support future land use as a cargo container storage and transport yard, approximately 5,000 cubic yards (cy) of soil and fill material, including the soil land-farmed during Chevron's ownership of the property, was removed from the property between 1992 and 1993 (as indicated by the permit for the effort), and replaced with newly-imported fill material (Port of Seattle 1992a).

Development of the container terminal was completed by 1995. CCI's operations included unloading cargo from barges and loading it onto trucks and railcars for transport. In addition, chassis repair and maintenance operations also occurred at the eastern portion of the Eastern Parcel during CCI's occupation of the property. Hazardous substances handled on the property in association with these activities included (but were not necessarily limited to) chlorofluorocarbon (CFC) 11/12, Freon 12, paint, paint thinner, oils, lubricants, and fuel products (Container Care International 1993).

In 2004, CCI merged with another depot operator called Global Intermodal Systems to form ConGlobal Industries (ConGlobal). ConGlobal assumed operation of both T-108 and T-106W at this time. For a brief period, ReNu recycling also leased approximately 2 acres of the southern portion of the Eastern Parcel of T-108 for use as temporary storage for trucks and roll-off bins (Pacific Groundwater Group 2007a). The ReNu lease was transferred to ConGlobal in August 2007.

3.5 OWNERSHIP AND OPERATIONAL HISTORY (1980-2008) – WESTERN PARCEL

The Port purchased the Western Parcel of T-108 from Chiyoda in 1980 and has maintained ownership of the property since that time. Between 1980 and 1985, the parcel remained vacant, with the exception of some container storage limited to the southern, paved portion of the parcel in the early 1980s. In 1985, the Pioneer Construction Materials Co. (Pioneer) was permitted to use the site as a temporary construction aggregate storage area for a period of approximately six months (Taylor 1985). The aggregate was unloaded from barges using a portable stacker/conveyer system and subsequently loaded onto trucks for transport to a construction site along I-90. The aggregate originated from Pioneer's gravel pit in Steilacoom, Washington and is assumed to have been free of contaminants when brought to the site.

In the late 1980s, a habitat project was constructed along the southern portion of the T-108 shoreline to mitigate for loss of habitat at another Port property (T-30). Approximately 12,400 cy of sediment and soil were cut out of the existing shoreline bank to create the 12,300 square foot (SF) intertidal shoreline habitat area located immediately north of Diagonal Avenue S (Port of Seattle 1985b) (Map 7). The majority of the soil and sediment removed during construction of the mitigation site was approved for open-water disposal in Elliott Bay. Approximately 200 cy of the excavated material was found to be contaminated and required disposal at an approved upland site (Ecology 1987). According to Port staff, contaminants in the soil were primarily metals and PAHs and were thought to be related trash (cans, broken glass, and other debris) dumped at the Diagonal Avenue S street end. Additional details (including the analytical results) of the sampling conducted in the mitigation area prior to its construction are not currently available. After the soil and sediment excavation was completed, approximately 1,500 cy of clean rock and structural fill were installed at the mitigation area to stabilize the bank.

Between 1989 and 1998, Lafarge leased the Western Parcel from the Port for use as a bulk cement transshipment facility. The facility was constructed in the early 1990s and was located on the southern half of the Western Parcel of T-108 (Map 7). Lafarge used the facility to transport bulk cement from barges to trucks and rail cars for distribution.

Several site improvements were made during development of the Lafarge facility. A barge moorage pier and pneumatic conveyor system were constructed offshore in the LDW, approximately in the center of the parcel shoreline (see Map 7 and Appendix B). A product transfer tower, four dry cement storage silos, a truck scale, and a truck wash-down area were all constructed according to permitting documentation (Port of Seattle 1988). The truck wash-down area was constructed on a concrete pad that drained to a catch basin and ultimately to the sanitary sewer. A prefabricated shed was placed on a paved area on the southwest portion of the parcel for use as an office building.

Public access improvements to the shoreline mitigation area and Diagonal Avenue S street end were also planned as part of the project. These improvements were in accordance with the Port's public access plan (Port of Seattle 1985a) and included a trail and hand-boat launch area. The wooden bulkhead observed along the property shoreline in March 2008 were associated with the public access trail (Blomberg 2008) (Appendix A, Photos 12 and 13).

Paved roadways, a rail spur, and associated loading areas were also constructed as part of the Lafarge facility improvements. According to Port staff, a covered loading area was located adjacent to the storage silos and was used to load trucks and railcars. The loading area was a shallow pit excavated beneath the rail line. Dry bulk cement that arrived to the facility by rail was unloaded into the pit and then loaded into the silos via an additional pneumatic conveyor system (Blomberg 2008). Plans for the terminal also called for construction of office and warehouse buildings, however according to Port staff and based on a review of historical aerial photographs, it does not appear that these buildings were ever constructed.

Grading and shoreline modifications were made as part of the Lafarge facility development. In order to stabilize eroding shoreline in the central and northern portions of the property, the bank was cut back above 11.5 ft MLLW and stabilized with riprap (Port of Seattle 1988, 1989). Excavated bank sediments, as well as dredge spoils along the northern portion of the shoreline (likely remaining from Chiyoda's 1977 dredging project) were graded across the northern portion of the parcel (Port of Seattle 1988). The area was then seeded/planted with vegetation to help control erosion.

Additional public access improvements were made to the mitigation area in the early-1990s. These improvements were made to compensate for public access restrictions to the S Oregon Street ROW implemented during development of the container storage facility on the Eastern Parcel of T-108 (Port of Seattle 1992a). Public access enhancements included removal of approximately a half acre of asphalt near the mitigation area, installation of additional native plantings, and installation of other human-use features such as picnic tables and interpretive signage (Port of Seattle 1992a).

In the late 1990s, Lafarge removed the bulk cement facility fixtures and transported them for use in Eastern Washington. The fixtures removed included the storage silos, office shed, truck scale and wash-down area, and rail car loading equipment (Port of Seattle 1999). Beginning around 2002 or 2003, CCI used a portion of the parcel as a chassis storage area.

3.6 CURRENT OPERATIONS AT T-108

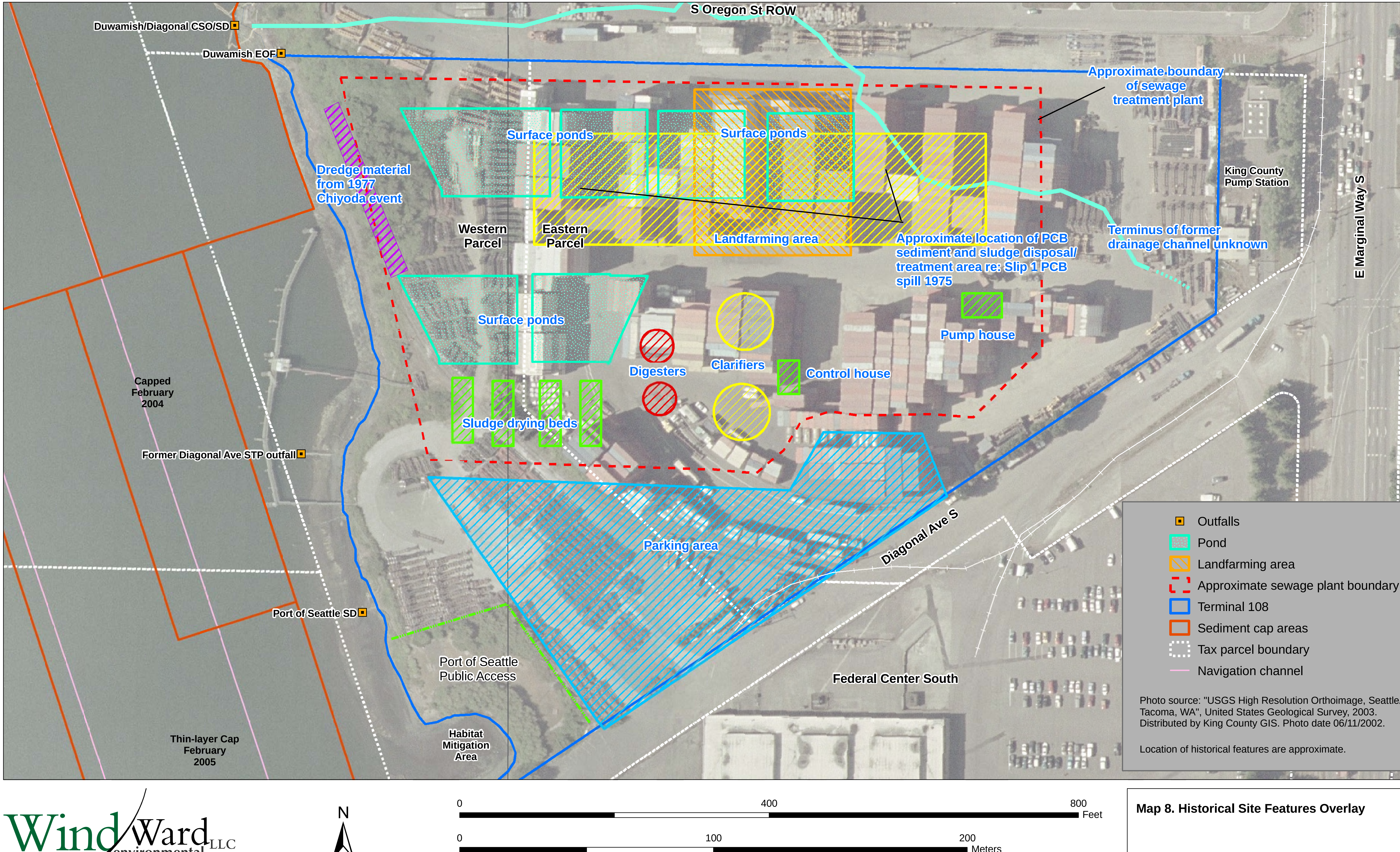
ConGlobal is currently the only tenant at T-108, and the company continues to operate a container terminal on the Eastern Parcel. Containers are stored throughout the Eastern Parcel and maintenance is conducted on the eastern end of the parcel (Appendix A, Photo 2). A fueling area, which includes two aboveground storage tanks (AST) containing diesel (one 300-gallons and one 600-gallons) is located on the southern portion of the Eastern Parcel. An additional 1,200-gallon AST is also located in this area.

ASTs are regulated based on the requirements outlined in the Code of Federal Regulations (CFR) (40 CFR 112 – Spill Prevention, Control, and Countermeasure Plans).

ConGlobal also leases the majority of the Western Parcel for use as a chassis storage and lay-down area (Appendix A, Photos 7 and 8). The public access park and mitigation area remain on the southern portion of the Western Parcel and are not included in the ConGlobal lease area (Appendix A, Photos 9 and 10). For reference purposes, Map 8 provides a comprehensive presentation of the historical site features (presented on Maps 6 and 7) overlying the current conditions of the T-108 subject property. Map 9 expands this comprehensive presentation to include the locations of previous soil and groundwater sample locations.

As of April 2008, ConGlobal maintains an industrial NPDES stormwater permit (No. SO3-010569) and a SWPPP for management of stormwater discharges from the container terminal to the Duwamish/Diagonal CSO/SD system has been prepared. ConGlobal also maintains an SPCC plan to be implemented in the case of a hazardous materials release. The purpose of the NPDES permit, SWPPP, and SPCC plan is to reduce the potential for stormwater contamination resulting from industrial activities conducted at the facility. Ecology conducted a stormwater compliance inspection at the facility on June 5, 2008. Several modifications to the SWPPP were required after the inspection.

