Lower Duwamish Waterway
River Mile 0.0-0.1 East
(Spokane Street to Ash Grove Cement)

Source Control Action Plan

June 2009

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River Mile 0.0-0.1 East
(Spokane Street to Ash Grove Cement)

Draft Source Control Action Plan

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Executive Summary

The purpose of this Source Control Action Plan (SCAP) is to identify potential contamination sources and the actions necessary to keep sediments from being contaminated again after any cleanup occurs. This SCAP is based on a review of information pertinent to sediment recontamination in the River Mile (RM) 0.0-0.1 East Source Control Area, as presented in *Lower Duwamish Waterway, RM 0.0-0.1 East (Spokane Street to Ash Grove Cement) Summary of Existing Information and Identification of Data Gaps* (E & E 2008a).

The Lower Duwamish Waterway (LDW) site, located in Seattle, Washington, was added to the National Priorities List (Superfund) by the U.S. Environmental Protection Agency (EPA) on September 13, 2001. The Washington State Department of Ecology (Ecology) added the site to the Washington State Hazardous Sites List on February 26, 2002. Contaminants of concern (COCs) found in waterway sediments include polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), dioxin/furans, arsenic, other metals, and phthalates. These COCs may pose threats to people, fish, and wildlife.

In December 2000, EPA and Ecology entered into an order with King County, the Port of Seattle, the city of Seattle, and The Boeing Company to perform a Remedial Investigation (RI) and Feasibility Study (FS) of sediment contamination in the waterway. EPA is the lead agency for the Remedial Investigation/Feasibility Study (RI/FS). Ecology is the lead agency for controlling current sources of pollution to the site, in cooperation with the city of Seattle, King County, the Port of Seattle, the city of Tukwila, and EPA. Phase 1 of the RI/FS used existing data to identify potential human health and ecological risks, information needs, and high priority areas for cleanup (Windward 2003a). Seven candidate early action areas (EAAs, or "Tier 1" source control areas) were also identified (Windward 2003b). Data collected during Phase 2 of the RI were used to identify additional sites where long-term cleanup actions may be necessary. The RM 0.0-0.1 East Source Control Area was identified as one of these "Tier 2" source control areas.

As part of the source control efforts in the LDW, Ecology works with their consultants to develop SCAPs for areas of sediment contamination that will or may require cleanup. The SCAP for each of these sediment areas identifies potential sources of sediment contaminants and actions needed to control them, and evaluates whether ongoing sources are present that could recontaminate sediments after cleanup. In addition, the SCAPs describe source control actions that are planned or currently underway, and sampling and monitoring activities that will be conducted to identify additional sources.

Sections 1 and 2 of this SCAP provide background information about the LDW site and the RM 0.0-0.1 East Source Control Area. Metals, PAHs, PCBs, phthalates, and semivolatile organic compounds are considered to be the major COCs in sediments associated with the RM 0.0-0.1 East Source Control Area. In upland media, COCs include petroleum hydrocarbons and volatile organic compounds (VOCs), in addition to the COCs found in sediments[1]. While this SCAP focuses on these COCs, other contaminants that could result in sediment recontamination will be addressed as the sources are identified.

Section 3 describes potential upland sources of contaminants that may affect sediments in the RM 0.0-0.1 East Source Control Area, including stormwater, storm drain solids, groundwater, soil erosion, surface runoff, and contamination that may result from spills. Section 3 also evaluates these potential sources and identifies the actions that are planned or are underway to control potential contaminant sources. Section 4 discusses monitoring activities that will be conducted to observe known sources, identify additional sources, support remedial action decisions, and assess progress. Section 5 describes how source control efforts will be tracked and reported.

Executive Summary Table 1 lists the source control actions that have been identified for the RM 0.0-0.1 East Source Control Area. This table includes a brief description for each property of the potential contaminant sources, source control activities to be conducted, the priority level for each action item, the parties involved in source control actions, and milestone/target dates for completion. In some cases additional document review is called for when adequate documentation was not available during the preparation of the Data Gaps Report. The milestones and targets are best-case scenarios based on consultation with the identified agencies or facilities. They reflect reasonably achievable schedules, and include the time required for planning, contracting, field work, laboratory analysis, and activities dependent on weather.

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[1] Although not explicitly addressed in the Sediment Management Standards (SMS), VOCs in pore water may cause adverse effects on benthic invertebrates and other aquatic biota, and are therefore considered COCs for source control efforts in the LDW.

Executive Summary Table 1

Source Control Facility/ Outfall	Action Item	Priority	Responsible Party	Status	Estimated Completion Date
Harbor Marina Corporate Center (HMCC)	The drainage connections to all outfalls need to be inspected and fully understood. The Port of Seattle and adjacent property owners will work with Ecology to clarify the origins and ownership of each outfall at the HMCC.	Low	Ecology, Port of Seattle	Planned	August 2010
	The permitting requirements and responsible parties for each outfall need to be clearly understood. The Port of Seattle and adjacent property owners will work with Ecology to confirm the type of permit required for outfall HRE-1 and appropriate responsibility will be assigned.	Medium	Ecology, Port of Seattle	Planned	August 2010
	Although there are no current fueling operations at this site, it is an active marina with vessels that carry fuel and other potential contaminants. The Port of Seattle will demonstrate that the marina is in compliance with any applicable permits.	High	Port of Seattle	Planned	August 2010
Port of Seattle Terminal 104	Ecology and the Port will undertake a dialogue to determine how to address identified data gaps in the western portion of T-104.	High	Ecology, Port of Seattle	Planned	April 2012

Source Control Facility/ Outfall	Action Item	Priority	Responsible Party	Status	Estimated Completion Date
Port of Seattle Terminal 104 (continued)	The Port of Seattle will prepare and submit an annual report to document groundwater monitoring results and provide recommendations for future remedial efforts as stated in the VCP CAP.	Medium	Port of Seattle	Ongoing	July 2009
	The Port of Seattle will ensure that the storm drain system structures on the site and their function are completely delineated and properly permitted with all existing drainage problems identified in Section 3.3.4.1.	High	Ecology, Port of Seattle	Planned	February 2010
	Ecology will review post remediation reports and the annual report as part of the VCP and determine whether further action is needed.	High	Ecology	Planned	TBD
Ash Grove Cement	Negotiate an agreed order for a Remedial Investigation/ Feasibility Study that will focus on potential soil and groundwater contamination at the site.	High	Ecology, Ash Grove Cement	Planned	April 2010
	Obtain a new NPDES permit for discharge into the City storm drain that discharges at S. Hind Street.	High	Ecology, Ash Grove Cement	Ongoing	December 2009

Source Control Facility/ Outfall	Action Item	Priority	Responsible Party	Status	Estimated Completion Date
Ash Grove Cement (continued)	Ecology will ensure that the storm drain system structures on the site and their function are completely delineated and properly permitted with all existing drainage problems identified. Since Seattle Public Utilities has recently confirmed that waste water and stormwater is draining to the S. Hind St. storm drain system, Ecology will require Ash Grove Cement to demonstrate appropriate separation of waste water from storm water and to install an appropriate treatment system.	Medium	Ecology, Ash Grove Cement	Planned	August 2010
	Ecology will inspect the condition and operational records of the groundwater well used for cooling water to insure that it is not capable of releasing contaminants directly into the aquifer.	Medium	Ecology	Planned	August 2010
	Conduct additional source control inspections to ensure compliance and BMPs.	High	Ecology, Seattle Public Utilities	Ongoing	August 2010
Atmospheric Deposition	Air pollution is a concern for the wider LDW region. Ecology will review work on atmospheric deposition being conducted by the Washington State Department of Health and planned by the Puget Sound Partnership. If funding is available, Ecology will hire a contractor to develop options and recommendations for addressing action items relating to air pollution.	Low	Ecology	Planned	TBD

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Acronyms/Abbreviations

AET	Puget Sound Apparent Effects Threshold
AOC	Agreed Order on Consent
AOP	air operating permit
BEHP	bis(2-ethylhexyl)phthalate
bgs	below ground surface
BMP	best management practices
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAP	Cleanup Action Plan
CESQG	Conditionally Exempt Small Quantity Generator
COC	contaminant of concern
CSCSL	Confirmed and Suspected Contaminated Sites List
CSL	Cleanup Screening Level
CSO	combined sewer overflow
Data Gaps Report	Summary of Existing Information and Identification of Data Gaps Report
dw	dry weight
E & E	Ecology and Environment, Inc.
EAAs	early action areas
Ecology	Washington State Department of Ecology
ECOSS	Environmental Coalition of South Seattle
EF	exceedance factor
EMWGS	East Marginal Way Grade Separation
EOF	Emergency Overflow
EPA	U.S. Environmental Protection Agency
ESN	ESN Northwest
FS	Feasibility Study
GIS	Geographic Information System
GPD	gallons per day
GSP	Grade Separation Project
HMCC	Harbor Marina Corporate Center

Acronyms/Abbreviations (Cont.)

ISIS	Integrated Site Information System
LAET	lowest apparent effects threshold
2LAET	second-lowest apparent effects threshold
LDW	Lower Duwamish Waterway
LDWG	Lower Duwamish Waterway Group
LUST	leaking underground storage tank
MCL	maximum contaminant limit
µg/kg	micrograms per kilogram
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MOU	Memorandum of Understanding
NFA	No Further Action
No.	Number
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standard
OC	organic carbon
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
ppm	parts per million
PSCAA	Puget Sound Clean Air Agency
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RM	river mile
ROD	Record of Decision
ROW	right-of-way
SCAP	Source Control Action Plan
SCWG	Source Control Work Group
SMS	Washington State Sediment Management Standards
SPU	Seattle Public Utilities

Acronyms/Abbreviations (Cont.)

SQS	Sediment Quality Standards
SVOC	semivolatile organic compound
T-XX	Terminal
TCA	1,1,1-trichloroethane
TCE	trichloroethene
TCLP	Toxic Characteristics Leachate Procedure
TOC	total organic carbon
TPH	total petroleum hydrocarbons
TPH-D	total petroleum hydrocarbons- diesel-range
TPH-G	total petroleum hydrocarbons- gasoline-range
USCG	United States Coast Guard
UST	underground storage tank
VBLS	vanillin black liquor solids
VCP	Voluntary Cleanup Program
VOCs	volatile organic compounds
WSDOH	Washington State Department of Health

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1.0 Introduction

This Source Control Action Plan (SCAP) describes potential sources of contaminants that may affect sediments adjacent to the RM 0.0-0.1 East Source Control Area[2]. This area is one of several source control areas identified as part of the overall cleanup process for the Lower Duwamish Waterway (LDW) Superfund Site (Figure 1). The Washington State Department of Ecology (Ecology) identified the properties within the RM 0.0-0.1 East Source Control Area that discharge stormwater to the adjacent sediments. With regard to storm drain systems and surface water runoff the upland properties within the RM 0.0-0.1 East Source Control Area are also referred to as the "RM 0.0-0.1 East drainage basin[3]" (Figures 1 and 2).

The purpose of this plan is to evaluate the significance of the sources and to determine what actions are needed to minimize the potential for recontamination of sediments adjacent to the RM 0.0-0.1 East Source Control Area after any proposed cleanup. In addition, this SCAP describes:

- Source control actions/programs that are planned or currently underway,
- Sampling and monitoring activities that will be conducted to identify additional sources and assess progress, and
- The method of tracking and reporting these source control efforts.