Best management practices (BMPs) are implemented to reduce stormwater pollution, and inspections and stormwater sampling are conducted as required under the NPDES permit and associated SWPPP. Stormwater samples are analyzed for total zinc, oil and grease, turbidity, total suspended solids (TSS), and pH. In addition, total copper and total lead are analyzed if the benchmark for zinc is exceeded during two consecutive sampling events. The chassis repair area and equipment fueling areas on the Eastern Parcel are covered by the NPDES permit and SWPPP; the portions of T-108 used only for storage, office space, and parking are not covered.



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Map 8. Historical Site Features Overlay

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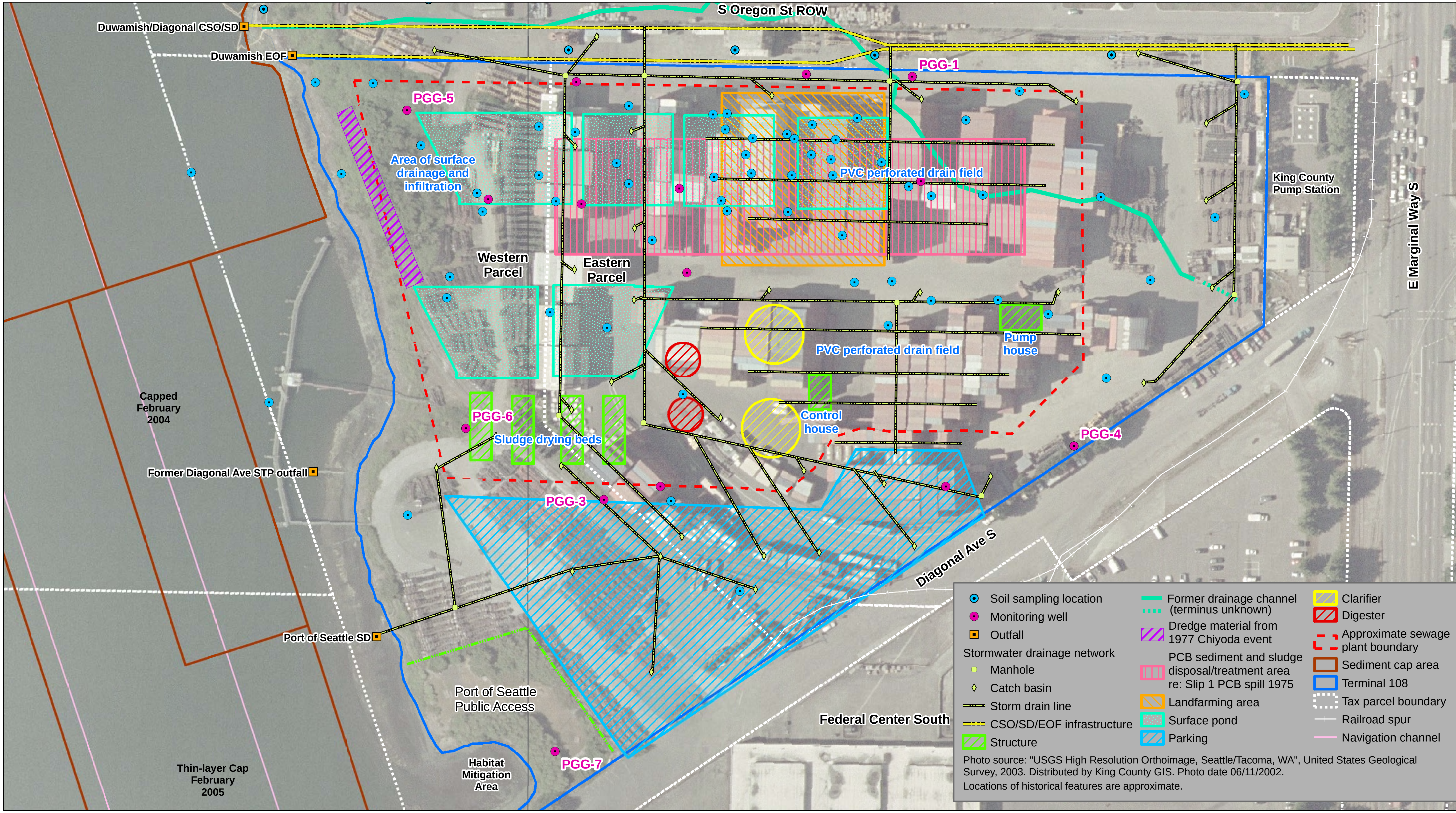

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0 250 500 Feet

0 100 200 Meters

Map 9. Historical site feature overlay, previous sample locations, and current drainage features

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4 T-108 Environmental Conditions and Investigation Information

Since the early 1980s, numerous environmental investigations have been completed at the subject property and at properties within its immediate vicinity. Environmental investigations have included sampling and analyses of soil, groundwater, seep water, bank soil, and nearshore sediment. Although samples have been collected over the majority of T-108, much of the investigation work has concentrated on the northern portion of the subject property, in the vicinity of the former landfarming and PCB sludge disposal and treatment areas.

The following sections provide an overview of previous sampling events completed at the subject and adjacent properties. The information in the section has been presented to assist with overall evaluation of the subject property, in order to develop an effective, long-term source control strategy. The particular data discussed in the follow sections are provided in more detail in Appendix D (T-108 related data) and Appendix E (relevant adjacent property data). This section and Appendix E also provide information on the rights-of-way surrounding the subject property and the stormwater outfalls within the vicinity of T-108.

4.1 Environmental Data Summary for T-108

In 2006, PGG completed a review and summary of historical soil and groundwater data for T-108 as part of their work plan for additional soil and groundwater sampling to be conducted on the property in 2006 and 2007 (Pacific Groundwater Group 2006c). The following soil and groundwater data summaries are based on the PGG work plan and the data reports summarizing PGG's recent environmental investigations at T-108 (Pacific Groundwater Group 2006b, 2007a).

4.1.1 T-108 soil

Several soil and groundwater investigations have been conducted on T-108 since the 1980s. Data are available from several historical investigations including Dames and Moore investigations from 1981 and 1984, PEG investigations from 1990, and an investigation by Applied Geotechnology, Inc. (AGI) in 1991 (Appendix D). PCBs, TPH (gasoline and diesel), toluene, ethylbenzene, and xylenes, thirteen individual PAHs, arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, thallium, and zinc have historically been detected in soils at T-108. Of these chemicals, only cadmium was detected above MTCA industrial cleanup levels.

Soil conditions at T-108 were recently investigated by PGG (Pacific Groundwater Group 2006b). The locations sampled, PGG-2, PGG-5, PGG-6, and PGG-7, are shown on Map 3. PCBs (Aroclors 1248, 1254, and 1260), petroleum hydrocarbons (gasoline, diesel, and lube oil), 17 individual PAHs, arsenic, cadmium, chromium, copper, lead, nickel, and zinc were all detected. Of these, only diesel-range hydrocarbons, lube oil-range hydrocarbons, and cadmium were detected above MTCA Method A industrial soil cleanup levels. Sample location PGG-2, located adjacent to the west of the PCB sediment disposal area, exceeded MTCA Method A industrial cleanup levels for diesel-range hydrocarbons and cadmium in the 9-10.5 ft bgs interval. The other exceedance (for cadmium) occurred in the 0.5-2 ft bgs interval in sampling location PGG-7, located at the southern portion of the Western Parcel near the mitigation area (Map 3).

4.1.2 T-108 groundwater

Historical groundwater investigations were conducted on T-108 by Dames and Moore in 1981 and 1984 (Dames & Moore 1984) and by AGI in 1991 and 1992 (AGI 1992a, 1992b). Groundwater data from the Dames and Moore reports were not included in the PGG work plan, but data from the 1984 investigation are included along with other historical data in Appendix D of this report. Groundwater data from the 1981 Dames and Moore investigation were not identified during the course of this investigation; however, according to a site assessment summary report completed for Chevron in 1992, PCB Aroclor 1242 was detected at 0.9 µg/L in one of six groundwater monitoring wells sampled by Dames and Moore in 1981 (AGI 1992a). The well in which Aroclor 1242 was detected was located in the south-central portion of the approximate PCB sludge disposal area. Groundwater samples collected by Dames and Moore in 1984 did not contain PCBs at concentrations above the 1 µg/L detection limit (Dames & Moore 1984); the locations of these historical groundwater wells were not identified during the course of this investigation. PCBs were not detected in groundwater samples collected from T-108 by AGI in 1991 or 1992 (Appendix D).

Groundwater monitoring results from the AGI investigations in the early 1990s identified petroleum hydrocarbons (diesel and gasoline) in wells located on the northern portion of the property. Gasoline-range hydrocarbons did not exceed MTCA Method A cleanup levels; diesel-range hydrocarbons did exceed MTCA Method C cleanup levels in one well located approximately 100 ft south of the sediment disposal pit area. BTEX constituents were also detected in groundwater samples collected within or near the sediment disposal pits; however, concentrations were below MTCA Method C industrial cleanup levels.

PAHs were historically detected in groundwater samples collected from wells on the northern portion of T-108. Total carcinogenic PAH (cPAH) toxic equivalents (TEQs) exceeded the MTCA Method C cleanup level in three wells located to the east and south of the sediment disposal pit area, and one well within the disposal pit area in 1991. Total cPAH TEQs were below MTCA Method C in all wells when re-sampled in 1992 (Pacific Groundwater Group 2006c).

Arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc were detected in historical T-108 groundwater samples. Arsenic and cadmium were each detected above MTCA Method C cleanup levels; arsenic exceeded MTCA in a well near the northeast corner of the Eastern Parcel, and cadmium exceeded MTCA in two wells, one located approximately 100 ft south of the sediment disposal pit area, and one located along the northern boundary of the sediment disposal pit area. In addition, arsenic exceeded the MTCA Method C cleanup level in three historical wells sampled by Dames and Moore in 1984 (Dames & Moore 1984); the locations of these wells are not known. In their work plan, PGG stated that historical groundwater samples collected at T-108 were likely unfiltered and therefore biased high (Pacific Groundwater Group 2006c). In addition, historical samples were not collected with the low flow method and therefore likely contained entrained soils which could also biased analytical results.

In 2006 and 2007, PGG installed seven new monitoring wells and sampled groundwater during four monitoring rounds. The data from these sampling events are presented in Appendix D. PCBs were not detected in any of the wells during all four sampling rounds with the exception of Aroclor 1016, which was detected above MTCA Method A cleanup levels in one well in the second sampling round (PGG-2 on Map 3). This sample result was rejected due to poor sample quality (Pacific Groundwater Group 2006b). The sample was considered to be of poor quality because the well pumped dry several times during sampling, and it was concluded that soil particulates were likely introduced into the sample. In addition, due to a lab/chain-of-custody error, the sample was analyzed after its holding time had elapsed.

Petroleum hydrocarbons and BTEX constituents were not detected in any of the wells sampled during the four sampling rounds. Non-carcinogenic PAHs were detected in two wells in the first round of sampling but were not detected in the following three rounds. Carcinogenic PAHs were detected in two wells (PGG-2 and PGG-5) during the second round of sampling. The results from well PGG-2 were rejected due to poor sample quality for the reasons discussed above (Pacific Groundwater Group 2006b).

Total and dissolved arsenic, chromium, copper, nickel, and zinc were detected in multiple monitoring wells during all four sampling rounds. Within the first two rounds of sampling, total and dissolved arsenic were detected above MTCA Method A cleanup levels in wells PGG-1 and PGG-2 (Map 3). Total arsenic was also detected above MTCA Method A in well PGG-5 in the first sampling round. Total lead was detected above MTCA Method A in well PGG-1 in the first round of sampling. All detected metals concentrations in rounds three and four were below both MTCA Method A cleanup levels and the groundwater screening levels developed by Ecology for the protection of LDW sediments (Pacific Groundwater Group 2007a). Based on the 2006 and 2007 groundwater monitoring results, PGG recommended that groundwater monitoring be discontinued and that the groundwater pathway be considered closed as a source to LDW sediments (Pacific Groundwater Group 2007a). Ecology recently acknowledged that groundwater at the subject property was not considered a potential source of contamination to LDW sediments (Pacific Groundwater Group 2007a).

4.1.3 T-108 bank soil

In 2005, King County collected two bank soil samples (DUD-30C and DUD-31C) from the northern portion of the T-108 shoreline (Anchor 2007) (see Appendix D, Tables D-8 and D-9). No information was provided regarding the tidal elevation at the time of sampling, or the condition of the bank where samples were collected. PCBs (Aroclors 1248, 1254, and 1260) were detected in both samples; however, the dry weight (dw) concentrations were below the MTCA Method A cleanup level for unrestricted land use. The OC-normalized concentration of total PCBs was greater than the CSL in one of the samples. The total organic carbon content of this sample was 1.05%.

One individual low-molecular-weight PAH (LPAH) (i.e., phenanthrene) and all nine individual high-molecular-weight PAHs (HPAHs) analyzed for were detected; however, total LPAH and HPAH concentrations were below the SQS concentrations. Arsenic, cadmium, chromium, copper, lead, mercury, silver, and zinc were all detected in bank soil; however, only mercury was detected above the SQS (in one sample). Bis(2-ethylhexyl) phthalate (BEHP), butyl benzyl phthalate (BBP), and di-n-butylphthalate were detected but were below the SQS. Phenol and benzoic acid were both detected above the CSL, and 1,2-dichlorobenzene was detected in one of the two bank samples at a concentrations below the SQS.

4.1.4 T-108 seep data

Dames and Moore collected two seep samples from the T-108 shoreline in 1984 (Dames & Moore 1984). One of the maps was missing from this report; therefore, the sampling locations are not known. PCBs were not detected in either seep; however, the detection limit (1 µg/L) was above the MTCA Method A cleanup level of 0.1 µg/L. Cadmium, chromium, lead, mercury, and zinc were each detected in at least one of the seep samples. Arsenic was detected at 10 µg/L, which is above the MTCA Method C cleanup level. Lead was detected at 6 µg/L in one seep and at 5 µg/L in the other seep, and mercury was detected in one seep at 2 µg/L (no MTCA groundwater cleanup levels are available for lead for comparison). Cadmium, chromium and zinc were all detected below MTCA Method C cleanup levels. Details on how the seep samples were collected (e.g., filtered or unfiltered samples) were not available.

4.2 Relevant Information for Surrounding Properties, Roadways, and Outfall Systems

The following sections discuss relevant information pertaining to the adjacent properties, streets, and outfall networks in the immediate vicinity of the T-108 subject property. The surrounding area chosen for discussion in this section focus on those properties or facilities that may directly affect source control concerns at the subject property.

4.2.1 Adjacent properties

Environmental investigations have been conducted on several of the properties adjacent to T-108. Surrounding properties include T-106W and the WSLCB facility to the north, a King County pumping station and E Marginal Way S to the east, and the General Services Administration's (GSA's) Federal Center South facility to the south. The following section briefly discusses the operational and environmental investigation history of these adjacent properties.

4.2.1.1 Terminal 106 West – southern portion of property

Terminal 106 West (T-106W) is located across the S Oregon Street ROW to the north of T-108. It is approximately 31 acres in size. The southern portion of the property, currently operated as a container storage facility, is applicable to T-108 source control because of its proximity. T-106W includes a container repair and wash area, container lifts and stackers. The majority of the facility is covered with gravel (Port of Seattle 1992b). A portion of the northern end of the container terminal drains to the S Nevada Street storm drain system (Ecology 2004a). Available information for this property is summarized in Table 2.

4.2.1.2 Washington State Liquor Control Board

The WSLCB property is approximately 11 acres in size and is located across the S Oregon Street ROW to the north of T-108. There are two warehouse buildings on the property used for storage and distribution of alcoholic beverages and other unspecified items (King County 2008). Very little information was available regarding the past and current uses of the property, property ownership history, and environmental conditions on the property; however, according to a 1992 business letter from Barbara Hinkle, Port of Seattle Environmental Management Specialist to Barbara Ritchie, Ecology, past practices on the property, including steam cleaning of batteries and equipment may have caused contamination along S Oregon Street ROW (Port of Seattle 1992b). Available information for this property is summarized in Table 2.

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Table 2. Summary of relevant information for properties adjacent to T-108

Time Period	Ownership, Operational History, and Changes in Site Features	Environmental Investigations	Chemicals Identified in Sampled Environmental Media	Remedial Actions and Source Control Activities	References
Terminal 106 W (southern portion of property). Regulatory Listings: RCRA SQG, LUST/UST, ICR					
Late 1960s	property developed by reclaiming land from LDW; no ownership information available	unknown	na	unknown	Pinnacle Geosciences (2005)
1970	property purchased by Port of Seattle; much of site reclaimed from LDW when rock bulkhead installed and area backfilled to create approximately 900 linear ft of additional upland shoreline	unknown	na	unknown	Pinnacle Geosciences (2005), King County et al. (2005a)
1975 to 1990	Coastal Trailer Repair, Inc. leased the southern portion of the property for use as cargo container storage, repair and cleaning yard	RCRA compliance inspection by Ecology (1985) noted storage of waste oil drums and flammable solvents; generator reports dated between 1982-1990 identified wastes including lacquer thinner, oil, and waste solvent; waste handling practices at the facility were unclear	na	Coastal Trailer Repair received guidance from Ecology on cleanup of the waste oil and solvent storage areas	Pinnacle Geosciences (2005)
		soil and groundwater investigation of a compressor area and a steam-cleaning area (1990)	oil and PCBs identified in soil; lead, arsenic, PCBs, and oil identified in groundwater	soil removed from compressor area (1992)	Envirotech (1991) as cited in Pinnacle Geosciences (2005)

TIME PERIOD	OWNERSHIP, OPERATIONAL HISTORY, AND CHANGES IN SITE FEATURES	ENVIRONMENTAL INVESTIGATIONS	CHEMICALS IDENTIFIED IN SAMPLED ENVIRONMENTAL MEDIA	REMEDIAL ACTIONS AND SOURCE CONTROL ACTIVITIES	REFERENCES
1990 to 2007	Container Care International (CCI) leased property for use as a container terminal; activities included storage, cleaning, repair, and transport of cargo containers and chassis	soil and groundwater investigation related to UST removal (1992)	petroleum identified in soil and groundwater	two USTs and associated petroleum-contaminated soil removed (1991)	Applied GeoTechnology (1992) as cited in Pinnacle Geosciences (2005)
		joint site inspection by the City of Seattle and Ecology (2001) noted poor housekeeping practices associated with used oil, antifreeze, and other waster materials	no sampling conducted	unknown	Ecology (2004a)
		facility inspection by Ecology (2002)	no sampling conducted	unknown	Ecology (2004a)
		catch basin solids sample collected along the boundary of T-106W and the WSCLB property by SPU (2003)[a]	copper (30 mg/kg dw), lead (10 mg/kg dw), zinc (55 mg/kg dw), TPH-D (15 mg/kg dw), TPH-O (52 mg/kg dw), BEHP (130 µg/kg dw), and BBP (20 µg/kg dw) detected in solids sample	unknown	Schmoyer (2008)
2007 to present	ConGlobal Industries leases property for use as a container storage and repair yard	none	na	established a SWPPP and acquired a general stormwater NPDES permit from Ecology	Pinnacle Geosciences (2005)
Washington State Liquor Control Board. Regulatory Listings: None					
Unknown to 2008	property owned by the SWLCB; warehouses used for storage and distribution	catch basin solids sample collected along the boundary of T-106W and the WSCLB property by SPU (2003)[a]	copper (30 mg/kg dw), lead (10 mg/kg dw), zinc (55 mg/kg dw), TPH-D (15 mg/kg dw), TPH-O (52 mg/kg dw), BEHP (130 µg/kg dw), and BBP (20 µg/kg dw) detected in solids sample	unknown	Pinnacle Geosciences (2005), King County Parcel Viewer (online)

Time Period	Ownership, Operational History, and Changes in Site Features	Environmental Investigations	Chemicals Identified in Sampled Environmental Media	Remedial Actions and Source Control Activities	References
1950s	warehouse building constructed	unknown	na	unknown	Pinnacle Geosciences (2005), King County Parcel Viewer (online)
1999	warehouse building demolished and reconstructed	unknown	na	unknown	Pinnacle Geosciences (2005), King County Parcel Viewer (online)
2007	second warehouse building constructed	unknown	na	unknown	Pinnacle Geosciences (2005), King County Parcel Viewer (online)
King County/METRO Duwamish Pump Station. Regulatory Listings: RCRA SQG					
1946 to late 1960s	site undeveloped, owner not known; southern boundary may have been used as a parking area	unknown	na	unknown	Aerial Photo Publishers (1946), Photographer unknown (1953), Pacific Aerial Surveys (1961),WDNR (1970)
Late 1960s to present	facility owned and operated by King County (formerly Metro) as a pumping station associated with the Elliott Bay Interceptor (part of the larger West Point WWTP system,) and the Duwamish Siphon	unknown	na	unknown	Pinnacle Geosciences (2005),King County et al. (2005a),Pacific Aerial Surveys (1961),WDNR (1970)
Federal Center South/US General Services Administration: Regulatory Listings: CSCSL, Spills, VCP, LUST/UST, ICR					
c. 1931 to c. 1941	property first developed and operated as a Ford automobile production plant	unknown	na	unknown	Herrera (2001)

Time Period	Ownership, Operational History, and Changes in Site Features	Environmental Investigations	Chemicals Identified in Sampled Environmental Media	Remedial Actions and Source Control Activities	References
c. 1937 to present	U. S. government acquired property and leased space in numerous buildings on the property for use as warehouse storage, office space, vehicle maintenance, and parking; materials were loaded onto barges and other vessels at Slip 1	na	na	na	Herrera (2001)
1974 to 1976	southern portion of property adjacent to Slip 1 and the LDW used as a treatment facility to remove spilled PCBs from Slip 1 and the LDW; treatment facility consisted of dredge pumps, a mobile treatment plant, dredged material receiving and holding tanks, and a clarifier; 215 barrels of contaminated sludge temporarily stored in the Air Force warehouse (Building 1202 on Map 2) during treatment operations	environmental investigations and cleanup related to a 265-gallon PCB spill into Slip 1 caused when a PCB-containing electrical transformer owned by the US Air Force was damaged while being loaded onto a private barge under contract to the Navy	PCBs (Aroclor 1242)	an initial spill cleanup was conducted by EPA in 1974; additional cleanup of PCB-contaminated sediments was conducted by EPA/USACE from 1974 and1976	EPA (1975)
1993	property owned by US government and leased to various tenants by GSA	hazardous waste inspection by Ecology noted boiler water was treated with algaecides, biocides, and fungicides and discharged into a drain (the discharge location of this drain was not specified); also chemically-treated coolant was discharged to a floor drain that discharged to the LDW and a drum storage area drained to the LDW	na	na	Ecology (2004a)

Time Period	Ownership, Operational History, and Changes in Site Features	Environmental Investigations	Chemicals Identified in Sampled Environmental Media	Remedial Actions and Source Control Activities	References
1997 to 1999	property owned by US government and managed by GSA	soil and groundwater investigations associated with the removal of USTs	diesel-range hydrocarbons (up to 4,700 mg/kg), heavy oil-range hydrocarbons (up to 960 mg/kg), gasoline-range hydrocarbons (up to 700 mg/kg), xylenes (up to 66 mg/kg), and metals (including lead) identified in soil; petroleum (gasoline plume and heavy hydrocarbons) and BTEX identified in groundwater; PCBs and VOCs not detected in soil samples[b]	USTs and associated contaminated soil removed	Herrera (2001); Glacier Environmental (1997), Herrera (1999), and Herrera (2003) as cited in Ecology (2004a)
2001	building on the western portion of property (Building 1203 on Map 2) used by the FBI as a maintenance area for motor pool vehicles	Phase I ESA conducted by Herrera; recognized environmental conditions identified included soil and groundwater contamination from removed USTs, the presence of five remaining USTs, and historical uses of the property	no sampling conducted in association with the Phase I ESA	unknown	Herrera (2001)
2008	GSA continues to manage the property; warehouse storage and office space is leased to various government agencies and other tenants, and the site is also used for vehicle maintenance and parking	unknown	na	unknown	Ecology (2004a; 2008)

[a] The same sample is discussed for both T-106W and the WSLCB property.