The information in this document was obtained from various sources, including the following documents:

- *Lower Duwamish Waterway, RM 0.0-0.1 East (Spokane Street to Ash Grove Cement), Summary of Existing Information and Identification of Data Gaps*, Ecology and Environment Inc. (E & E) December 2008, located on Ecology's website: http://www.ecy.wa.gov/programs/tcp/sites/lower_duwamish/sites/RM_00-01_E/dataGapsReport.html
- *Lower Duwamish Waterway Source Control Strategy*, Washington State Department of Ecology, January 2004, located on Ecology's website: http://www.ecy.wa.gov/pubs/0409043.pdf

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[2] This SCAP incorporates data published through March 3, 2009. Personal communications and e-mails beyond this date may have also provided additional information. Section 6, Tracking and Reporting of the Source Control Activities, describes how newer data will be disseminated.

[3] The area referred to herein as the "RM 0.0-0.1 East drainage basin" is actually a sub-drainage basin of the LDW valley. The LDW valley drainage basin has been divided into sub-drainage basins, defined tentatively by stormwater collection systems and outfalls, as shown in Figure 1.

1.1 Organization of Document

Section 1 of this SCAP describes the LDW site, the strategy for source control, and the responsibilities of the public agencies involved in source control for the LDW. Section 2 provides background information on the RM 0.0-0.1 East Source Control Area, including a description of the contaminants of concern (COCs) for sediments. Section 3 provides an overview of potential sources of contaminants that may affect sediments near the RM 0.0-0.1 East Source Control Area, including outfalls and properties within the RM 0.0-0.1 East drainage basin. Section 3 also describes actions planned or currently underway to control potential sources of contaminants, while Sections 4 and 5 describe monitoring and tracking/reporting activities, respectively. References are listed in Section 6, and figures and tables are presented at the end of the document.

As new information about the sites and potential sources discussed in this document becomes available and as source control progress is made, Ecology will update this SCAP by publishing Technical Memoranda or by including updates to the Source Control Status Reports, as appropriate.

1.2 Lower Duwamish Waterway Site

The LDW is the downstream portion of the Duwamish River, extending from the southern tip of Harbor Island to just south of Turning Basin 3 (Figure 1). It is a major shipping route for bulk and containerized cargo. Most of the upland areas adjacent to the LDW have been developed for industrial and commercial operations. These include cargo handling and storage, marine construction, boat manufacturing, marina operations, concrete manufacturing, paper and metals fabrication, food processing, and airplane parts manufacturing. In addition to industrial uses, the river is also used for fishing, recreation, and wildlife habitat. Residential areas near the waterway include the South Park and Georgetown neighborhoods.

Beginning in 1913, this portion of the Duwamish River was dredged and straightened to promote navigation and industrial development, resulting in the river's current form. Shoreline features within the waterway include constructed bulkheads, piers, wharves, buildings extending over the water, and steeply sloped banks armored with riprap or other fill materials (Weston 1999). This development left intertidal habitats dispersed in relatively small patches, with the exception of Kellogg Island, which is the largest contiguous area of intertidal habitat remaining in the Duwamish River (Tanner 1991). Over the past 20 years, public agencies and volunteer organizations have worked to restore intertidal and subtidal habitat within the river. Some of the largest restoration projects are at Herring House Park/Terminal (T) 107, Turning Basin 3, Hamm Creek, and T-105.

The presence of chemical contamination in the LDW has been recognized since the 1970s (Windward 2003a). In 1988, the United States Environmental Protection Agency (EPA) investigated sediments in the LDW as part of the Elliott Bay Action Program. Contaminants identified by the EPA study included metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), phthalates, and other organic compounds. In 1999, EPA completed a study of approximately 6 miles (10 km) of the waterway, from the southern tip of Harbor Island to just south of the turning basin near the Norfolk combined sewer overflow

(CSO) outfall (Weston 1999). This study confirmed the presence of PCBs, PAHs, phthalates, mercury, and other metals, that may pose threats to people, fish, and wildlife.

In December 2000, EPA and Ecology signed an Agreed Order on Consent (AOC) with King County, the Port of Seattle, the City of Seattle, and The Boeing Company, collectively known as the Lower Duwamish Waterway Group (LDWG). Under the agreement, the LDWG is conducting a Remedial Investigation (RI) and Feasibility Study (FS) of the LDW to assess risks to human health and the environment and to evaluate cleanup alternatives. The RI for the site is being done in two phases. Results of Phase 1 were published in July 2003 (Windward 2003a). The Phase 1 RI used existing data to provide an understanding of the nature and extent of chemical distributions in LDW sediments, develop preliminary risk estimates, and identify candidate sites for early cleanup action. The Phase 2 RI is currently underway and is designed to fill critical data gaps identified in Phase 1. Based on the results of the Phase 2 RI, additional areas for cleanup may be identified. During Phase 2, an FS is being conducted that will address cleanup options for contaminated sediments in the LDW.

On September 13, 2001, EPA added the LDW to the National Priorities List. This is EPA's list of hazardous waste sites that warrant further investigation and cleanup under Superfund. Ecology added the site to the Washington State Hazardous Sites List on February 26, 2002.

An interagency Memorandum of Understanding (MOU), signed by EPA and Ecology in April 2002 and updated in April 2004, divides responsibilities for the site (EPA and Ecology 2002; EPA and Ecology 2004). EPA is the lead for the RI/FS, while Ecology is the lead for source control issues.

In June 2003, the *Technical Memorandum: Data Analysis and Candidate Site Identification* (Windward 2003b) was issued. Seven candidate sites for early action (Early Action Areas [EAAs]) were recommended (Figure 1). The sites became the Tier 1 source control areas and include:

- EAA-1: Duwamish/Diagonal CSO and storm drain
- EAA-2: West side of the waterway, just south of the First Avenue S. Bridge, approximately 2.2 miles from the south end of Harbor Island
- EAA-3: Slip 4, approximately 2.8 miles from the south end of Harbor Island
- EAA-4: South of Slip 4, on the east side of the waterway, just offshore of the Boeing Plant 2 and Jorgensen Forge properties, approximately 2.9 to 3.7 miles from the south end of Harbor Island
- EAA-5: T-117 and adjacent properties, approximately 3.6 miles from the south end of Harbor Island, on the west side of the waterway
- EAA-6: East side of the waterway, approximately 3.8 miles from the south end of Harbor Island
- EAA-7: Norfolk CSO/SD, on the east side of the waterway, approximately 4.9 to 5.5 miles from the south end of Harbor Island

Of the seven recommended EAAs, five either had sponsors to begin investigations or were already under investigation by a member or group of members of the LDWG. These five sites are EAA-1, EAA-3, EAA-4, EAA-5, and EAA-7. EPA is the lead for managing cleanup at two areas, EAA-3 and EAA-5. The other three EAA cleanup projects were begun before the current LDW RI/FS was initiated. Cleanup at EAA-4, under EPA Resource Conservation and Recovery Act (RCRA) management, is currently in the planning stage. The EAA-1 and EAA-7 cleanups are under King County management as part of the Elliott Bay-Duwamish Restoration Program. Cleanup at EAA-1 was partially completed in March 2004, and a partial sediment cleanup was conducted at EAA-7 in 1999. Early action cleanups may involve members of the LDWG or other parties as appropriate. Planning and implementation of early action cleanups is being conducted concurrently with the Phase 2 investigation.

Further information about the LDW can be found on Ecology's website:

http://www.ecy.wa.gov/programs/tcp/sites/lower_duwamish/lower_duwamish_hp.html

and on EPA's website: http://yosemite.epa.gov/r10/cleanup.nsf/sites/lduwamish.

1.3 Lower Duwamish Waterway Source Control Strategy

The Lower Duwamish Waterway Source Control Strategy (Ecology 2004) describes the process for identifying source control issues and implementing effective source controls for the LDW. The goal of the strategy is to minimize the potential for recontamination of sediments to levels exceeding the LDW sediment cleanup goals and the Washington State Sediment Management Standards (SMS). This goal is based on the principles of source control for sediment sites described in EPA's *Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites*; February 12, 2002 (EPA 2002), and SMS (WAC 173-204). The first principle is to control sources early, starting with identifying all ongoing sources of contaminants to the site. EPA's Record of Decision (ROD) for the site will require that sources of sediment contamination to the entire LDW site be evaluated, investigated, and controlled as necessary. Dividing source control work into specific SCAPs and prioritizing those plans to coordinate with sediment cleanups will address the guidance and regulations and will be consistent with the selected remedial actions in the EPA ROD. The source control work will be identified in a series of detailed, area-specific SCAPs, which are prioritized to coordinate with sediment cleanups.

Each SCAP documents what is known about each source control area, the potential sources of recontamination, past clean up actions taken to address them, and actions necessary to achieve adequate source control for an area. Because the scope of source control for each site will vary, it is necessary to adapt each plan to its respective area.

The success of this strategy depends on the coordination and cooperation of all public agencies with responsibility for source control in the LDW area, as well as prompt compliance by the businesses and property owners that must make changes necessary to control releases from their properties.

Source control priorities are divided into four tiers. Tier 1 consists of source control actions associated with the EAAs. Tier 2 consists of source control actions associated with any final, long-term sediment cleanup actions identified through the Phase 2 RI and the EPA ROD. Tier 3 consists of source identification and potential source control actions in areas of the LDW that are not identified for cleanup, but where source control may be needed to prevent future contamination. Tier 4 consists of source control work identified by post-cleanup sediment monitoring (Ecology 2004). This document is a SCAP for a Tier 2 source control area.

The Lower Duwamish Waterway Source Control Strategy can be found on Ecology's website:

http://www.ecy.wa.gov/programs/TCP/sites/lower_duwamish/source_control/sc.html

Further information about Lower Duwamish Waterway source control can be found at Ecology's

Lower Duwamish Source Control website:

http://www.ecy.wa.gov/programs/tcp/sites/lower_duwamish/lower_duwamish_hp.html

and at the King County/Seattle Public Utilities Joint Business Inspection website:

http://www.kingcounty.gov/environment/wastewater/IndustrialWaste.aspx

1.4 Source Control Work Group

The primary public agencies responsible for source control for the LDW are Ecology, the city of Seattle, King County, the Port of Seattle, the city of Tukwila, and EPA. All of these agencies, except for the city of Tukwila, are directly involved in the source control activities for the RM 0.0-0.1 East Source Control Area.

To coordinate among these agencies, Ecology formed the Source Control Work Group (SCWG) in January 2002. The purpose of the SCWG is to share information, discuss strategy, actively participate in developing SCAPs, jointly implement source control measures, and share progress reports on source control activities for the LDW area. The monthly SCWG meetings are chaired by Ecology. All final decisions on source control actions and completeness will be made by Ecology, in consultation with EPA, as outlined in the April 2004 Ecology/EPA Lower Duwamish Waterway Memorandum of Understanding (EPA and Ecology 2004).

Other public agencies with relevant source control responsibilities include the Washington State Department of Transportation, Puget Sound Clean Air Agency, and the Seattle/King County Department of Public Health. These agencies are invited to participate in source control with the SCWG as appropriate (Ecology 2004).

1.5 Scope of Document

The scope of this document is geographically limited to the upland area within the RM 0.0-0.1 East Source Control Area (Figure 2) and discharge points into the LDW along the waterfronts of the properties within this boundary.

This report addresses three properties within the RM 0.0-0.1 East Source Control Area: Harbor Marina Corporate Center (HMCC, also known as Port of Seattle T-102), Port of Seattle T-104 (formerly T-106 NW), and Ash Grove Cement. The report identifies potential sources of contamination within upland media that could recontaminate these sediments. This report also summarizes the COCs that have been identified in the sediments associated with the RM 0.0-0.1 East Source Control Area.

Data on existing sediment contamination in the RM 0.0-0.1 East Source Control Area are summarized in Section 2 and include data published by July, 2008. However, source control actions in this report are focused only on upland sources that have potential pathways for contaminants to reach sediments near the RM 0.0-0.1 East Source Control Area.