[b] The analytical data collected in association with UST removals was not available; however, maximum concentrations were reported in source documents.

BBP – butyl benzyl phthalate
BEHP – bis(2-ethylhexyl) phthalate
BTEX – benzene, toluene, ethylbenzene, xylene
CSL – cleanup screening level
PCB – polychlorinated biphenyls
RCRA – Resource Conservation and Recovery Act
SQG – small-quantity generator
SQS – sediment quality standard

Ecology – Washington State Department of Ecology
ESA – Environmental Site Assessment
FBI – Federal Bureau of Investigation
GSA – General Services Administration
ICR – Independent Cleanup Report
LDW – Lower Duwamish Waterway
LUST – leaking underground storage tank
mg/kg – milligrams per kilogram
na – not applicable
SWPPP – stormwater pollution prevention plan
TPH-D – diesel-range total petroleum hydrocarbons
TPH-O – oil-range total petroleum hydrocarbons
UST – underground storage tank
VCP – voluntary cleanup program
VOC – volatile organic compound
WSLCB – Washington State Liquor Control Board
WWTP – wastewater treatment plant
µg/kg – micrograms per kilogram

4.2.1.3 King County Pumping Station

King County operates a pumping station on the 0.7-acre parcel of land adjacent and to the east of T-108. The pumping station has been in operation as part of the Elliott Bay Interceptor (EBI) system since the late-1960s (Pinnacle Geosciences 2005; WDNR 1970). The EBI system carries sewage and wastewater from the LDW basin and parts of West Seattle to the West Point WWTP. No additional information was available for this property beyond what is summarized in Table 2.

4.2.1.4 GSA's Federal Center South – northern portion

The Federal Center South is located on a 33-ac parcel of land across Diagonal Avenue S to the south of T-108 (Map 2). The Federal Center South facility is owned by the US government and managed by the GSA which leases space within the center to various government agencies and other tenants. The property was operated as a Ford Motor plant from approximately 1931 to 1941 (Herrera 2001), and a significant historical PCB spill occurred directly offshore of the property in 1974. Additional a information available for this property is summarized in Table 2.

4.2.2 Adjacent streets

Two street ROWs are located adjacent to T-108. The S Oregon Street ROW is located adjacent and to the north and the Diagonal Avenue S ROW is adjacent and to the south. These ROWs are applicable to environmental conditions on T-108 because of their proximity to the property. If contamination were present within the ROWs, the possibility would exist for these contaminants to migrate to T-108 or the LDW. Information about these two ROWs is presented in the sections that follow and is summarized in Table 3.

4.2.2.1 S Oregon Street ROW

The S Oregon Street ROW extends westward from E Marginal Way S and terminates at the LDW. The ROW is owned by the City and is used for commercial operations by ConGlobal Industries and the WSLCB. The ROW has both paved and graveled portions. Power transmission lines are also located within the S Oregon Street ROW; public access to the roadway is restricted. The Duwamish/Diagonal CSO/SD and Duwamish EOF piping networks underlay the S Oregon Street ROW.

Table 3. Summary of relevant information for street rights-of-way adjacent to T-108

Time Period	Site Use	Environmental Investigations	Chemicals Identified in Environmental Media	Remedial Actions and Source Control Activities	Citations[a]	Available Analytical Data and Data Location[b]
S Oregon Street ROW						
Pre-1940 to late 1960s	area included tidal/drainage channel that likely received stormwater and wastewater discharges from surrounding industrial properties	unknown	na	unknown	Pacific Groundwater Group (2007a); Aerial Photo Publisher (1946); Photographer unknown (1953); Pacific Aerial Surveys (1961); WDNR (1970)	na
Late 1960s	underground piping associated with Metro's West Point sanitary sewer system and the Duwamish Siphon (the Duwamish/Diagonal CSO/SD, and the Duwamish EOF) laid adjacent to or within channel and channel filled	unknown	na	unknown	Pacific Groundwater Group (2007b); Pacific Aerial Surveys (1961); WDNR (1970)	na
1970s	high-power electrical transmission lines installed within ROW	unknown	na	unknown	cleanup study report	na
1970s to 1993	ROW; specific uses unknown	unknown	na	unknown	WDNR (1970); WDNR (1981); Metro Aerial (1991)	na

TIME PERIOD	SITE USE	ENVIRONMENTAL INVESTIGATIONS	CHEMICALS IDENTIFIED IN ENVIRONMENTAL MEDIA	REMEDIAL ACTIONS AND SOURCE CONTROL ACTIVITIES	CITATIONS[a]	AVAILABLE ANALYTICAL DATA AND DATA LOCATION[b]
1993 to 2008	portions of ROW used by the Port as an access roadway between T-108 and T-106W. Also used by WSLCB operations; public access restricted; the Duwamish/Diagonal CSO/SD and the Duwamish EOF discharge at end of ROW	Phase II ESA to investigate soil, groundwater, and adjacent intertidal sediment conditions (2007)	PAHs, diesel, and lube oil detected above MTCA Method A cleanup levels in soil, PCBs, cadmium, copper, lead, nickel, and zinc also detected in soil; gasoline, BTEX, and arsenic not detected in soil; cPAHs, lube oil, and dissolved arsenic detected above MTCA Method A in groundwater, PCBs also detected in groundwater; PAHs, diesel, lube oil, and metals detected in intertidal sediment	unknown	Pacific Groundwater Group (2007b)	soil, groundwater, and intertidal sediment data presented in Appendix E
Diagonal Avenue S ROW						
Pre-1944 to early 1960s	road ROW extending from E Marginal Way S to LDW with railroad spur crossing	unknown	na	unknown	Aerial Photo Publisher (1946); Photographer unknown (1953); Pacific Aerial Surveys (1961)	na
c. 1961 to mid-1980s	southwestern half of ROW incorporated into a large parking area for the Diagonal Avenue S STP and Federal Center South facility; street-end may have been used as an unofficial dump site	unknown	na	unknown	Pacific Aerial Surveys (1961); WDNR (1970); WDNR (1981); Metro Aerial (1991)	na
Mid-1980s to 2008	road ROW extending from E Marginal Way S to LDW with railroad spur crossing; Diagonal Avenue S storm drain line present beneath ROW	unknown	na	unknown	Ecology (2004a); Metro Aerial (1991); WDNR (1995)	na

[a] Historical aerial photographs cited are presented in Appendix B.

[b] Data associated with the drainage lines buried within these rights-of-way are presented in Table 4.

BTEX – benzene, toluene, ethylbenzene, xylene

MTCA – Model Toxics Control Act

cPAH – carcinogenic polycyclic aromatic hydrocarbon
CSO – combined sewer overflow
Ecology – Washington State Department of Ecology
EOF – emergency overflow
ESA – Environmental Site Assessment
na – not applicable
PAH – polycyclic aromatic hydrocarbon
PCB – polychlorinated biphenyl
ROW – right-of-way
SD – storm drain
STP – sewage treatment plant
WSLCB – Washington State Liquor Control Board

4.2.2.2 Diagonal Avenue S ROW

The Diagonal Avenue S ROW extends southeastward from E Marginal Way S and terminates at the LDW. It is owned by the City, and public access is allowed. The ROW has been present since at least the 1940s based on review of historical aerial photos (Appendix B). The exact date that the ROW was developed is not known. The street-end is currently used as a hand-boat launch area and park. The Diagonal Avenue S street end may have been used as a trash dumping area until the late 1980s according to Port staff. Cans, broken glass, and other debris were observed in the soil when the area was excavated during installation of the public access area and adjacent T-108 mitigation area. The Diagonal Avenue S SD line is located beneath the ROW, and discharges to the south of the ROW's terminus. This drainage line is discussed further in Section 4.2.3.3. Four source-tracing solids samples have been collected within the SD system; data for these samples are discussed in Table 4 and presented in Appendix E.

4.2.3 Public outfalls

Four public outfalls discharging to the LDW are located in the vicinity of T-108 (Map 2). The Diagonal Avenue S SD is located near the terminus of the Diagonal Avenue S ROW, and the S Nevada Street SD is located on the northern portion of T-106W. Two public outfalls discharge from the terminus of the S Oregon Street ROW: the Duwamish/Diagonal CSO/SD, (owned jointly by the City and the County), and the Duwamish EOF associated with the County-owned Duwamish siphon and pump station.

4.2.3.1 Duwamish/Diagonal CSO/SD and associated drainage basin

The Duwamish/Diagonal CSO/SD outfall discharges at the terminus of the S Oregon Street ROW at RM 0.45, approximately 50 ft from the northern portion of T-108. The system has a combined sewer service area of 4,900 ac and the storm drain basin encompasses about 2,620 acres (King County and SPU 2005). The drainage basin includes a 3.6-mi portion of I-5, parts of the Central District, the Duwamish industrial area, Rainier Valley, and Beacon Hill. The stormwater network in the Eastern Parcel of T-108 discharges to this drainage system. The estimated medium-range stormwater runoff from the Duwamish/Diagonal drainage basin is 1,045 million gallons per year (mgy) (King County 2002). Recent source control sampling efforts indicate that the average TSS values for the discharge is approximately 80 mg/L with the TSS loading range from 241 to 414 million tons per year (MT/yr).

Between 2002 and 2006, Seattle Public Utilities (SPU) collected in-line sediment from the Diagonal Avenue CSO/SD network in association with the Duwamish/Diagonal sediment remediation effort. During this timeframe, portions of the overall network were cleaned, including the Diagonal Avenue S CSO/SD mainline, the S Dakota Street lateral, and the downstream sections of the 1st Avenue S lateral and the Denver

Table 4. Summary of relevant information for outfalls adjacent to T-108

Ownership and Operational History	Drainage Basin Information	Discharge Information	Environmental Investigations	Chemicals Identified in Environmental Media	Source Control Activities	Citations	Available Analytical Data and Data Location
Duwamish/Diagonal CSO/SD							
System installed in the late 1960s in association with the West Point WWTP; the City owns and operates the storm drain system and the County owns and operates the CSO system	CSO service area is 4,900 ac in size and includes portions of the Diagonal and Hanford drainage basins, SD basin is 2,600 ac in size; SD basin includes a portion of I-5, and parts of the Central District of Seattle, the Duwamish industrial area; Rainier Valley, and Beacon Hill; outfall located at the S Oregon Street street-end	discharges to the LDW via a 144-in concrete outfall; average stormwater discharge of 1,100 mgy (King County 2002); average untreated CSO/EOF event frequency is 0.17 events/yr, with average an annual discharge volume of 0.67 mgy (Nairn 2007; King County 2006)	two source-tracing sediment samples collected (1985)	four individual PAHs detected above the CSL and seven detected above the SQS, total HPAHs and total LPAHs detected above the SQS, 1,2-dichlorobenzne, 1,4-dichlorobenzene, dimethyl phthalate, dibenzofuran, phenol, and 4-methylphenol detected above the CSL, and zinc detected above the SQS	unknown	Ecology (2004a)citing Tetra Tech (1988)	Appendix E
			whole-water stormwater effluent samples collected at two locations (1995)	arsenic, cadmium, chromium, copper, lead, mercury, zinc, fluoranthene, pyrene, and phthalates	unknown	Ecology (2004a)	stormwater effluent data presented in Appendix E
			multiple rounds of in-line sediment solids sampling (2002-2006)	PCBs, TPH, arsenic, lead, mercury, copper, zinc, BEHP, BBP, and PAHs	system drainage lines being cleaned periodically; business inspections in drainage basin (2000-present)s	King County and SPU (2005)	inline sediment solids data presented in Appendix E

Ownership and Operational History	Drainage Basin Information	Discharge Information	Environmental Investigations	Chemicals Identified in Environmental Media	Source Control Activities	Citations	Available Analytical Data and Data Location
			source-tracing sediment sampling was conducted within the CSO/SD basin by SPU; onsite catch basins, right-of-way catch basins, inline sediment trap, and inline sediment grab samples were collected (2002-2007)	arsenic, copper, lead, mercury, zinc, diesel-range hydrocarbons, oil-range hydrocarbons, BEHP, BBP, total PCBs, HPAHs, and LPAHs	source-tracing efforts within the CSO/SD drainage basin	Schmoyer (2008)	Appendix E
Duwamish EOF							
Installed in the late-1960s as part of the EBI system; owned and operated by the County; EOF is connected to the Duwamish Siphon and pump station	has the potential to discharge storm-water and combined sewage from the sanitary sewer system if flows from the Duwamish Siphon are too high; outfall located at the S Oregon Street street-end	overflows to the LDW only in emergency by-pass situations; has not overflowed since 1989; outfall is 36-in in diameter	unknown	na	unknown	Ecology (2004a)	na

Ownership and Operational History	Drainage Basin Information	Discharge Information	Environmental Investigations	Chemicals Identified in Environmental Media	Source Control Activities	Citations	Available Analytical Data and Data Location
S Nevada Street SD							
Owned and operated by the City; date of installation not identified	drains the northern portion of T-106W, including the northern end of the ConGlobal Industries container terminal	discharges to the LDW via a 24-in SD outfall located at the S Nevada Street street-end	source-tracing solids sampling within Nevada Street storm drain line (1985); SPU also attempted to sample manholes in the system but either solids were not present in the manholes or manholes were inaccessible	cadmium, chromium, and lead detected at concentrations above the CSL, and zinc detected above the SQS in storm drain solids	source-tracing solids sampling	Ecology (2004a) citing Tetra Tech (1988); Ecology (2004a); King County and SPU (2005)	storm drain solids data presented in Appendix E
Federal Center South Private Outfall (located on the northern portion of property)							
Owned and operated by USACE; date of installation not identified	drainage basin not identified; based on location, assumed to collect drainage from parking areas and roof drains on the northern portion of Federal Center South including parking areas and rooftops	discharges to the LDW via a 12-in metal outfall located to the west of Building 1203 (Map 2)	unknown	na	unknown	Herrera (2004)	na

Ownership and Operational History	Drainage Basin Information	Discharge Information	Environmental Investigations	Chemicals Identified in Environmental Media	Source Control Activities	Citations	Available Analytical Data and Data Location
Diagonal Avenue SD							
Owned and operated by City; date of installation not identified	system drains approximately 12 ac, including the Diagonal Avenue S roadway west of E Marginal Way S	discharges to the LDW via a 12-in. diameter steel outfall located on the northern portion of the Federal Center South property, adjacent to the south of the Diagonal Avenue S ROW	source-tracing solids sample collected (1985)	chromium detected above the CSL, zinc, di-n-octyl phthalate, and indeno(1,2,3-c,d)pyrene detected above SQS	unknown	Ecology (2004a) citing Tetra Tech (1988)	Appendix E
			sediment samples collected offshore of outfall location	BEHP and BBP exceeded the SQS	unknown	(King County 2002); Ecology (2004a)	Appendix E
			City attempted to collect manhole solids from system but manhole locations were inaccessible (2005)	na	unknown	King County and SPU (2005)	na

BBP – butyl benzyl phthalate
BEHP – bis(2-ethylhexyl) phthalate
CB – catch basin
CSL – cleanup screening level
CSO – combined sewer overflow
EBI – Elliott Bay Interceptor
Ecology – Washington State Department of Ecology
EOF – emergency overflow
HPAH – high-molecular-weight polycyclic aromatic hydrocarbon
LDW – Lower Duwamish Waterway
LPAH- low-molecular-weight polycyclic aromatic hydrocarbon
mgy – million gallons per year
na – not applicable
PAH – polycyclic aromatic hydrocarbon
PCB – polychlorinated biphenyl
RCB – right-of-way catch basin
ROW – right-of-way
SD – storm drain
SPU – Seattle Public Utilities
STP – sewage treatment plant
SQS – sediment quality standard
USACE – United States Army Corps of Engineers
WSLCB – Washington State Liquor Control Board
WWTP – wastewater treatment plant

Avenue S lateral. A total of 168 samples were collected from the system's mainline and contributing lateral lines (as of December 2007), and several of the lines were cleaned out.

4.2.3.2 Duwamish EOF (pump station emergency bypass)

The Duwamish EOF is located at the terminus of S Oregon Street ROW approximately 100 ft upstream of the Diagonal Avenue S CSO/SD, and approximately at the northwest corner of T-108. It operates as the emergency overflow for the Duwamish siphon and pump station associated with the King County interceptor system. The Duwamish EOF has not overflowed since 1989, and therefore, Ecology does not consider it a significant source of recontamination to the LDW (Ecology 2004b).

4.2.3.3 Diagonal Avenue storm drain

The Diagonal Avenue SD is a 12-in-diameter steel outfall located adjacent to the south of the terminus of the Diagonal Avenue S ROW, approximately 100 ft from the southern end of T-108. The system drains stormwater from approximately 12 acres, including the Diagonal Avenue S roadway west of E Marginal Way S. Most of the area drained by this outfall is paved and used for general roadway access and miscellaneous storage by surrounding property tenants.

4.2.3.4 S Nevada Street storm drain

The S Nevada Street SD is a 24-in.-diameter outfall located at the S Nevada Street street end in approximately the center of the T-106W shoreline. The system is owned and operated by the City, and drains stormwater from the northern portion of T-106W, including the northern portion of the ConGlobal container yard. Most of the area drained by this outfall is paved or covered with buildings and is used for storage and transport of cargo and other goods.

5 Potential Pathways of Contamination and Source Control Management

The following section briefly highlights the various pathways through which contaminants can migrate and potentially enter the LDW; sources of contamination can often migrate through more than one potential pathway. This section also provides information on the source control measures and procedures that are either in place or can be incorporated at T-108 to aid in the management of these potential contaminant pathways. The section presents this data in a tabularized discussion with respect to the subject property's specific concerns relative to source control.

5.1 POTENTIAL PATHWAYS

Chemicals released to media such as air, soil, groundwater, or stormwater can migrate within the subject property and potentially to the LDW through various pathways. With respect to the subject property, the pathways of potential concern include atmospheric deposition; stormwater inputs (i.e., direct discharge); groundwater migration, and bank erosion. The following sections briefly discuss the potential pathways of concern at the subject property.

5.1.1 Atmospheric deposition

Chemicals have the potential to be emitted to the atmosphere from both point and non-point sources. Point sources include various industrial facilities and operations within the greater LDW basin (EPA 2001). T-108 is not currently regulated as a point-source of air emissions (Thomas 2008). Non-point sources include emissions from motor vehicles, marine vessels, and trains, as well as common materials (e.g., plastics) through off-gassing. Chemicals emitted to the air may be transported over long distances, generally in the direction of the area's prevailing winds.

Air pollutants can be deposited through either direct or indirect deposition. Direct deposition occurs when contaminated particulates are deposited directly onto the land surface or the surface of a water body. Indirect deposition to water bodies occurs when chemicals are first deposited on land or other water bodies and then transported to the receiving water body via stormwater runoff. Contaminants can adhere to solids on the ground or in stormwater runoff and potentially be transported to LDW sediment. The latter process is a major concern when considering source control within the greater Duwamish Valley; however, it is not expected to play a major role in environmental conditions at T-108.

5.1.2 Stormwater inputs (direct discharge)

Contaminants carried in stormwater have the potential to discharge directly into the LDW through public or private outfalls. Several outfalls serve the subject property, including connection with the City and County owned Duwamish/Diagonal CSO/SD network. Stormwater traversing across impervious surfaces can pick up chemicals originating from accidental spills (vehicle fueling, maintenance, etc.); leaking equipment or storage tanks; particulates deposited on the subject property through atmospheric deposition; and general commercial/industrial operations. Stormwater runoff in unpaved areas (surface runoff) can also collect materials (soil, debris, etc.) in the flow stream and transport them to other parts of the subject property and potentially into the LDW.

5.1.3 Groundwater migration

Groundwater flow in the greater Duwamish Basin is generally towards the LDW, although the direction varies locally depending on the nature of subsurface materials, hydrostratigraphy, local affects of tidal fluctuations, and relative proximity to the waterway. At the subject property, groundwater has been shown to flow radially from a relative high near the center of the site in all directions (pending time of year and tidal stage). Contaminants in groundwater have the potential to migrate directly into the LDW (seeps, shoreline discharge) or through other pathways (infiltration into underground stormwater piping). Leaking or spilled chemicals, as discussed above, can also infiltrate into groundwater in areas without pervious surfaces (western parcel). The determination of whether a chemical identified in groundwater will reach sediment and surface water is a complex process. In this case however, Ecology has acknowledged that recent monitoring has shown that groundwater at the subject property is not considered a potential source of contamination to LDW sediment.

5.1.4 Bank erosion

Soil in unprotected shoreline banks is susceptible to erosion by disturbances from human activities, wind, surface water runoff, tidal exchange, and groundwater discharge. Shoreline armoring and vegetation significantly reduce bank erosion, and steeper banks are particularly susceptible. Much of the subject property's shoreline is armored and covered with vegetation; however, some areas remain susceptible to bank erosion. Contaminants in the subject property's surficial and subsurface soil (originating from non-native fill or historical site operations, etc.) may exist at elevated concentrations in the shoreline bank. This contaminated material does have the potential to migrate to the waterway.