Some SCAPs include discussion of the impacts of combined sewer overflow (CSO) outfalls as a contaminant pathway when such outfalls exist in the respective Source Control Area. There is no CSO outfall in the RM 0.0-0.1 East Source Control Area. However, if any contaminants from this Source Control Area are discharged to the combined sewer system, it is possible for them to be released to the LDW through one or more CSO outfalls. Such releases are not covered here, but are addressed in the SCAPs with associated CSO outfalls. Section 3.1 explains the combined sewer system in more detail.

Atmospheric deposition of air pollution is a potential source of contamination to sediments adjacent to the RM 0.0-0.1 East Source Control Area from local or regional sources outside of the RM 0.0-0.1 East Source Control Area. However, this document contains only a limited discussion of atmospheric deposition (Section 3.5). Air pollution is a concern for the wider LDW region. Ecology will review work on atmospheric deposition being conducted by the Washington State Department of Health and planned by the Puget Sound Partnership. Ecology plans to hire a contractor to develop options and recommendations for addressing action items relating to air pollution.

2.0 RM 0.0-0.1 East Source Control Area

This section describes the history and current conditions of the RM 0.0-0.1 East Source Control Area. It located along the eastern side of the LDW Superfund Site between 0.0 and 0.1 miles from the southern tip of Harbor Island (Figure 2). Sediments near this Source Control Area have accumulated chemical contaminants from numerous sources, both historical and potentially ongoing. These chemicals may have entered the LDW through direct discharges, spills, bank erosion, groundwater discharges, surface water runoff, atmospheric deposition, or other non-point source discharges.

Historically, the Duwamish River meandered through the mud flats of the river delta. In the late 1800s and early 1900s, extensive modifications were made to straighten the Duwamish River to create a navigable channel. Many of the current slips are remnants of old river meanders. Dredged material, in addition to imported fill, was likely used to fill in the upland areas near the RM 0.0-0.1 East Source Control Area.

Industrialization of the LDW, including the RM 0.0-0.1 East Source Control Area, began in the early 1900s. At that time Harbor Island was created from the material resulting from development of the nearby portions of the waterway and leveling of upland slopes. Historical and current commercial and industrial operations within the RM 0.0-0.1 East Source Control Area include cargo handling and storage, auto repair and storage lots, shipbuilding and repair, paper bag manufacturing, lead smelting and storage, cement production and storage, bulk petroleum fuel storage, and a lumber storage yard.

Groundwater within the Duwamish Valley alluvium is typically encountered under unconfined conditions within approximately 10 feet below ground surface (bgs). Groundwater in this unconfined aquifer is found within the fill material and native alluvial deposits. The direction of groundwater flow in the unconfined aquifer is generally toward the LDW. However, the direction may vary locally depending on the nature of subsurface material and tidal influence of the LDW. The upland area affected by tidal fluctuations is generally within 300 to 500 feet of the LDW (Windward 2003a) and varies depending upon location.

2.1 Contaminants of Concern in Sediments

The *Lower Duwamish Waterway Phase 2 Remedial Investigation Draft Report* (Windward 2007), which summarizes all LDW sediment investigation results, was queried by sample location for surface and subsurface sediment samples in which chemicals were detected near the RM 0.0-0.1 East Source Control Area. Chemical concentrations for these sample locations were compared to SMS, which include both the Sediment Quality Standards (SQS) and Cleanup Screening Levels (CSL) (WAC 173-204). Sediments that meet the SQS criteria have a low likelihood of adverse effects on benthic organisms. However, exceeding the SQS criteria does not necessarily lead to adverse effects or toxicity. The CSL is defined as the maximum chemical concentration and level of biological effects permissible at a cleanup site, to be achieved by 10 years after cleanup has been completed. The CSL is greater than or equal to the SQS and represents a higher level of risk to benthic organisms than SQS levels. The SQS and CSL values provide a basis for identifying sediments that may pose a risk to some ecological receptors. The SMS for most organic chemicals are based on total organic carbon (TOC)-normalized concentrations.

Contaminants of Concern (COCs) in Sediment				
Contaminant of Concern (COC)	**Surface Sediment**		**Subsurface Sediment**	
	> SQS	**> CSL**	**> SQS**	**> CSL**
Metals				
Arsenic	●	●	●	●
Lead	●	●	●	●
Mercury	●	●	●	●
Zinc	●		●	●
PAHs				
1,2,4-Trichlorobenzene			●	
Benzo(a)pyrene	●			
Benzo(g,h,i)perylene	●			
Benzofluoranthenes (total)	●			
Chrysene	●			
Dibenzo(a,h)anthracene	●			
Fluoranthene	●			
Indeno(1,2,3-cd)pyrene	●			
Total HPAH	●			
Phthalates				
Bis(2-ethylhexyl) phthalate	●	●	●	●
Butyl benzyl phthalate			●	
Other Semi-volatile Organic Compounds				
2,4-Dimethylphenol			●	●
PCBs				
PCBs (total)	●	●	●	●

Note:
This table includes data published through March 12, 2007.
Source: Lower Duwamish Waterway Group Web site sediment database (www.ldwg.org, LDWG 2008). Shaded cells indicate COCs exceeded both SQS and CSL.

Contaminants that exceeded the SQS or CSL were identified as COCs and are listed in the table above. COCs were identified in surface sediments at several locations, which included DR001, DR003, DR055, LDW-SS2, LDW-SS6, LDW-SS301, LDW-SS302, and LDW-SS305 (Figure 3). COCs were identified in subsurface sediments at the following locations: LDW-SC1, LDW-SC2, and LDW-SC4 (Figure 4). Analytes marked in gray are those exceeding both the SQS and the CSL values for either surface or subsurface sample locations[4].

To allow for comparison of applicable SMS compounds to SQS and CSL, organic compounds were organic carbon (OC) normalized. Detected concentrations (dry-weight basis) were normalized to the TOC concentrations in samples. However, SQS and CSL limits are applicable to TOC-normalized concentrations only when TOC content is between 0.5 and 4.0%. For samples with TOC concentrations outside the applicable range, concentrations of organic compounds were compared with Puget Sound Apparent Effects Threshold (AET) values. AET values are the functional equivalent of the SQS and CSL, only they are expressed on a dry-weight basis. The lowest AET (LAET) was used as the equivalent of the SQS, and the second lowest AET (2LAET) was used in place of the CSL.

Since clean up levels differ among chemicals, the Exceedance Factor (EF) is a uniform way of showing how much a contaminant exceeds a given criteria. The EF is the ratio of the measured concentration to the criteria concentration. An EF of greater than one means that the measured concentration exceeds the cleanup criteria by a factor equal to the EF (e.g., an EF of 2.0 means the measured concentration is twice the criteria for that compound.

Figures 3 and 4 show the EFs for sediment contaminants with an EF $\geq$ 1.0 at each sample location. The highest EFs were generally found in the subsurface sediment, and concentrations of the same compound generally increased with depth. Additionally, the four highest EFs are attributed to total PCBs, indicating that these compounds may be of particular concern in this source control area.

Analytical results that exceed the SQS or CSL and their EFs are listed in Tables 1 and 2. Analytical results for most sample locations can be found in the sediment database at www.ldwg.org.

2.1.1 Metals

Metals exceedances were recorded at five surface and three sub-surface sediment sample locations adjacent to properties in the RM 0.0-0.1 East Source Control Area. Arsenic exceeded at three surface and two subsurface sampling locations near Ash Grove Cement. Mercury exceeded at one subsurface and two surface sampling locations adjacent to HMCC. Out of all the surface and subsurface samples, the highest EFs for metals were for arsenic and zinc at LDW-SC2, near the boundary between T-104 and Ash Grove Cement. The highest arsenic concentration was 270 mg/kg dw, and the highest zinc concentration was 1,430 mg/kg dw (Figures 3 & 4).

[4] Errors in the surface sediment data as presented in Table 1 of the Data Gaps Report have been corrected for this SCAP report. The COCs listed in the table above are still the same; however, the sample locations they are associated with have been corrected.

2.1.2 Poly Aromatic Hydrocarbons

The only exceedances of Poly Aromatic Hydrocarbons (PAHs) were found in surface sediments adjacent to HMCC. PAHs here exceeded SQS criteria at two surface sediment locations. The SQS EFs ranged from 1.1 to 1.6. The sample with the highest exceedance factor (LDW-SS301) had a concentration of 56 mg/kg OC for Indeno(1,2,3-cd)pyrene (Figures 3).

2.1.3 Phthalates

Phthalates, including butyl benzyl phthalate (BBP) and bis(2-ethylhexyl)phthalate (BEHP), exceeded SQS criteria at one surface and at two subsurface sediment locations adjacent to the RM 0.0-0.1 East Source Control Area. BEHP concentrations ranged from 850 to 2,400 micrograms per kilogram (µg/kg) dry weight (dw), with the highest exceedance factor (2.6) at subsurface sampling location LDW-SC2 adjacent to the border between T-104 and Ash Grove Cement. The highest EF for BBP was 1.0 (98 µg/kg dw), for a subsurface sample at LDW-SC1 near HMCC.

2.1.4 Semi-Volatile Organic Compounds

Two of the Semi-Volatile Organic Compounds (SVOCs) selected for analyses exceeded SMS criteria, and both were in subsurface sediment samples. At LDW-SC1 1,2,4-Trichlorobenzene had an SQS EF of 1.2 with a concentration of 20 µg/kg dw. At LDW-SC4, near Ash Grove Cement, 2,4-Dimethylphenol had an EF of 1.6 with a concentration of 46 µg/kg dw (Figure 4).

2.1.5 PCBs

PCBs exceeded criteria at five surface and three subsurface sediment locations. Concentrations of PCBs ranged from 209 to 6,700 µg/kg dw. The highest concentration of PCBs was from LDW-SC1, a subsurface sample location adjacent to HMCC.

2.2 Contaminants of Concern in Upland Media

Several environmental investigations and cleanup activities have been conducted at properties within the RM 0.0-0.1 East Source Control Area to address contamination of upland media (including stormwater, storm drain solids, groundwater, seeps, and soil). These investigations are summarized in Section 3.

If a chemical was detected during an investigation above an applicable screening level in one or more samples of upland media, then the chemical is defined as a COC in upland media. The determination of COCs in upland media (upland COCs) is independent of the determination of sediment COCs, as upland COCs are not always detected in sediments adjacent to the RM 0.0-0.1 East Source Control Area.

Applicable screening level criteria included Model Toxics Control Act (MTCA) Method A cleanup levels for soil and groundwater, Ecology stormwater compliance benchmark levels for facilities covered under the Industrial Stormwater General Permit, and SMS criteria for both storm drain solids and sediments sampled within the LDW in association with a facility of concern. The table below lists the COCs, the upland media, and the potential pathways for this source control area.

Following the identification of COCs in upland media, a screening tool developed by Ecology was used in an attempt to rule out upland COCs that are not considered a concern to LDW sediments (SAIC 2006). However, the screening tool is limited to SMS compounds found in soil or groundwater, and it is limited to predicting exceedances of SMS numerical criteria only for protection of benthic invertebrates. Ecology's screening tool is described in Lower Duwamish Waterway, RM 0.0-0.1 East (Spokane Street to Ash Grove Cement), Summary of Existing Information and Identification of Data Gaps (E & E 2008a).

The upland COCs and pathways in the table below show the results of Ecology's review of available information on LDW sediments adjacent to the RM 1.0-0.1 East Source Control Area. This table shows COCs discovered in upland media and cannot be used to determine which upland COCs are also sediment COCs in the LDW. Comparison with sediment and seep data collected for the LDW sediment investigation indicates that not all of the upland COCs shown above are problematic for sediment source control.

For Ash Grove Cement there has not been any analytical testing to confirm or rule out the presence of COCs. However, information reviewed identifies several suspected sources of COCs. These include the following materials (and the suspected COCs related to them):

- stockpiles of coal in uncovered areas (PAHs and mercury);
- Teck Cominco slag (heavy metals such as cadmium, copper, lead, mercury and zinc);
- vanillin black liquor solids (VBLS) (copper);
- construction materials exposed after demolition (asbestos, PCBs); and
- electrical transformers (PCBs).

Further investigation will determine if any suspected COCs are confirmed to be a concern to LDW sediments.

Contaminants of Concern in Upland Media			
Facility of Concern	**Contaminant of Concern[5] (COC)**	**Media**	**Potential Pathway to LDW Sediments**
Harbor Marina Corporate Center (HMCC)	Petroleum hydrocarbons (TPH-G, TPH-D, BTEX)	Soil	Stormwater
Terminal 104	Petroleum hydrocarbons (TPH-G, TPH-D, BTEX)	Groundwater, soil	Stormwater, groundwater
	Chlorinated solvents (TCE)	Groundwater, soil	
	Metals (Arsenic, Cadmium, Chromium, Lead, Mercury, Zinc)	Catch basin solids, groundwater, soil	
Ash Grove Cement	[Quantitative analyses were not available to confirm suspected COCs]	unknown	Stormwater, groundwater, spills

[5] Although not explicitly addressed in the SMS, VOCs in pore water may cause adverse effects on benthic invertebrates and other aquatic biota, and are therefore considered COCs for source control efforts in the LDW.

3.0 Potential Sources of Sediment Recontamination

For each of the RM 0.0-0.1 East Source Control Area properties, this section summarizes current and historical land uses, the results of environmental investigations and cleanup activities, and actions necessary to achieve source control. In addition, there are four active public outfalls (2151, 2154[6], 2156, 7041[7]) and one private outfall (HRE-1) (Figures 5, 6 & 7) within the RM 0.0-0.1 East Source Control Area that discharge to the LDW. Ash Grove Cement has recently applied for an individual National Pollutant Discharge Elimination System (NPDES) permit to discharge stormwater and treated wastewater to a city storm drain that discharges into the east waterway north of the RM .0.-0.1 East Source Control Area. Active outfalls were determined based on existing information and are discussed in Sections 3.2 through 3.4, where the properties within the RM 0.0-0.1 East Source Control Area (HMCC, Port of Seattle T-104, and Ash Grove Cement) are described. Atmospheric deposition is discussed in Section 3.5.

3.1 Outfalls

The LDW area is served by combined sewer systems and separated storm drain/sanitary sewer systems. Although there is no CSO outfall in this Source Control Area, contaminants from this area that enter a combined system may still reach the LDW. Storm drains in separated areas convey stormwater runoff directly to the LDW, while under normal conditions sanitary sewage and industrial wastewater are treated at a regional waste water treatment plant before being discharged into Puget Sound. In a combined system, stormwater runoff is combined with sanitary sewage and industrial wastewater and conveyed to the treatment plant.

Most of the waterfront properties are served by separated storm drain systems that discharge stormwater directly to the Duwamish Waterway and sanitary systems that convey sewage and industrial wastewater to the treatment plant. Although there are situations when the combined sewer system can overflow to the LDW, there are no CSO outfalls in the RM 0.0-0.1 East Source Control Area. Therefore, the sanitary sewer pathway is not discussed in this report.

3.1.1 Storm Drain Outfalls

Storm drains discharging to the LDW carry precipitation runoff collected from streets, parking lots, roof drains, yards, gardens, etc. A wide range of contaminants may become dissolved or suspended in runoff as rainwater flows over the land. Urban areas may accumulate particulates, dust, oil, asphalt, rust, rubber, metals, pesticides, detergents, or other materials as a result of urban activities. These can migrate into storm drains during wet weather. Storm drains can also

[6] Outfall 2154 and 7042 are the same. This reflects different outfall numbering systems used by different sources. In Figure 3, outfalls 2151, 2156 and HRE-1 are referred to as 6031, 6030 and 6032, respectively, by the Port of Seattle.

[7] Outfall 7041 is not listed in the RI Appendix H and there is no known alternative reference number.

convey materials from businesses, residences, vehicle washing, landscaped areas, erosion of contaminated soil, groundwater infiltration, and materials illegally dumped into the system or onto the ground.

Stormwater can discharge via outfalls from private sites adjacent to the river or from publicly owned storm drain systems. Figures 5, 6 and 7 illustrate known storm drain system lines and outfalls within the RM 0.0–0.1 East Source Control Area. These direct discharges are permitted by Ecology through two types of NPDES permits.

3.1.2 NPDES Permits

Six types of NPDES permits cover various discharges to the LDW. At this time, only three types of permits apply to the RM 0.0-0.1 East Source Control Area: the Phase I Municipal Stormwater Permit, the Industrial Stormwater General Permit, and the Sand & Gravel Permit. On April 9, 2009 Ash Grove Cement submitted an application for a fourth type: an Individual NPDES Permit. This application was still in process at the time of this publication. Permits that do not apply to the RM 0.0-0.1 East Source Control Area include the Phase II Municipal Stormwater Permit and boat yard permits.

Phase I Municipal Stormwater Permit

Stormwater runoff into municipal separated storm drains that discharge to surface waters must have a NPDES permit under the federal Clean Water Act. Phase I of the municipal stormwater program went into effect in 1990 and applies to municipalities with populations of more than 100,000, including the city of Seattle and King County. The Port of Seattle is a special Phase I secondary permittee. Within the RM 0.0-0.1 East Source Control Area, this permit requires HMCC to adequately identify and map all drainage structures on the properties. These structures are identified in Figures 5 & 6.

The original Phase I permit was issued in 1995 and was reissued on January 17, 2007. The new permit represents a significant shift in approach to stormwater monitoring. The new permit requires monitoring of in-line water and storm drain solids, during both wet and dry seasons. Contaminants to be monitored include the Washington SMS list, as well as toxicity testing for effluent and receiving sediments. The permit requires all permittees to monitor one stormwater drainage/outfall representing each type of land use: residential, commercial, and industrial. Complete monitoring requirements are in Special Condition S.8 of the permit, which is available online at:

http://www.ecy.wa.gov/programs/wq/stormwater/municipal/phaseIpermit/phipermit.html

In addition to the expanded monitoring described above, the Phase I permit also contains more traditional requirements such as system maintenance, best management practices (BMPs), and business inspections. In addition, the Phase I permit contains programmatic requirements in the areas of education/outreach, illicit discharge detection and elimination, and the development of municipal stormwater codes and regulations.

Ongoing source control programs conducted by the city, county, and Ecology help reduce the amount of pollution entering public storm drains and sanitary/combined sewer systems that discharge to the LDW. Such programs also address discharges from private outfalls. These source control programs include the 2003-2005 city/county joint inspection program, the ongoing Seattle Public Utilities (SPU) program, the ongoing King County Industrial Waste Program, the Ecology Urban Waters Initiative, and Ecology's coordination with city/county programs. LDW source control activities generally go beyond what is required under the NPDES program. In particular, the level of source tracing and characterization these programs conduct exceeds what is required by NPDES.

Industrial Stormwater General Permit

The Industrial Stormwater General Permit covers 112 industries within the LDW drainage basin. The Industrial Stormwater General Permit requires a facility to monitor its stormwater discharge for copper, zinc, oils, and total suspended solids. Development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) is also required under the permit. Within the RM 0.0-0.1 East Source Control Area, there is one outfall (HRE-1, Figures 5 & 6) on the Port of Seattle's T-102 facility that is believed to be covered under this permit. However, further information about the owner of this outfall was not available at the time of this report.

Sand & Gravel General Permits

Sand & Gravel General Permits provide coverage for discharges of process water, stormwater, and mine dewatering water associated with sand and gravel operations, rock quarries, and similar mining activities. It includes stockpiles of mined materials, concrete batch operations, and hot mix asphalt operations. Stoneway Concrete holds permit #WAG-503300C to discharge their process water to the stormwater system at Ash Grove Cement (Ecology 2009).

Individual NPDES Permits

An individual permit is written for a specific discharge at a specific location. The individual permit is highly tailored to regulate the pollutants in the discharge. An individual permit may be an NPDES permit for discharges to surface waters. NPDES individual permits may be issued to an industry or to a municipality.

3.2 Harbor Marina Corporate Center

Harbor Marina Corporate Center (HMCC) is located at the southern end of Harbor Island (Figures 5 & 6) at 1001 SW Klickitat Avenue. It is owned by the Port of Seattle, and is also referred to as Terminal 102 (T-102). The 18 acre facility is on the southern tip of Harbor Island, an artificial island created in 1905 to improve the seaport and provide additional land for industrial and commercial use. Harbor Island was built on shallow tidelands of the LDW from the sediment materials from adjacent uplands and regrading projects. The East and West waterways were then dredged, and the resulting dredge material, a mixture of sand, silt, clay, and gravel, was used as additional fill at the site.

HMCC is bounded to the north by SW Manning Street and the West Seattle Freeway. The LDW boarders the property on the south, east, and west. The land use to the north and across the waterway is industrial and commercial, with nearby facilities conducting manufacturing and shipping operations.

Source control for most of Harbor Island and T-104 are covered under the East Waterway RI/FS. While Ecology has not taken an active role in source control efforts for the East Waterway, it is interested in facilities that could be sources of recontamination in both the LDW and East Waterway.

Given the low elevation of the site and the proximity of the LDW, groundwater occurs at shallow depths of 7 to 9 feet with very low gradient (estimated at 0.001). Groundwater fluctuations depend primarily on tidal variations in the LDW, as the extensive pavement on the site prevents rainwater infiltration. There are no water wells on or near the site (RETEC 1997).

3.2.1 Current Site Use

HMCC is currently used as a marina and office park, and includes two office buildings, paved parking, and the adjacent Harbor Marina. Although petroleum fuel has been stored here in the past, there are currently no fueling stations or other chemical containment areas at the Marina.

Facility Summary: Harbor Marina Corporate Center (HMCC)	
Address	1011 SW Klickitat Ave. Suite 101
Property Owner	Port of Seattle
Property Lessee	N/A
Tax Parcel No.	7666701220
Parcel Size	18.47 acres
Facility/Site ID	34525399
EPA ID No.	N/A
NPDES Permit No.	N/A
UST/LUST ID No.	3023
Listed on CSCSL	No
TRI No.	N/A
KCIWP	N/A

3.2.2 Past Site Use

Harbor Island has been used for commercial and industrial activities since 1912. These have included secondary lead smelting, shipbuilding and repair, bulk petroleum fuel storage, metal fabrication, and containerized cargo shipping (Windward 2007).

The former USTs at the site included one 10,000-gallon leaded gasoline tank, one 10,000-gallon diesel tank, and one 2,000-gallon waste oil tank (Figure 8). The two 10,000-gallon USTs were placed side-by-side, approximately 100 feet from the LDW. The USTs were used to supply diesel and leaded gasoline to boats via dispensers located at the end of the main Marina dock. The waste oil UST was approximately 70 feet to the west and also had a concrete pad at the surface. All three USTs were installed in May 1984 (RETEC 1997).

3.2.3 Environmental Investigations and Cleanup Activities

Phase II Environmental Site Assessment (1996)

In May and June of 1996, GeoEngineers Inc. completed a Phase II Environmental Site Assessment. This investigation consisted of 10 Geoprobe® borings to depths of 12 feet bgs, collection of soil samples from these borings at 1- to 2-foot intervals, and collection of groundwater samples from three of the borings (RETEC 1997).