5.2 HISTORY OF THE DUWAMISH/DIAGONAL SOURCE CONTROL AREA

As mentioned in the previous sections, T-108 has been identified as a property of potential concern for source control with respect to the greater Duwamish/Diagonal Source Control Area (SCA). The sediments near the Duwamish/Diagonal outfalls were originally identified as a priority cleanup area by the Elliott Bay/Duwamish Restoration Program in the mid-1990s because of contamination associated with the Duwamish EOF and Duwamish/Diagonal CSO/SD outfalls. The area was identified again through the

LDW Remedial Investigation as an early action area. Dredging and capping actions were implemented through the Elliott Bay/Duwamish Restoration Program beginning in November 2003. Ecology prepared a SCAP for the Duwamish/Diagonal SCA in December 2004. A sediment remediation project closure report was prepared in 2005 (King County et al. 2005b).

Studies conducted in 1994 and 1996 identified PCBs, mercury, BEHP, and BBP as the principal chemicals of concern for the Duwamish/Diagonal SCA area near the outfalls (Ecology 2004a; King County 1997). Table 5 presents the chemicals that have been identified in surface sediment within the Duwamish/Diagonal SCA in-water boundary during the LDW Remedial Investigation effort. The chemicals included on this table had at least one exceedance of its associated SMS criteria for surface sediment, as applicable, prior to sediment removal and capping activities.

Table 5. Chemicals of concern in Duwamish/Diagonal SCA surface sediment (exceeding associated SMS criteria)

Chemical	Chemical	Chemical
1,2,4-Trichlorobenzene	Bis(2-ethylhexyl)phthalate	Mercury
1,2-Dichlorobenzene	Butyl benzyl phthalate	Naphthalene
1,4-Dichlorobenzene	Cadmium	N-Nitrosodiphenylamine
2,4-Dimethylphenol	Chromium	PCBs (total calc'd)
2-Methylnaphthalene	Chrysene	Pentachlorophenol
2-Methylphenol	Dibenzo(a,h)anthracene	Phenanthrene
4-Methylphenol	Dibenzofuran	Phenol
Acenaphthene	Dimethyl phthalate	Pyrene
Benzo(a)anthracene	Fluoranthene	Silver
Benzo(a)pyrene	Fluorene	Total HPAH (calc'd)
Benzo(g,h,i)perylene	Hexachlorobenzene	Total LPAH (calc'd)
Benzofluoranthenes (total-calc'd)	Hexachlorobutadiene	Zinc
Benzoic acid	Indeno(1,2,3-cd)pyrene	
Benzyl alcohol	Lead	

Note: Exceedances of the chemicals listed in this table were detected before sediment removal and capping activities were conducted at the Duwamish/Diagonal cleanup area.

The Duwamish/Diagonal sediment cleanup project began in 1994; remedial actions occurred in late 2003 and early 2004. Sediment remediation included dredging contaminated sediments from a 7-ac area in the LDW and placing an engineered cap over the remaining sediment. The dredging was conducted between November 2003 and January 2004; the sediment cap was installed between January and March 2004 (see Map 2). A follow-up action was conducted in February 2005 involving the placement of a thin layer of sand around the dredged area in response to elevated chemical concentrations resulting from the previous dredging activity (Ecology 2004a) (Map 2).

Long-term sediment monitoring began in the summer of 2004 and is currently scheduled to continue until 2014. In samples collected as part of the monitoring program between June 2004 and April 2007, BEHP, BBP, fluoranthene, dimethyl phthalate, benzyl alcohol, benzoic acid, and total PCBs exceeded the SQS, and BEHP, total PCBs, benzyl alcohol, and benzoic acid also exceeded the CSL.

5.3 Source Control Management Tools

A wide variety of source control management tools are available for use at the subject property. These tools vary greatly in management and application, but all are aimed to help reduce or eliminate the potential impact from contaminant sources and their associated pathways on the subject property. In many instances, the components of these tools and source control measures overlap with one another in their intent or physical application. An effective long-term source control strategy will require incorporation of a mixture of these options, with specific focus on the operations at the subject property and types of contamination and pathways of concern. Some of these tools are already in place at the subject property; nevertheless, further consideration of additional application of these tools would continue to promote the goal of an effective, long-term source control strategy at the subject property. This strategy would include the compliance monitoring necessary to determine the effectiveness and performance of these tools.

Regulatory and compliance programs overseen by federal, state, and local jurisdictions offer numerous possible tools that could be implemented at the subject property under various circumstances. Table 6 presents a list of some of the available and relevant tools and source control measures that will be combined to establish and promote effective source control at the subject property. Many other source control tools exist and may be applicable to the site, especially with changes in operations or future development activities. For example, programs managed under the Toxic Substance Control Act (TSCA) could be applicable if hazardous waste associated with the former PCB disposal pits is encountered during site improvement work. Additionally, if future operations generated wastewater requiring off-site treatment, King County's Industrial Waste pre-treatment authorizations would represent an additional source control tool. Table 6 is not meant to be a comprehensive list of all tools available but those most appropriate for the current conditions and operations at the subject property.

Table 6. Potential source control management tools for the subject property

Source Control Tools	Tool Components	Additional Information on Potential Use or Application
Regulatory and Compliance Programs	NDPES Permit Programs	Municipal Permit - Port of Seattle. Includes Stormwater Management Planning, tenant education and oversight, and O&M programs.
		General Industrial Permit – ConGlobal. Includes requirements for preparation and management of a SWPPP and SPCC for operational areas.

Source Control Tools	Tool Components	Additional Information on Potential Use or Application
	Port of Seattle Compliance Programs and Tenant Lease Arrangements	Port's internal compliance unit inspects for environmental compliance based on environmental regulations and lease agreements.
	LDW Source Control Work Group (SCWG) Coordination	Coordination with long-term strategy of SCWG and associated programs (Puget Sound Initiative, Urban Waters Initiative, etc.).
Environmental investigation	Multi-media characterization	Additional media information (subsurface, bank soil, etc.) to fulfill data gaps and focus effective environmental strategy.
Remediation Programs	Independent removal action (excavation, etc.)	Soil excavation with performance sampling in coordination with voluntary cleanup program
	Containment	Capping for in-place containment of impacted media
	In-situ treatments	In-situ treatment of areas of impacted subsurface soil
	Monitored natural attenuation	Monitoring of existing environmental conditions to satisfy cleanup goals
Operational/ Behavioral Best Management Practices (BMPs)	Public Involvement/Education	Education and communication of source control concerns with tenants and public users to support compliance and promote overall environmental stewardship.
	Good housekeeping practices	Promote environmentally-friendly operational and behavioral practices of those using the subject property.
Physical BMPs	Construction BMPs (permanent and temporary)	Erosion and runoff controls, sediment controls (vegetative buffer, drainage swales), grading improvements, hay bale buffers, catch basin filter socks, etc.
	Redevelopment BMPs	Habitat restoration, porous pavement, green roof technologies.
Capital Improvements	Utility upgrades and improvements	Upgrades to stormwater collection networks and other underground utility systems, upgrades to onsite pre-treatment, etc.
	Infrastructure improvements	Paving, grading, access concerns, bank/shoreline stabilization, etc.
	Tenant-driven improvements	Improvements in tenant areas (either operational or compliance driven)
	Restoration opportunities	Construction of restoration/mitigation areas along shoreline; with potential link to existing habitat area
Engineering Controls	Operation and Maintenance programs	Proper operation and maintenance of equipment used on property can greatly reduce the potential for accidently spills and leaks.
	Upgrades to newer "greener" equipment	Use of newer, "greener" equipment technologies could greatly reduce the potential impact from onsite operations.
Institutional Controls	Property deed restrictions	Restriction of long-term use of property to help ensure environmental stewardship.
	Tenant restrictions	Restrictions on operational use of tenant lease areas

Again, the tools highlighted in Table 6 are not inclusive of all of the options available for approaches to source control management, but are focused to a relative extent on measures that can be implemented at the subject property. Depending on the specific aspects of the contaminant and/or pathway of concern, different components of the tools mentioned may be more appropriate for evaluation and implementation. This evaluation process will be an important aspect of the SCSPs that will be prepared after finalization of this documentation.

One of the major tools available to help assess and manage stormwater concerns at the subject property is the NPDES permit program. As discussed in previous sections, stormwater discharges at T-108 are regulated under two NPDES permits: the Municipal Stormwater permit, under which the Port of Seattle is a secondary permittee, and the industrial stormwater general permit recently obtained by the tenant, ConGlobal Industries, in April 2008.

As required under the permit, the Port of Seattle has implemented a Stormwater Management Program (SWMP) that includes:

- an education program, including training on Best Management Practices (BMPs), for tenants and Port employees aimed at reducing behaviors and practices that can adversely affect stormwater quality
- a program to identify, eliminate, and prevent illicit discharges and spills to the stormwater system
- a program of information gathering that allows for adequate stormwater management planning, priority setting, and program evaluation including maps of properties, drainage basins, stormwater conveyance lines, and outfalls
- a program for documenting operation and maintenance activities for stormwater facilities
- field inspections to inspect for illicit discharges at all known outfalls covered under the permit; at least one third of all outfalls should be inspected each year
- procedures for removing illicit discharges and documenting activities associated with monitoring these discharges
- a spill response plan
- a program for management of construction site stormwater runoff and post-construction stormwater management for new development and redevelopment
- an operation and maintenance program for all catch basins, stormwater treatment, and flow control facilities
- a long-term monitoring program to characterize stormwater runoff at a limited number of locations[1], evaluate stormwater management practices, and evaluate BMPs

[1] The facility selected for monitoring under the Port's SWMP is used for different operational purposes than T-108 and is not located in the LDW; monitoring data from this facility will most likely not be directly applicable to conditions at T-108.

These elements of the Port's SWMP are aimed to help in the protection of stormwater quality at all Port terminals and facilities, including T-108.

As of April 2008, ConGlobal has maintained a general industrial NPDES stormwater permit (No. SO3-010569) and a SWPPP for management of stormwater discharges from the container terminal to the Duwamish/Diagonal CSO/SD system. The chassis repair area and equipment fueling areas on the Eastern Parcel are covered by the NPDES permit and SWPPP; the portions of T-108 used only for storage, office space, and parking are not covered.

As part of the general industrial stormwater permit, ConGlobal:

- maintains an SPCC plan to be implemented in the case of a hazardous materials release
- implements BMPs to reduce stormwater pollution
- inspects the stormwater system infrastructure
- samples stormwater and analyzes samples for total zinc, oil and grease, turbidity, total suspended solids (TSS), and pH, as well as total copper and total lead if the benchmark for zinc is exceeded during two consecutive sampling events
- provides discharge monitoring reports to Ecology to report the results of the inspection and sampling program

As with the Port's program, ConGlobal's NPDES permit, SWPPP, and SPCC plan are in place to reduce the potential for stormwater contamination resulting from industrial activities conducted at the facility. While the permit and plans limit and control the discharge of a number of pollutants, they do not necessarily control contaminants that pose a threat to LDW sediments, such as PCBs, phthalates, arsenic, mercury, and PAHs (Thomas 2008). The combinations of these established regulatory and compliance requirements with the other "grab bag" of tools presented in Table 6 (BMPs, remediation programs, capital improvements, institutional controls, etc.) will be further evaluated in the following sections with respect to their potential application and use at the subject property to lessen or potentially eliminate the threat from the potential pathways of contamination.

5.4 T-108 Onsite Potential Pathways of Contamination and Source Control

Several potential onsite contaminant migration pathways were identified at the subject property through the completion of the environmental conditions review effort. Controlling these potential pathways and sources can decrease the potential for them to impact other media on the property or ultimately the LDW. Many of these identified pathways and their associated contaminant sources can be either eliminated entirely or controlled to some degree through implementation of various source control tools and procedures and adherence to the requirements of regulatory programs currently governing operations at the subject property.