Chemical analyses of the soil samples indicated that at some depths diesel-range total petroleum hydrocarbons (TPH-D) concentrations were in excess of the Model Toxics Control Act (MTCA) Method A cleanup level of 200 milligrams per kilogram (mg/kg) at the time of the investigation[8]. An exceedance was noted in the 10-foot depth of boring B-1 (440 parts per million [ppm] diesel). Petroleum hydrocarbons were either not detected or were below MTCA Method A levels in all other soil samples (RETEC 1997).

Analysis of the groundwater samples indicated the presence of petroleum hydrocarbons exceeding MTCA Method A cleanup levels in all three samples collected near the former USTs. Concentrations of TPH-D were detected at 1.26, 1.90 and 132 milligrams per liter (mg/L) and motor oil-range hydrocarbons at <8.25, 1.27 and 5.54 mg/L. The investigators noted that the sample with the highest level of diesel (132 mg/L) was collected from a point very close to the location of a former UST, within the tank backfill material. The report stated, "Groundwater sample B-1 was collected from within the original excavation outline and thus was not representative of the actual groundwater present in the surrounding confined aquifer." The investigators also concluded that samples collected from the Geoprobe® borings that penetrated the semi-confined aquifer outside of the eventual tank excavation outline all indicated that petroleum hydrocarbons were not present in the localized groundwater (RETEC 1997).

[8] Subsequent to 1996 the MTCA Method A cleanup levels for diesel and heavy oil have been revised upward to 2,000 ppm.

UST Removal (1996)

HMCC is on Ecology's leaking underground storage tank (LUST)/underground storage tank (UST) database with three removed USTs. The property is listed with a LUST Release ID #498401 and UST ID #3023. All three USTs were installed in May, 1984, and were removed on October 22, 1996 (RETEC 1997).

During the UST removal, the tanks were noted as being of steel construction and in excellent condition with no corrosion or holes. Exposed piping on the marina dock was also removed and disposed of, while buried piping between the tanks and the marina dock was drained, rinsed, capped, and left in place. Approximately 200 tons of crushed rock was imported to the site and used to bring the excavated areas up to grade. The area was then completely paved over. All excavated soil was removed from the site by a company called Olympus. No further information regarding the disposal or destination of this material is available (RETEC 1997).

Immediately following the excavation and removal of the USTs on October 22, 1996, discrete soil samples were collected from the sidewalls and floor of each of the tank excavation sites. Three additional composite samples were obtained from the removed and stockpiled soil. Soil samples were taken from the west and south sidewalls of the gasoline and diesel UST excavations, and from the north and west sidewalls of the waste oil UST excavation. Soil from the floors beneath the former tanks was sampled from all three excavation sites (RETEC 1997).

Samples from the stockpile and the diesel and gasoline UST excavations were analyzed for diesel and oil, while the samples from the waste oil UST excavation were analyzed for heavy oil. Additionally, the sample taken from the gasoline UST excavation floor was analyzed for gasoline and benzene, toluene, ethylbenzene, and xylenes (BTEX) (RETEC 1997).

Chemical analyses of these samples showed that only one soil sample, taken from the diesel UST excavation floor, contained levels of petroleum hydrocarbons in excess of the MTCA Method A cleanup levels. Supplemental investigations confirmed these findings. Observations made during the initial tank excavation indicated that all three USTs were constructed of steel and in good condition with no corrosion or holes. Contamination was believed to be a result of leakage from a pump on the diesel tank (RETEC 1997).

Supplemental soil and groundwater sampling in the UST excavation areas was performed on October 31, 1996. Samples from nine 14-foot bgs Geoprobe® borings were collected, including eight soil samples and six groundwater samples, to determine the extent of the contamination. All eight soil samples were analyzed for diesel and oil, while all six groundwater samples were analyzed for diesel. One soil sample was also analyzed for gasoline and BTEX (RETEC 1997).

Only one boring yielded diesel at a detectable limit: GP-5 soil showed a diesel level of 206 ppm, exceeding the MTCA Method A cleanup level of 200 ppm in effect at the time of investigation[9].

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[9] Subsequent to 1996 the MTCA Method A cleanup levels for diesel and heavy oil have been revised upward to 2,000 ppm.

Samples from this boring were collected in the same area in which previous diesel exceedances were discovered in prior investigations. Diesel was not detected in any other soil samples, or in any of the groundwater samples. Oil-range hydrocarbons were detected at levels exceeding the MTCA Method A cleanup level in soil samples GP-1 and GP-8 at 1,740 ppm and 1,080 ppm, respectively. These hydrocarbons were not detected in any other soil or groundwater samples. RETEC noted that a confining clay layer underneath the LUST had most likely prevented the contamination from migrating downward (RETEC 1997).

Port of Seattle Stormwater Mapping Inspection Reports and Maps (2006)

An inspection was conducted on November 10, 2006, by the Phoinix Corporation to locate or verify all the drainage structures on the site, including structures related to the separate stormwater system and to the combined sewer system. The inspection is a required component for the Port of Seattle to fulfill its NPDES Phase I Municipal Permit (Phoinix 2006). Thirty-three stormwater structures were located and verified throughout the property. These include 10 manholes, 22 catch basins , and 1 trench drain (Figures 6 & 9). Three outfalls were identified as metal structures with backflow prevention gates located in the southwest, south, and southeast portions of the property (Phoinix 2006).

3.2.4 Potential Contaminant Sources

Historical contamination at the site could recontaminate sediments near the RM 0.0-0.1 East Source Control Area via stormwater, groundwater, or soil contamination. Though these risks are minimal for HMCC, potential contaminant sources include the following:

3.2.4.1 Stormwater

There are three known stormwater outfalls on the perimeter of HMCC (2051, 2056 and HRE-1) that empty into the sediment area adjacent to the RM 0.0-0.1 East Source Control Area (Figures 5 & 6). There are no industrial activities on site, and HMCC is composed almost entirely of commercial buildings and paved parking lots. There are no current chemical holding areas or fueling stations.

The Port of Seattle states that HRE-1 does not drain Port of Seattle property and is most likely the responsibility of the business located off Port property (Port of Seattle 2009b). However, a figure provided by the Port of Seattle (Figure 6) shows one storm water catch basin (#5510) on Port property that appears to drain to HRE-1. Ownership and permitting responsibility of outfall HRE-1 could not be verified at the time of this report. However, drainage information is continuously being updated as new information surfaces.

Figure 6 also shows that stormwater drains from catch basin #5503 to outfall 2151. This is located on a property that was not included in the RM 0.0-0.1 East Source Control Area.

However, an initial review of the tax record for this parcel (#7666701250[10]) did not reveal any concerns for source control.

As no high-risk pollution-generating activities have been identified, the chance of these outfalls being contaminant pathways to the waterway is considered to be relatively low and comparable to other commercial parking areas throughout the city. However, there is currently no requirement to monitor these outfalls and no information regarding sampling or monitoring was found. These outfalls are viable conduits if any upland activities (such as spills or changes in land use) create a new source of contamination.

3.2.4.2 Soil and Groundwater

Results from previous soil investigations have indicated that unacceptable levels of petroleum hydrocarbons may exist in the soils and groundwater on the site. However, due to the very low flow gradient and the confining clay layer, these compounds are likely to attenuate before reaching the waterway through groundwater. Subsequent sampling outside of the former LUST area indicated that no migration of the chemicals had occurred (RETEC 1997). Hence, the risk of recontamination of LDW sediments through these pathways is also considered low.

3.2.4.3 Spills

Because the USTs were removed in 1996, there is no longer any concern for spills from the USTs or fueling operations. However, because HMCC is an active marina, fueled vessel pose the risk of direct spills to the LDW in the event that onboard fuel leaks directly into the waterway.

The current facility activities do not employ any hazardous materials or require any contaminants on site. However, there is a risk for spills in the paved parking lot area from vehicle use that could potentially drain to the LDW. This risk is similar to other commercial parking areas throughout the city and is considered minimal.

3.2.4.4 Bank Erosion/Leaching

The impervious ground cover and reinforced banks seem to be preventing erosion from carrying any contaminated soil to the LDW. The crushed rock cap and pavement of the former UST areas also eliminate the potential for leaching from the impacted soil to groundwater or surface water.

3.2.5 Source Control Actions

Since the production of the Draft SCAP new drainage information has become available. Now there are action items to be completed in order to address the issues that have recently developed.

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[10] This parcel is currently owned by Harbor Real Estate, but was owned by the Port of Seattle until 1996 (King County 2008).

- The drainage connections to all outfalls need to be inspected and fully understood. The Port of Seattle and adjacent property owners will work with Ecology to clarify the origins and ownership of each outfall at the HMCC. However, since there are no known activities or historical contaminants that pose a high risk of contaminant migration, this action item has a low priority.
- The permitting requirements and responsible parties for each outfall need to be clearly understood. The Port of Seattle and adjacent property owners will work with Ecology to confirm the type of permit required for outfall HRE-1 and appropriate responsibility will be assigned.
- Although there are no current fueling operations at this site, it is an active marina with vessels that carry fuel and other potential contaminants. The Port of Seattle will demonstrate that the marina is in compliance with any applicable permits.

3.3 Terminal 104 and Poncho's Legacy Property

T-104 (formerly T-106NW) is owned by the Port of Seattle and is located at 3629 (or 3627)[11] Duwamish Avenue South. The overall terminal area is approximately 16.5 acres and is bounded by Spokane Street to the north, Duwamish Avenue to the east, Ash Grove Cement to the south, and the LDW to the west (Figure 10). The terminal consists of two separate tax parcels. The main parcel (7666700315) is south of S. Spokane Street and consists of approximately 14 acres. Portions of the elevated S. Spokane Street corridor (including a portion of the West Seattle Bridge) are built over the northern parcel (7666700560). This parcel is divided by a railroad right-of-way running east-west, parallel to and south of the Spokane Street corridor. The northern parcel is 2.7 acres and does not offer water access (King County 2008).

The Poncho's Legacy Property (parcel 7666700325) borders T-104 to the southeast. While not part of T-104, the Poncho's Legacy property is included in this source control area and this facility section because it is part of the East Marginal Way Grade Separation Project, which also encompasses portions of T-104 (New Figures 11 & 12) (Anchor and Windward 2008). Poncho's Legacy is also currently conducting work as part of Ecology's Voluntary Cleanup Program (VCP).

Source control for most of Harbor Island and T-104 is covered under the East Waterway RI/FS. While Ecology has not taken an active role in source control efforts for the East Waterway, it is interested in facilities that could be sources of recontamination in both the LDW and East Waterway.

Groundwater is typically present 7 to 8 feet bgs. Soils at the site generally consist of medium to fine sands and silts with varying amounts of silt, sand, and gravel (Shannon & Wilson 2005).

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[11] Online facility database reports indicate that the address of 3627 Duwamish Ave. South is sometimes inter-changed with 3629 Duwamish Ave. South. Both addresses apply to this facility.

Facility Summary: Terminal 104 (formerly Terminal 106NW)	
Address	3629 (or 3627) Duwamish Ave S
Property Owner	Port of Seattle
Property Lessee	N/A
Tax Parcel Nos.	7666700315, 7666700560 Poncho's Legacy Property: 7666700325
Parcel Size	16.5 acres
Facility/Site ID	72668645 (T-104), 2313 (Former T-106NW), 1538 (Poncho's Legacy Property)
EPA ID No.	WAD988506234
NPDES Permit No.	N/A
UST/LUST ID No.	6274/3009
Listed on CSCSL	Yes
TRI No.	N/A
KCIWP	N/A

3.3.1 Current Site Use

According to the current East Waterway Operable Unit report (Anchor and Windward 2008), the northern area of T-104 (adjacent to the Spokane Street corridor) is vacant and undeveloped, consisting of mostly unpaved gravel surface. The southern area is occupied by three warehouses that are used by the Port for storage and truck storage and maintenance.