Table 7 provides information on the potential pathways and sources of contamination identified on the T-108 property, and briefly identifies the various source control tools (with reference to those discussed in Table 6) that are either in place or that can be implemented to help control each pathway. Not all pathways and corresponding chemical sources have the same relative potential for impact to area media and the LDW. The table provides general information on chemicals that can be potentially associated with each source type.

Information on the table takes into consideration both historical source areas and potential ongoing sources based on the current conditions of the property, and expected long-term tenant operations (cargo container storage, chassis storage and repair, miscellaneous maintenance). The table also provides general information on data gaps related to these potential pathways and sources. Fulfilling these data gaps may require further study or characterization to more fully understand their potential for contributing contaminants to the LDW, as well as options for controlling them.

Table 7. Potential onsite pathways of contamination and general source control information at T-108

Potential Pathway	Potential Sources	Potential Contaminants	Details	Data Gap	General Options and Tools for Additional Pathway Characterization or Source Control (Refer to table 6)	
					Western Parcel	Eastern Parcel
Air	Emissions from operational equipment	Metals, phthalates, dioxins/furans, particulates	Equipment and machinery used by the current tenants are of similar use as most commercial operations in the greater Duwamish Valley (trucks, etc.).	Data on air emissions in the greater Duwamish Valley are very limited; additional data would be helpful in further assessing pathway but difficult to associate directly with T-108 concerns.	• **Regulatory and Compliance Programs** – Stormwater monitoring results can help assess impact from atmospheric deposition. • **Operational BMPs** – Good housekeeping and environmental stewardship education can help limit impact from air emissions. • **Engineering Controls** – Newer "greener" machinery can help reduce onsite emissions.	• **Regulatory and Compliance Programs** – Stormwater monitoring results can help assess impact from atmospheric deposition. • **Operational BMPs** – Good housekeeping and environmental stewardship education can help limit impact from air emissions. • **Engineering Controls** – Newer "greener" machinery can help reduce onsite emissions; effective operation and maintenance of equipment can also reduce emissions. • **Institutional Controls** – Deed and tenant restrictions can limit operations that produce harmful emissions.
Stormwater	Spills, leaks, and accidental discharges; onsite dust and debris	Metals, PAHs, PCBs, TPH, VOCs, SVOCs	Operations include chassis and miscellaneous maintenance; chemicals have the potential to enter stormwater system and discharge to LDW via the Duwamish/Diagonal CSO/SD (Eastern Parcel) and Port private storm drains (Western Parcel).	Current information on stormwater quality limited. ConGlobal's NDPES sampling requirements will provide some additional information to assist in ongoing assessment of this potential contaminant pathway.	• **Regulatory and Compliance Programs** – Stormwater monitoring results, although limited for this area, can help assess impact from stormwater runoff. • **Operational BMPs** – Good housekeeping and environmental stewardship education can help reduce introduction of contaminants to stormwater. • **Physical BMPs** – Erosion and runoff control, and vegetative barriers can help limit transport of contaminants in stormwater. • **Capital Improvements** – Paving and utility upgrades (installation of stormwater infrastructure) would help management stormwater issues in this area.	• **Regulatory and Compliance Programs** – Adherence to requirements of the Port's and ConGlobal's permit (proper materials storage/handling, inspection and oversight, etc.) will help manage stormwater concerns in this area. • **Operational BMPs** – Good housekeeping and environmental stewardship education can help reduce introduction of contaminants to stormwater. • **Physical BMPs** – Hay bale buffers, catch basin filter socks, etc., can help prevent accidental spills from affecting stormwater. • **Institutional Controls** – Deed and tenant restrictions can limit potential operations in this area.

Table 7, cont. Potential onsite pathways of contamination and general source control information at T-108

Potential Pathway	Potential Sources	Potential Contaminants	Details	Data Gap	General Options and Tools for Additional Pathway Characterization or Source Control (Refer to Table 6)	
					Western Parcel	Eastern Parcel
Stormwater	Contaminants in fill material	Miscellaneous	Large portions of the subject property have been filled over time, using both native and non-native materials. These fill materials can infiltrate into underground piping.	Soil data available for site; additional soil data would provide little new information relevant to the tools used to manage this potential contaminant pathway.	• **Regulatory and Compliance Programs** – Stormwater monitoring results, although limited for this area, can help assess impact from impacted fill material. • **Environmental Investigation** – Additional characterization could assess volume and potential impact from contaminated fill in this area. • **Remediation Programs** – Soil excavation, containment, or in-situ treatment could help manage contaminants in fill material. • **Physical BMPs** – Erosion and runoff controls, sediment controls, and vegetative buffers would aid in management of this pathway. • **Capital Improvements** – Paving and utility upgrades (installation of stormwater infrastructure) would help management potential impact to stormwater in this area.	• **Regulatory and Compliance Programs** – Stormwater monitoring results could help assess impact from contaminated fill materials in this area; however, upgraded stormwater network at higher elevation than areas of suspected fill; potential impact from this pathway is unlikely. • **Environmental Investigation** – Additional characterization in this area could assess volume and potential impact from contaminated fill in this area; however, investigation would greatly affect ongoing operations and would not likely provide information useful for practical management of this potential pathway.
Stormwater	Sludges and general STP-related materials and PCB-contaminated materials from the 1974 spill remain in place	TPH, PCBs, metals, household/ industrial chemicals	Much of the area comprising the former treatment plant and PCB-material treatment/disposal area is covered by pavement. Areas in the western parcel that overlay former STP units are unpaved.	Additional soil data would provide further understanding of where STP-or PCB spill-related materials remain on site; however, this additional information will add little to support the tools available for managing these lingering materials.	• **Regulatory and Compliance Programs** – Stormwater monitoring results, although limited for this area, could help assess impact from remaining impacted materials. • **Environmental Investigation** – Additional characterization could assess volume and potential impact from remaining contaminated materials in this area. • **Remediation Programs** – Soil excavation, containment, or in-situ treatment could help manage remaining contaminants in these materials. • **Physical BMPs** – Erosion and runoff controls, sediment controls, and vegetative buffers would aid in management of this pathway. • **Capital Improvements** – Paving and utility upgrades (installation of stormwater infrastructure) would help management potential impact to stormwater in this area.	• **Regulatory and Compliance Programs** – Stormwater monitoring results could help assess impact from remaining contaminated materials in this area; however, upgraded stormwater structure at higher elevation than suspected materials; potential impact from this pathway is unlikely. • **Environmental Investigation** – Additional characterization in this area could assess volume and potential impact from STP/PCB-treatment related contamination in this area; however, investigation would greatly affect ongoing operations and would not likely provide information useful for practical management of this potential source concern.

Table 7, cont. Potential onsite pathways of contamination and general source control information at T-108

Potential Pathway	Potential Sources	Potential Contaminants	Details	Data Gap	General Options and Tools for Additional Pathway Characterization or Source Control (Refer to Table 6)	
					Western Parcel	Eastern Parcel
Groundwater migration	Contaminants in groundwater on the subject property have the potential to migrate directly to the LDW or via underground piping/infiltration.	TPH compounds, metals	Sampling results indicated that TPH, metals, PCBs, and PAHs were present at some level in onsite groundwater, however at levels below MTCA standards.	Recent groundwater sampling has been conducted; available data establishes that pathway is not of impact concern at the subject property; additional data not required.	Recent groundwater investigations have allowed Ecology to determine that groundwater at the subject property is not a pathway for recontamination of LDW sediment. Nevertheless, capital improvements to address other potential pathways (i.e., stormwater) will greatly reduce infiltration and migration potential.	Recent groundwater investigations have allowed Ecology to determine that groundwater at the subject property is not currently a pathway for recontamination of LDW sediment.
Groundwater migration	Chemicals spilled or leaked on impervious areas have the potential to infiltrate into migrating groundwater	TPH compounds, metals, PCBs, PAHs, and SVOCs	Operations being completed in areas currently unpaved (storage) do not indicate a major threat for accidental spills and leaked chemicals that could enter groundwater.	Given conditions of areas of operation, impact from these sources would likely affect stormwater prior to any influence over area groundwater; additional groundwater data not required.	• **Operational BMPs** – Good housekeeping and environmental stewardship education could help reduce the potential future introduction of contaminants to groundwater. • **Capital Improvements** –Paving, grading, and utility improvements (stormwater network installation) would greatly limit future infiltration of stormwater into subsurface groundwater and prevent these spilled materials from being transported via groundwater.	• **Regulatory and Compliance Programs** – Adherence to requirements of the Port's and ConGlobal's permit (proper materials storage/handling, inspection and oversight, etc.) will help limit potential future impact to groundwater; although the majority of this area is paved and managed by an updated stormwater network installed above the water table. • **Operational BMPs** – Good housekeeping and environmental stewardship education can help reduce the potential for future introduction of contaminants from spills and leaks. • **Engineering Controls** – Proper operation and maintenance of machinery can limit accidental spills and leaks. • **Institutional Controls** – Deed and tenant restrictions can limit potential operations in this area.
Groundwater migration	Contaminated fill material beneath subject property or in former tidal drainage channel	Miscellaneous sewage and industrial wastes	Large portions of the subject property have been filled over time including the former drainage channel, using both native and non-native materials. These fill materials can infiltrate into migrating groundwater	Additional soil information gathered to ascertain location and quality of fill materials would be helpful; however, the information would add little to implementation of the tools most effective to address potential lingering contamination.	• **Remediation Programs** –Containment or in-situ treatment could help manage potential future impact to groundwater from contaminants in fill material. • **Capital Improvements** – Paving and utility upgrades (installation of stormwater infrastructure) would help prevent future infiltration of stormwater into impacted fill material which may mobilize contaminants to groundwater.	• **Environmental Investigation** – Additional characterization in this area could assess volume and potential future impact to groundwater from contaminated fill in this area; however, investigation would greatly affect ongoing operations and provide little information for a pathway previously determined to be of minimal concern.

Table 7, cont. Potential onsite pathways of contamination and general source control information at T-108

Potential Pathway	Potential Sources	Potential Contaminants	Details	Data Gap	General Options and Tools for Additional Pathway Characterization or Source Control (Refer to Table 6)	
					Western Parcel	Eastern Parcel
Groundwater migration	Sludge materials remaining in place from historical STP or PCB spill treatment operations	TPH, PCBs, metals, household/ industrial chemicals	Much of the area comprising the former STP and PCB-spill treatment areas is covered by pavement. Areas in the Western Parcel that overly former STP units are unpaved.	Additional groundwater data would provide further understanding of STP- and PCB treatment-related materials; however, groundwater determined not to be a potential source at the subject property and additional data would not benefit application of practical tools to address lingering contamination.	• **Environmental Investigation** – Additional characterization in this area could assess volume and potential future impact to groundwater from contaminated materials in this area. • **Remediation Programs** –Containment or in-situ treatment could help prevent future stormwater infiltration that may mobilize contaminants remaining in these materials into groundwater. • **Capital Improvements** – Paving and utility upgrades (installation of stormwater infrastructure) would help prevent future infiltration of stormwater that may mobilize contaminants in these materials into local groundwater.	• **Environmental Investigation** – Additional characterization in this area could assess volume and potential future impact to groundwater from STP/PCB spill treatment related contamination in this area; however, investigation would greatly affect ongoing operations and would not likely provide information useful for practical management of this pathway already determined to be of minimal concern.
Bank erosion	Contaminated bank sediment can erode directly into the LDW (surface water runoff, tidal exchanges, etc.)	PCBs, metals, TPH compounds, PAHs, phthalates, phenol, benzoic acid, 1,2-dichlorobenzene	Areas of the subject property shoreline are unarmored, or existing armoring/vegetation are not providing stability as designed.	Little shoreline bank data are available; further sampling of the bank would provide useful information and help focus long-term environmental strategy.	• **Environmental Investigation** – Additional characterization of bank soil is necessary to provide information to formulate an effective strategy for this area. • **Remediation Programs** – Soil removal and/or containment would greatly reduce the potential impact from this pathway. • **Physical BMPs** – Erosion and runoff controls and vegetative buffers would help reduce potential impact from this pathway to LDW sediment. • **Capital Improvements** – Infrastructure improvements (paving, grading, containment, and shoreline stabilization, etc.) would greatly reduce potential impact from this pathway. Restoration opportunities along the shoreline would promote long-term environmental stewardship.	Not applicable

BMP – best management practice
CSO – combined sewer overflow
LDW – Lower Duwamish Waterway
NPDES – National Pollutant Discharge Elimination System
PAH – polycyclic aromatic hydrocarbon
PCB – polychlorinated biphenyl
SD – storm drain
STP – sewage treatment plant
SWPPP – stormwater pollution prevention plan
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

The potential pathways and associated source information in Table 7 provide a general overview of the contaminant dynamics currently of potential issue at the subject property. Planning and management of ongoing and future source control programs at the subject property will be discussed in greater length in the subsequent SCSP documentation to be completed upon finalization of this Environmental Conditions Report.