According to a site tenant Web site, this property currently hosts Western Cartage, Seattle Transload, and Seattle Bulk Rail Station Inc. three companies that operate together as a transloader triad known as Washington Transportation Inc. (Seattle Transload 2008). However, the Port of Seattle states that this tenant will be vacating the property in June 2009, and there are no plans to lease the property again (Port of Seattle 2009a).

Current Redevelopment Activities – East Marginal Way Grade Separation Project

The East Marginal Way Grade Separation (EMWGS) project is a transportation and infrastructure collaboration between the City of Seattle, Port of Seattle, and the Washington Department of Transportation to provide a new vehicular overpass designed to route traffic up and over the existing Union Pacific and Burlington Northern Santa Fe railroads. The project goal is to reduce congestion and improve safety by providing grade separation between vehicular and rail traffic. East Marginal Way is designated as part of the National Highway System and the grade separation will allow better traffic flows for this function. The project is being overseen by Ecology to ensure a comprehensive and appropriate evaluation and cleanup of historic environmental conditions.

A portion of the EMWGS project is located within the eastern and northern portions of T-104. The right-of-way (ROW) areas for this project include the north parcel and east portion of T-104 and neighboring properties (Figure 13). Project work will include demolition of existing structures and excavation for structural foundations and roadway-related structures.

3.3.2 Past Site Use

The T-104 property was used by a paper bag manufacturer, a lumber storage yard, an auto repair shop, a restaurant, a foundry supply warehouse, and a cargo transfer and storage yard (Anchor and Windward 2008). In addition, the area was occupied by a lumber storage yard, ironwork warehouse, general store, carpenter shop, and auto repair shop. A variety of potentially hazardous materials, including heavy metals, solvents, degreasers, and petroleum hydrocarbons, are commonly associated with the businesses formerly located at these sites (Shannon & Wilson 2005). At some time prior to 1991 lead ingots were transferred from rail cars to shipping containers for a number of years (Port of Seattle 1992). Records indicate that as recently as 2005, a pest control company called Paratex leased the northwest corner of the parcel (King County 2005b). Records also indicate that part of the property was used as a central United States Customs examination center (EMCON 1992a).

Located adjacent to T-104 the Poncho's Legacy property (parcel #7666700325) was historically occupied by an iron works, a manufacturing company, a welded wire mesh industry, and a real estate business, and until recently was occupied by International Belt and Rubber Supply. All buildings and other facilities related to this industry were demolished at some unknown time in recent years. The property is bordered by an inactive Port of Seattle railroad line on the south side. Potentially hazardous materials from historical use of this site are similar to those at the T-104 site (Shannon & Wilson 2005).

3.3.3 Environmental Investigations and Cleanup Activities

East Marginal Way Grade Separation Project

Since 1991, several environmental assessments and subsequent remedial actions have been conducted at T-104 and the adjacent Poncho's Legacy property as part of the EMWGS Project. The assessments indicated the presence of several contaminants that exceed their respective MTCA Method A and Method C Cleanup Levels for both soil and groundwater. The following discussion addresses each of the contaminants.

BTEX / Total Petroleum Hydrocarbons: T-104, Underground Storage Tank

An unleaded gasoline underground storage tank (UST) was removed from the T-104 property in 1991. Analytical results of soil samples collected from seven borings in the vicinity of the former UST location indicated concentrations of benzene, toluene, ethylbenzene, xylenes (BTEX), and total petroleum hydrocarbons (TPH) were less than MTCA Method A cleanup levels. Six of the borings were converted to groundwater monitoring wells and subsequent analytical results indicated concentrations of BTEX were greater than cleanup levels in monitoring well MW-1. TPH concentrations in groundwater exceeded the MTCA Method A cleanup level in wells MW-1, MW-4, and MW-6. Downgradient flow of contaminants was not evident (Figures 14 & 15) (EMCON 1992a).

Quarterly monitoring of the groundwater monitoring wells from April 1992 through February 1993 indicated possible seasonal fluctuations of BTEX and TPH-G in samples collected from well MW-1. During each quarterly monitoring event, one or more analyte concentrations exceeded the corresponding MTCA Method A cleanup levels in well MW-1. Compounds detected in MW-1 that exceeded current MTCA Method A cleanup levels include benzene, ethylbenzene, xylenes and TPH-G. Analytical results of the June 1992 monitoring event indicated concentrations of ethylbenzene and xylenes from wells MW-3 and MW-4 exceeded MTCA Method A cleanup levels in effect at the time. However, when compared to current MTCA Method A cleanup levels, there were no exceedances for these compounds at wells MW-3 or MW-4. Well MW-3 had one exceedance of TPH-G in June of 1992 by both former and current MTCA Method A standards (EMCON 1992b, 1992c, 1992d, and 1993).

Groundwater samples were collected from wells MW-1, MW-5, and MW-6 once in 1994 and twice in 1995. Additionally, soil samples were collected from the vicinity of well MW-1 during this period. Residual concentrations of petroleum hydrocarbons were detected from 8 – 10 feet bgs in the vicinity of well MW-1. Although MW-1 had been the only well with consistent exceedances and detections, it is not understood why two of the other four wells (MW-5 and MW-6) were sampled and the other two (MW-3 and MW-4) were not sampled (Port of Seattle 1996a). In 1996, the Port of Seattle submitted to Ecology a proposal to cease investigation and remedial actions at the property due to the Port's interpretation of the data is that there was natural attenuation of petroleum hydrocarbons in the vicinity of well MW-1 and no evidence of contaminant migration (Port of Seattle 1996b).

In 2003, Ecology issued a letter to the Port of Seattle indicating changes to MTCA that reevaluated conditions at the T-104 property. Although some BTEX concentrations were now under the new MTCA standards for BTEX compounds, TPH-G concentrations remained above the unchanged MTCA standard for TPH-G in all groundwater samples from well MW-1. Additionally, the letter served as notice to the Port of Seattle of the requirement to cleanup remaining pollutants (Ecology 2003a).

Volatile Organic Compounds (VOCs): Poncho's Legacy Property, Unknown Source

During the 2005 preliminary environmental assessment of properties potentially affected during the EMWGS project, VOCs including TCE and cis-1,2-dichloroethene (cis-1,2-DCE) were detected in groundwater samples below MTCA Method A cleanup levels (Shannon & Wilson 2005). Possible sources of the contaminants include solvent use during auto repair, which is a reported former use of the property. Under Ecology's Voluntary Cleanup Program (VCP), a supplemental investigation into the nature and extent of the contaminants indicated a soil concentration of TCE exceeded the cleanup level at location ST-6 while groundwater concentrations of TCE exceeded the cleanup level at several locations within the western portion of the Poncho's Legacy property (Environmental Partners 2007a). Figure 10 shows the location of Poncho's Legacy.

In July 2007, potassium permanganate solution was injected into the subsurface to oxidize VOCs and arsenic. Approximately 160 gallons of the solution was injected at each of 22 direct-push locations in the western portion of the Poncho's Legacy property. Groundwater analytical results for post-injection monitoring events did not indicate a significant decrease in TCE or cis-1,2-

DCE concentrations. The Port's interpretation of the data suggests that VOCs do not appear to be migrating downgradient of the former International Belt Warehouse building foundation area (Environmental Partners 2008).

Petroleum Hydrocarbons: T-104 Right-of-Way Property, Unknown Source

Petroleum hydrocarbons in the gasoline-range and oil-range were detected in soil and groundwater sampling locations in the Right-of-Way (ROW) area of T-104 during the December 2006 and January 2007 supplemental investigation. Probable sources of the contaminants include leaks or spills from parked tractor and trailers at the gravel covered property. Analytical results indicated that soil concentrations from one location exceeded the MTCA Method A cleanup levels for oil-range hydrocarbons. Groundwater concentrations from only one location exceeded the cleanup level for gasoline-range hydrocarbons. The Port's interpretation of the data is that non-detect sampling locations downgradient of the sample locations with cleanup level exceedances suggest a limited area of contaminant impact (Environmental Partners 2007a).

Additional monitoring wells MW-21 and MW-22 were installed at the ROW property in May 2007 to further assess the extent of petroleum hydrocarbon contamination (Figure 16). Analytical results for soil samples collected during well installation indicate that neither BTEX nor gasoline-range hydrocarbons were detected. However, at well MW-22 groundwater concentrations of xylenes and gasoline-range hydrocarbons exceeded cleanup levels. In August 2007, approximately 18 gallons of oxygen releasing compound solution (EHC-O) were injected into the subsurface at each of 20 locations across the ROW property using direct-push technology. Petroleum hydrocarbon concentrations detected during subsequent monitoring events were less than groundwater cleanup levels (Environmental Partners 2008).

Petroleum Hydrocarbons: Warehouse No. 2 T-104, Unknown Source

As part of the EMWGS project, excavation personnel discovered apparent petroleum hydrocarbons in soil during demolition activities at T-104's Warehouse No. 2 in March 2007. The demolition project discovered petroleum-contaminated soil (PCS) based upon visual and olfactory observations. A total of 3 cubic yards of PCS were excavated and disposed. Confirmation soil sampling of the excavation floor and side-walls indicate that remaining petroleum hydrocarbon concentrations were less than MTCA Method A cleanup levels. Groundwater was not encountered during the remedial effort (Environmental Partners 2007b).

Metals: Unknown Source Poncho's Legacy and T-104 Properties

Metals including arsenic, cadmium, chromium, and lead were detected in soil and groundwater samples during the 2005 preliminary environmental assessment of properties potentially affected during the EMWGS project. A cadmium concentration exceeded the MTCA Method A cleanup level in a soil sample from location P18 (Figure 16); arsenic concentration exceeded the cleanup level in a soil sample collected from P26; arsenic concentrations exceeded the cleanup level in the groundwater samples collected from locations P17, P23, P25, P-26, and P28; chromium concentration exceeded the cleanup level at location P25; and lead concentrations exceeded the cleanup level at locations P-25, P26, and P28. The Port's interpretation of the data indicates that, although several cleanup levels for soil and groundwater were exceeded, none of the analyte concentrations suggested a potential source (Shannon & Wilson 2005).

A Port of Seattle document from April 9, 1992, states that the Port's consultant, Shannon & Wilson, conducted a remedial investigation of T-104 on October 10, 1991. This investigation report was not available for review. The Port document states that for a number of years lead ingots were transferred from rail cars to shipping containers. The investigation discovered lead-contaminated solids in the catch basins both to the north and south of the transload dock on the west side of T-104 (Figures 14), and elevated levels of lead in the dust on and around the docks. Soil samples taken at further distances from the dock and all subsurface soil samples showed no elevated lead levels. The Port responded that it intended to immediately clean up the lead contamination under a "one time only" RCRA generator status (Port of Seattle 1992).

Other possible sources of the metals contaminants include imported fill material at the properties or adjacent properties, timber piles and former metalworking shops in an area upgradient of the properties, or from the Ash Grove Cement Plant to the south (Shannon & Wilson 2005).

Arsenic occurring in groundwater at the Poncho's Legacy Property has been detected in concentrations exceeding the MTCA Method A cleanup level on several occasions. In July 2007, potassium permanganate solution was injected into the subsurface to oxidize VOCs and arsenic. Approximately 160 gallons of the solution was injected at each of 22 direct-push locations in the western portion of the Poncho's Legacy property. Groundwater analytical results for post-injection monitoring events did not demonstrate a reliable decrease in arsenic concentrations (Environmental Partners 2008).

3.3.4 Potential Contaminant Sources

The remedial actions conducted so far are not sufficient enough to address the contamination, including the chlorinated solvents contamination at the Poncho's Legacy property, metals contamination at the Poncho's Legacy and T-104 Properties, and TPH contamination at T-104. Historical contamination at the site could recontaminate sediments near the RM 0.0-0.1 East Source Control Area via stormwater and groundwater pathways.

3.3.4.1 Stormwater

Storm drains could serve as a pathway for upland contaminants to reach the waterway, and there are problems with the stormwater drainage from T-104:

Drainage Information:

Currently available drainage information for the T-104 site is not clear. According to mapping layers provided by SPU there are two outfalls serving T-104, and one of these has two ID numbers (7041 and 2154 / 7042) (Figure 7). The drainage map produced by Phoinix Corp. in 2007 indicates there is a third outfall (#7043 in Figure 7), but this outfall does not appear in the SPU outfall database. The coastal atlas photo from Ecology's website (Figure 17) was taken in July 2006 but shows no signs of any of these three outfalls.

Figure 7 also shows three additional structures on the eastern half of the property (labeled as outfalls #7044, 7045 & 7046). It does not appear that these outfalls discharge to the LDW; however, it is not clear if they discharge to the King County combined sewer or to some other storm drain system. Also, permitting information for the T-104 stormwater system is incomplete, and there is no indication that discharge is being regulated or monitored.

Equipment:

The current stormwater structures do not appear to be effectively managing surface runoff from the site. Without monitoring it is not known if stormwater requires any treatment or separation. Nevertheless, there are not indications that any treatment or separation equipment exists. Also, according to recent surveys, man hole 7005 is not adequately handling discharge, and it appears to contain petroleum contamination (Phoinix 2007).

3.3.4.2 Groundwater

The status and extent of groundwater contamination at this site is not well understood or delineated. Very little information has been found on facility operations in other areas of the site. A King County Industrial Waste Inspection report suggests that a pest control company had operated on site while not in compliance with some aspects of its pollution management (SPU 2005). Other historical activities at this site involved the use of hazardous compounds that might remain at the site. A better understanding of past operations at T-104 would help identify contaminants that could be potential sources for groundwater contamination.

TCE, heavy metals, petroleum hydrocarbons, BTEX, and other compounds have all been identified at levels above upland cleanup criteria and still exist in the soil and groundwater on this property. These contaminants could also exist on neighboring and upland properties and could be migrating onto the site. Any compound currently on site or migrating from off-site sources could potentially discharge to the waterway via groundwater.

3.3.4.3 Spills

As long as storm drain outfalls remain active on the site there is a potential for spills to discharge to the LDW. Although the current tenant is vacating the site in June of 2009, any future operations will require pollution prevention practices to verify that this pathway is being managed effectively.

3.3.5 Source Control Actions

The following source control actions will be conducted:

- Ecology and the Port will undertake a dialogue to determine how to address identified data gaps in the western portion of T-104.
- The Port of Seattle will prepare and submit an annual report to document groundwater monitoring results and provide recommendations for future remedial efforts as stated in the VCP CAP.
- The Port of Seattle will ensure that the storm drain system structures on the site and their function are completely delineated and properly permitted with all existing drainage problems identified in Section 3.3.4.1.

- Ecology will review post remediation reports and the annual report as part of the VCP and determine whether further action is needed.

3.4 Ash Grove Cement

The 24-acre Ash Grove Cement property consists of Parcel 1, more than 23 acres, and Parcel 2, less than half an acre. The Ash Grove Cement property is bordered to the west by the LDW, to the north by Port of Seattle T-104 (formerly T-106NW), to the east by East Marginal Way S., and to the south by Port of Seattle T-106 (a different property than the former T-106NW).

On August 23, 2007, Ash Grove Cement was issued a Notice of Potential Liability by EPA, stating a request for information under section 104 (e) of CERCLA. This notice required Ash Grove Cement to provide all documentation related to site occupancy, site activities, financial information, insurance coverage, and information about subsidiaries or other parties involved at the site (USEPA 2007). On November 13, 2007, Ash Grove Cement responded with two boxes of documents in response to the request (Cascadia 2007) [12]. These documents, including memos, inspection notes, e-mails and published reports, were electronically inventoried by EPA, after which E & E identified applicable information for use in this report.

Facility Summary: Ash Grove Cement	
Address	3801 East Marginal Way S.
Property Owner	Ash Grove Cement West, Inc.
Partial Property Lessee	Stoneway Concrete (2.2 acres)
Tax Parcel Nos.	Parcel 1: 7666700350, Parcel 2: 7666700395
Parcel Sizes	23.35 acres/0.32 acres
Facility/Site ID	2142
EPA ID No.	WAD009249616
NPDES Permit No.	N/A
UST/LUST ID No.	N/A
Listed on CSCSL	No
TRI No.	98134SHGRV3801E
KCIWP	4009-01 (renewed as 4009-02)

3.4.1 Current Site Use

This property is owned by Ash Grove Cement West, Inc., headquartered in Overland Park, Kansas. Ash Grove Cement is the sixth-largest cement manufacturer in the United States (AGC

[12] Due to budgetary constraints this information was not reviewed as thoroughly as previously available information, but new information from these files is included in this report that was not presented in the Data Gaps Report. In addition, some references could not be located for information from Ecology's files.

2008). The facility contains several large silos, storage domes, truck loading equipment, and storage sheds (Figure 18). Located on the east side of the property is Stoneway Concrete, a ready-mix concrete plant owned by Gary Merlino Construction Co. Inc. (Merlino). This plant leases 2.2 acres from Ash Grove Cement (E & E 1987). The Ash Grove Cement facility currently produces Portland cement. It has the capacity to process 92 tons of clinker per hour. Portland cement clinker is a sintered material produced by heating a mixture of raw materials to high temperature (> 1200°C) (AGC 2007). The extreme heat required can be derived from burning petroleum coke, coal, natural gas, whole tires, and/or a small amount of internally generated waste fuels. Groundwater is at 5-10 feet bgs in composite fill material and is tidally influenced. The entire site is fenced and has 24-hour security (EPA 1987).

3.4.2 Past Site Use[13]

The Ash Grove Cement property has been used for cement manufacturing since 1928. From 1928 to 1984, the plant produced clinker using the wet process. In this process limestone, clay, sand, and small amounts of iron ore were crushed and then mixed into a slurry. Other additives including vanillin (for its calcium content), calcium derivatives, and molasses were also used to maintain the quality of the resulting cement. The slurry was then pumped into one of two kilns to produce clinker. Clinker was then mixed with gypsum and ground in the finish mill to the final cement product (E & E 1987).

The plant was owned and operated by the Pacific Coast Cement Company until 1934. Since then ownership has changed hands several times. In 1934 the name changed to Superior Portland Cement Company until 1946, and again from 1949 to 1956. The Kaiser Cement Company owned the facility from 1946 to 1949. In 1956, Lone Star Industries (Lone Star) purchased the property and cement facility and then sold the facility to Oregon Portland Cement Company (OPCC) on March 23, 1984 (E & E 1987). It is assumed that OPCC was soon acquired by Ash Grove Cement. Parcel 2 was owned by the railroad companies prior to 1967 when it was purchased by the Port of Seattle. The Port of Seattle sold Parcel 2 to Ash Grove Cement in 1989 (EPA 2009).

Although clinker production stopped in 1984, cement was still being manufactured between 1984 and 1987 using clinker purchased from Genstar Cement (EPA 2009). In March 1987, Gary Merlino Construction Co. began discussion with Ash Grove Cement to lease and construct a ready-mix cement facility on the site property. Construction on this project began in October 1987.

In January 1989 Ash Grove Cement began moving forward with plans to modernize its facility. Mills, slurry tanks, and pneumatic transfer lines were demolished and deconstructed, and the wharf was enlarged. All gas, water, stormwater, and sanitary sewer lines in the demolition areas were removed to 6 inches below grade before any improvements were made. Once the remodeled facility was in operation Ash Grove Cement started producing clinker again using a

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[13] A considerable number of documents were reviewed on the history of the Ash Grove Cement property. However, unlike other sites, no formal reports on investigations or cleanup activities were available. Hence, a detailed, comprehensive summary of the site's history could be incorporated. Furthermore, the information reviewed was not complete and was even conflicted in some cases.

dry process (EPA 2009). A timeline summary of the sites ownership and operations is shown in Figure 19.

Settling Pond

One of the key features of the sight that was noted often in historical documents was the settling pond. Starting in 1964 the facility maintained a permit with Ecology to discharge wastewater via seepage to the LDW and groundwater. In 1973, the unlined settling pond was constructed on the southwest corner of the property less than 50 yards from the Duwamish River (Figure 20). Stormwater and process waste water was directed or pumped to this pond. The water could then be used to water grass, suppress dust, or recycle back into the cement process.

When the pond's capacity was exceeded an emergency overflow device allowed excess water to discharge into the LDW (E & E 1987). In 1974, the pond water developed a yellowish-green color, and it was tested. Test results showed that the pH was as high as 10.7. Heavy metals testing showed copper concentration levels less than 0.01 ppm and nickel concentration levels less than 0.1 ppm (Ecology 1974).

In 1983 Ecology tested the waters of both the settling pond and the truck wash station. The pH levels of the settling pond and truck wash waste water were 10.8 and 11.2, respectively. These high pH values were attributed to use of limestone in cement. The pond was found to have 35 ppm total chromium (E & E 1987) and 0.1 ppm copper (AGC 1985b). Copper concentrations exceeded acute criteria, while lead and zinc were slightly below exceedance levels (REL 1983). Periodically the settling pond was neutralized with sulfuric acid.

In 1985 METRO (now King County) requested that Ecology closely monitor the settling pond to address concerns about heavy metal loading from the pond to the LDW (METRO 1985). Ash Grove Cement responded with a statement that its discharge was permitted adequately and no new monitoring was necessary (AGC 1985a). After the cessation of clinker production by the wet process in 1984, the facility was not producing as much process waste water. The settling pond was drained in August 1986 for maintenance, but continued to be used until 1992.

In 1990 as part of its plan to modernize the facility, Ash Grove Cement considered constructing a new drywell system to hold process and stormwater (Klein 1990). However, there were no records found that confirmed such a system was installed. Instead it appears that Ash Grove Cement made changes in their process to start recycling their cooling water rather than discharging it to the drywell system. The existing stormwater runoff and sewer plans were evaluated and a new plan was proposed. Under the new plan, the remaining stormwater and wastewater that could not be recycled would be rerouted to the main sewer system on East Marginal Way.

In May of 1991, a single water sample from the holding pond was collected and tested. Laboratory results showed that the pH was 6.1; copper was 0.011 mg/L; chromium was 0.030 mg/L; lead was non-detect; and zinc was 0.014 mg/L (Laucks 1991a). Testing was later conducted in December 1991 for the pond sediments for various metals. The concentration of copper was 120 mg/kg; chromium was 64 mg/kg; lead was 710 mg/kg; and zinc was 450 mg/kg (Laucks 1991b).

In 1991 Ecology approval was given to modify the Waste Discharge Permit to allow Lone Star to fill the pond with rocks and soil cover, and then divert all stormwater and process wastewater to the METRO combined sewer system (Ecology 1991). By the end of September 1989, the settling pond treatment was completed, but no details were discovered. In June of 1992 Ash Grove Cement notified Ecology that they would not be renewing Permit #5162 as the pond area had been reclaimed (AGC 1992b). It is not known how much of the pond sediment was excavated and removed from the site before the pond was closed. There are no records indicating that any remaining contaminants in the soil and groundwater beneath the former pond have been fully characterized.