5.5 OFFSITE POTENTIAL PATHWAYS OF CONTAMINATION

Contamination documented at adjacent properties also has the potential to migrate into and through the subject property. Some of this documented environmental contamination was discussed in Section 4.2; data summaries for many of these facilities are provided in Appendix E.

Since these pathways are outside of the T-108 property boundary, options for control or elimination of these sources and pathways are highly limited. However, source control management practices, standard operating procedures, and existing permit monitoring requirements can be utilized to greatly reduce the potential impact from these offsite sources.

Table 8 highlights some of the potential offsite sources and the routes of migration onto the subject property. As with the information included in Table 7, the information in this table will be used to assist in the planning and management of ongoing and future source control programs at the subject property to be discussed in the upcoming SCSP documentation.

Table 8. Potential offsite sources of contamination and pathway information relative to T-108

Potential Pathway	Potential Sources	Potential Contaminants	Details	Data Gap	General Options and Tools for Additional Pathway Characterization or Source Control (Refer to Table 6)
Air	Emission from neighboring industrial facilities depositing on site	Metals, phthalates, dioxins/furans, particulates	Subject property located in large industrial area; neighboring facilities (e.g., Ash Grove Cement) have documented releases to the atmosphere above regulatory standards; emissions can migrate through stormwater and groundwater pathways.	Data on air emissions in the greater Duwamish Valley are very limited; additional data would be helpful in further assessing pathway but difficult to associate directly with T-108 concerns.	• **Regulatory and Compliance Programs** – Review and consideration of greater Duwamish Valley stormwater monitoring results can provide insight as to the level of impact from atmospheric deposition. Ongoing coordination with the SCWG can provide valuable information on strategies within the greater Duwamish Valley to assess and manage impacts from atmospheric deposition. • **Operational BMPs** – Good housekeeping and environmental stewardship education can aid in the identification by subject property workers of potential offsite air emissions issues.
Stormwater	Spills, leaks, and accidental discharges from neighboring facilities	Metals, PAHs, PCBs, TPH, VOCs, miscellaneous chemicals	Contaminants from operations at adjacent terminal properties, truck traffic, and general ROW activities have the potential to migrate through stormwater runoff or sheet flow and into the drainage networks serving the subject property.	Monitoring information from adjacent Port properties (as applicable to their permit) and other potential monitoring data from local property owners (as available) can be assessed for potential impacts to the subject property; however, available data will likely be very limited.	• **Regulatory and Compliance Programs** – Coordination with other NPDES permittees and with the efforts of the SCWG can provide useful information on assessing potential for impact to the subject property from contaminated stormwater originating offsite. • **Operational BMPs** – Good housekeeping and environmental stewardship education can help subject property workers identify concerns in advance of potential impact to the site. • **Physical BMPs** – Hay bale buffers, catch basin filter socks, silt screens, etc., can help limit the introduction of contaminants transported to the site from offsite stormwater. Regular cleaning of the catch basin and the stormwater networks can prevent impacted materials from entering the LDW through the stormwater pathway.
Stormwater	Contaminants from indirect atmospheric deposition, dust and particulates	Metals, phthalates, dioxins/furans, particulates	As mentioned above, contaminants deposited via indirect atmospheric deposition onto the subject property can be transported to the LDW through the stormwater pathway.	Data on air emissions in the greater Duwamish Valley are very limited; additional data would be helpful in further assessing pathway but difficult to associate directly with T-108 concerns.	• **Regulatory and Compliance Programs** – Review and consideration of greater Duwamish Valley stormwater monitoring results can provide insight as to the level of impact from atmospheric deposition. Ongoing coordination with the SCWG can provide valuable information on strategies within the greater Duwamish Valley to assess and manage impacts from atmospheric deposition. • **Operational BMPs** – Good housekeeping practices (pavement sweeping, catch basin cleanout, etc.) can help prevent contaminants in atmospheric materials from entering the stormwater network.

Potential Pathway	Potential Sources	Potential Contaminants	Details	Data Gap	General Options and Tools for Additional Pathway Characterization or Source Control (Refer to Table 6)
Stormwater	Contaminants carried to the subject property from offsite by trucks, miscellaneous equipment, and in cargo containers, etc.	Metals, PAHs, PCBs, TPH, miscellaneous chemicals	Tenant operations involve management of trucks, chassis, and cargo containers that could potentially introduce contaminants to the subject property from other locations.	Information on potential contaminants that can be brought to the site via truck traffic, etc. is very limited. Additional data would be helpful but would be difficult to assign specifically to potential T-108 concerns.	• **Regulatory and Compliance Programs** – Permit required monitoring could be used to assess potential impact from offsite materials deposited on the subject property and transported into the stormwater pathway. However, differentiation between onsite contributions and those introduced by offsite equipment would be very difficult to ascertain. • **Operational BMPs** – Good housekeeping practices (pavement sweeping, catch basin cleanout, etc.) and an established equipment/truck washing program in a dedicated area at the subject property (with appropriate wash-water collection systems) would be the most practical way of addressing this potential contaminant pathway at the subject property.
Groundwater migration	Contaminants in groundwater in properties outside the T-108 subject property (i.e., S Oregon Street ROW) have the potential to migrate onto the subject property	TPH compounds, metals, miscellaneous chemicals	Results of sampling in the S Oregon Street ROW indicated soil and/or groundwater impacted with PCBs, metals, TPH compounds, and PAHs	Additional coordination and assessment of neighboring groundwater monitoring programs will provide necessary, if likely limited, information on overall groundwater quality in the area of the subject property.	• **Environmental Investigation** – Additional characterization of groundwater conditions around the perimeter of the subject property would provide useful information on the quality of groundwater potentially entering the property; however, groundwater flow patterns in many areas of the subject property have been shown to be existing the subject property toward neighboring facilities. • **Remediation Programs** – In-situ treatment of groundwater at the property boundary, or potential containment pumping of impacted groundwater would limit its influence on subsurface groundwater conditions at the site; however, given the level of contamination identified to date, this is an expensive and relatively impractical approach to address this potential pathway of concern.

BMP – best management practice
LDW – Lower Duwamish Waterway
NPDES – National Pollutant Discharge Elimination System
PAH – polycyclic aromatic hydrocarbon
PCB – polychlorinated biphenyl
ROW – right-of-way
SWPPP – stormwater pollution prevention plan
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

6 Conclusions and Recommendations

Terminal 108 has had numerous owners and operators over the course of the last hundred years. Operations have included wastewater/stormwater treatment, materials storage and transfer, PCB-contaminated sediment treatment and disposal, and most recently container and chassis storage and miscellaneous maintenance efforts. Upgrades and improvements to subject property infrastructure have occurred with each change of operation at the site and have greatly influenced the overall shape and layout of the subject property.

This diverse operational history has created a complex list of potential environmental concerns that must be considered in the formulation and implementation of an effective long-term source control strategy. Numerous source control tools and management procedures are available for consideration and incorporation into an effective strategy for the subject property. Requirements of a variety of regulatory and compliance programs, many already applicable to operations at the subject property (NPDES permits, etc.), can be utilized to reduce and potentially eliminate contaminants from impacting the subject property while at the same time assessing potential impacts from other onsite and offsite sources. Focused characterization efforts and remediation programs can potentially remove or contain impacted media at the subject property while operational and physical BMPs (good housekeeping practices, worker education, erosion control, etc.) can be incorporated as standard operating procedure at the subject property. Most importantly capital improvement initiatives (utility upgrades, paving, infrastructure improvements, etc.) can greatly reduce the potential for impact from upland sources to LDW sediment.

Environmental media at the subject property (i.e., surface and subsurface soil, groundwater) have been sampled and analyzed for the last three decades. Impacted soil at the subject property may have originated from past onsite operations (wastewater treatment, PCB-impacted sediment treatment and disposal) or may have been brought to the site during filling and grading historically associated with the construction of the LDW. Although the continued characterization and potential remediation (i.e., excavation) of these impacted materials should be considered for the site (especially in consideration of bank soil in the Western Parcel), current and long-term operational use at the subject property makes this approach practical for only small portions of the site. With these considerations, ongoing infrastructure improvements and applicable engineering controls (paving, containment, etc.) are a more practical and effective strategy for the subject property.

Recent groundwater investigation reports for the subject property (Pacific Groundwater Group 2006b, 2007a) have indicated that low concentrations of contaminants have been identified in samples, but at reporting levels below relevant regulatory cleanup standards. Subsequent to this reporting, Ecology acknowledged that groundwater at T-

108 is not currently considered as a potential source for impact to neighboring LDW sediment. Nevertheless, groundwater migration potential (from onsite and offsite) must be considered if a long-term source control strategy implemented at the site is to be effective.

The stormwater pathway's potential to transport contaminants across the subject property and to the LDW will need to be a chief focus during development and implementation of an effective source control strategy. Stormwater has the potential to transport a wide array of contaminants whose origins are from both onsite (spills, leaks, accidental discharges, etc.) and offsite (atmospheric deposition, runoff from adjacent properties, etc.). Numerous options are available to help reduce this pathway's potential of impact including the aspects of the existing NPDES programs (education, spill prevention, proper materials handling and storage, and inspection and oversight). Adherence to the requirements of the Port's and tenant's NPDES permits will reduce the potential for chemicals to leave the property and impact the LDW.

Nevertheless, source control programs will only be effective if they consider the "big picture," including understanding potential future uses of the property (both by its tenants and owner), and the potential for outside sources and pathways to impact the subject property. The understanding of the current conditions of the subject property provided in this documentation, including (but not limited to) the property's geology, hydrogeology, historical operations and practices, environmental investigation history, and future development plans (as applicable) will have to be considered in order to develop an effective strategy for the site.

The SCSPs that will now be completed will expand upon the information included in this documentation (particularly concerning potential pathways and selected source control measures/tools) and provide an overall strategy for continued source control management at the subject property. The plans will take into consideration the regulatory requirements already established as well as other measures and techniques that can be used to ensure that the strategies are proactive and can adjust to the potential changing operational and environmental conditions of the subject property.

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