Waste Water & Stormwater Discharge

The settling pond was never intended to handle all of the facilities waste water and stormwater. So another key element of the site's history consists of the various practices for discharging waste water and stormwater. Lone Star received its initial Waste Discharge Permit (#2119) from the Pollution Control Commission on January 5, 1965. The permit allowed Lone Star to discharge up to 3.5 million gallons per day (GPD) of cooling and contaminated process water directly into the LDW. Lone Star was required to allow the wastewater to settle prior to discharge. This permit was set to expire on January 5, 1970 (WSPCC 1965). On January 15, 1970, Lone Star applied for and was granted Waste Discharge Permit #3279, which reduced the allowable amount of waste water discharged into the waterway to 135,000 GPD. The same requirement for pre-settling applied, but the new permit stated that all uncontaminated stormwater could be discharged directly into the Duwamish. However, no information was available regarding the criteria used to classify stormwater as "uncontaminated." This permit was set to expire on January 15, 1975.

Ecology performed an inspection on October 13, 1977, after which the operations were deemed "satisfactory." However, the inspector noted several concerns about the plant. The settling pond was in proper condition, but storm drainage south of the shop area drained toward and into the Duwamish waterway instead of the pond. Seepage and stormwater from the site and the pier also directly entered the groundwater and river system. The inspector agreed to discuss these things with Lone Star as well as reminded them that the discharge permit had expired in 1975 (Ecology 1977).

Lone Star received a letter on October 14, 1977, from Ron Devitt (District Environmental Quality Inspector) recommending that Lone Star apply for a waste discharge permit (Ecology 1977). Lone Star did and on January 17, 1978, Ecology issued Lone Star Industries State Waste Discharge Permit #5162. The permit allowed 214,100 GPD of process and stormwater to be discharged to the LDW. The permit required Lone Star to allow contaminated wastewater to percolate into the subsurface of the unlined settling pond before discharging the excess into the river. Under this permit, Lone Star was required to closely monitor pH and turbidity, and could not discharge any oil or materials spilled on the pier. This permit was set to expire on January 17, 1983 (Ecology 1978).

Another inspection was conducted by Ecology on July 1, 1982. The inspector again noted that some of the stormwater drainage was not intercepted by the settling pond. A separate runoff pond had accumulated due to runoff from the paved and unpaved areas. No berm or other containment was found for this second pond (Ecology 1982).

In 1984 when Lone Star was turned over to Ash Grove Cement, permit #5162 was also transferred, and it was renewed with no changes in effluent discharge allowances. All permit parameters remained the same. This permit expired October 26, 1989, and was renewed by Ash Grove Cement on November 30, 1989. The new regulations required runoff water, truck wash water, and pond discharge to fall under the permitting guidance. In November 1989, Ash Grove Cement applied for and was granted an updated Industrial/Commercial Waste Discharge permit, allowing Ash Grove Cement to discharge waste water to the combined sewer. In February 1990, Ash Grove Cement submitted forms for the new NPDES requirements under EPA ID# WAD009249616.

On July 3, 1991, Ash Grove Cement was issued a Wastewater Discharge Authorization (#296) by the METRO which was valid until July 1996. The authorization granted permission to discharge up to 10,000 GPD of industrial wastewater into the King County sewer system, allowed for self-monitoring, and imposed general discharge limitations. Permit #5162 was therefore replaced and subsequently cancelled (METRO 1991a).

In October 1991, Ash Grove Cement informed Ecology of its plans to build a new cement plant. Initially the plans included closing the settling pond, and discharging stormwater to the city storm drain and waste water to the combined sewer. Ecology performed a site inspection of Ash Grove Cement on October 21, 1991, to address the company's concerns over the requirement to obtain a permit to release storm water into the storm drain. The inspector noted two sources of stormwater contamination: a truck wash station that discharged directly to the settling pond, and a 7,500-gallon ethylene glycol tank with no cover or containment. Ash Grove Cement responded that the truck wash water would soon be rerouted to the combined sewer and agreed to provide containment for the ethylene glycol tank.

Ecology told Ash Grove Cement that a stormwater discharge permit would not be required if the stormwater was discharged to the METRO sewer system and met state water quality standards (Ecology 1991). Ash Grove Cement then applied to METRO to increase their wastewater discharge limit to include stormwater. On December 20, 1991 METRO approved Ash Grove Cement's request, allowing them discharge up to 20,000 GPD of wastewater to the sewer system. This authorization was set to expire on July 3, 1996 (METRO 1991b).

In May of 1994, an inspection was performed by an investigator from METRO. This inspection confirmed that Ash Grove Cement discharged all stormwater and waste water to the METRO combined sewer, and therefore did not need a NPDES permit. This conclusion was seconded by Dan Cargill of Ecology, who agreed no NPDES permit was needed (AGC 1994a). However, in July of 1994, NPDES permit WAG 50-3044 was issued to Ash Grove Cement which was effective from August 6, 1994 through August 6, 1999 (Ecology 1994b). Contradicting this issuance, a letter dated November 29, 1994 from Gerald Brown of Ash Grove Cement to Ecology states that the facility does *not* have a NPDES permit (AGC 1994b). This statement was in response to a request for information needed to assess potential areas of concern in the Duwamish River.

Ecology conducted a follow-up inspection on June 27, 1994, to confirm that the connection to the METRO sewer system had been accomplished appropriately and that the sedimentation pond had been covered. The inspection report noted that the area where the pond had been was filled in and covered with concrete. Ash Grove Cement also appeared to have successfully connected to the METRO combined collection system and all water, including storm water, was appropriately directed to the combined system. The inspector recommended the cancellation of Ash Grove Cement's discharge permit #5162 due to satisfactory compliance with requirements (Ecology 1994a).

In February of 2001, Ash Grove Cement applied for a renewal of Minor Discharge Authorization #296 with no changes to operations (AGC 2001). However, on May 1, 2001, King County canceled this Minor Discharge Authorization and issued Ash Grove Cement a Major Industrial Waste Discharge Authorization No. 4009-01 (King County 2001). This permit allows for up to 7,500 GPD of industrial wastewater and stormwater to be discharged into the King County Sewer System (formerly METRO). Included in the permit requirements were self-monitoring protocols, settling as a pre-treatment process, and general discharge limitations. This permit was renewed as No. 4009-02 on August 17, 2006, with the same requirements and limitations (King County 2006).

Since 1991 it was believed that all stormwater and waste water discharged to the King County (formerly METRO) combined sewer under current permit 4009-02. However, despite past assurances to the contrary, a recent inspection on January 14, 2009 revealed that considerable quantities of storm water, co-mingled with industrial wastewater, *are* being discharged to the City storm drain. Figure 21, dated 1990, shows a connection to what seems to be referred to as the "city storm sewer" in the upper right corner (the lettering if hard to decipher on the available copy). It is possible that the misnomer of "storm sewer" could have meant "storm drain," leading to some of the confusion. An original copy of the drawing may help clarify the true connection.

This storm drain discharges to the East Waterway at the South Hind St. outfall. However, since this outfall lies outside of the LDW boundaries, any resulting impact on the waterway will be addressed as part of the source control efforts for the East Waterway (Ecology 2009). As a result of this inspection Ash Grove Cement has applied for an Individual NPDES permit.

The report from the January 14, 2009 inspection states that most of the site's stormwater is directed to a large underground horseshoe shaped vault that reportedly connects to the sewer; however, a current stormwater drainage map was not available to the inspectors. The report cites several instances of inadequately contained materials observed on site, including totes and drums of liquid products and/or wastes. The inspectors could not discern whether stormwater in certain areas was being directed to the collection system or allowed to runoff into the LDW. The report states that Ash Grove has an active water right to pump groundwater from a well and use it for cooling in their process. A large oil/water separator unit is in use but maintenance records and design information were not available to the inspectors. The inspection report calls for more enhanced stormwater treatment and an updated Stormwater Pollution Prevention Plan (SWPPP) (Ecology 2009). A timeline summary of the wastewater handling practices is shown in Figure 22.

Vanillin Black Liquor Solids

On of the unique materials used at Ash Grove Cement was Vanillin Black Liquor Solids (VBLS). VBLS was 1-2% copper and 31% calcium, with a pH of 12.5. Although its high calcium content was of interest to Ash Grove Cement, the copper content makes VBLS a potential source for this COC. This material was a by-product from Monsanto Chemical Company's production of artificial vanilla flavoring. Monsanto manufactured the flavoring at a former facility located at RM 4.0 East on the LDW in the Slip 6 Source Control Area (E & E 2008b). The Monsanto facility was later purchased by Rhône-Poulenc but it no longer exists. An agreement between Lone Star Industries and Monsanto Chemical in 1980 stated Lone Star planned to purchase Vanillin Black Liquor Solids (VBLS) from Monsanto to use as a calcium source for cement production (Monsanto 1980).

The Monsanto Chemical Company agreed to install and lease handling and storage facilities on the property to store the VBLS, but included a clause stating that the VBLS was provided to Lone Star on an "as is" basis "with all faults" (Lone Star 1980). In January 1983, a letter from Lone Star to Puget Sound Clean Air Agency (PSCAA) indicated that it would begin using VBLS as a dust suppressant on roads within the facility (Lone Star 1983a). An activity report dated August 22, 1983, suggested the company was considering taking measures to sell its inventory. Sometime during 1987, Rhône-Poulenc Inc. bought back the VBLS storage tank. Although VBLS is not likely the only potential source of copper, the extent of copper and other heavy metals contamination has not been fully characterized.

PCBs

PCBs are another COC with specific information available. In a June 13, 1986, memo Ash Grove stated plans to clean up some leaking and damaged transformers on the property. On June 26, 1986, six transformers were removed from the site. Crowley Environmental Services submitted hazardous waste manifests for the transformers, drained the PCB liquids from them, and removed approximately 13,500 pounds of PCB-contaminated soils from the kiln and slurry areas of the facility (Crowley Environmental Services 1986). During the site modifications there is record of a large transformer near the slurry tanks that contained 981 gallons of PCB oil, but there is no record of its disposal.

On February 1, 1991, Ash Grove Cement submitted an Annual Dangerous Waste Report stating that large numbers of out-of-service transformers, switches, and other PCB-contaminated materials were stored on the property. One neutral driving transformer was found to have 890 mg/kg PCBs (the PCB threshold level established at that time was 1 mg/kg). The transformer was immediately removed and disposed of; however, no documentation of its termination was available.

In April 1991, Ash Grove Cement received sample test results from General Electric stating that a swab sample taken from the Raw Mill concrete pad did not detect any PCBs. It also included a disposal record showing that eleven sources of PCBs had been removed and disposed of, and that no PCBs existed on the site at the end of 1990 (General Electric 1991). Nevertheless, given the quantities of PCB material reported, it does not appear that the site has been fully characterized with respect to PCBs.

Cement Production Materials

Various cement production raw materials and process by-products were on site at different times in the site's history. Many of these materials are potential sources of COCs. Materials used at some time or another for the production of cement (either as an ingredient or as a fuel) include boiler fly ash from the University of Washington, coal, coal slag, VBLS, molasses, and Lignosite (sodium lignosulfate powder). In 1984 when clinker production ceased many of these materials were left stockpiled at the facility until they could be removed. Some materials remained on sight for over a year (Ecology 1985).

Some process by-products also had environmental concerns. In November 1983, a Lone Star internal memo was circulated that discussed kiln dust as a hazardous waste under Ecology's new regulations (Lone Star 1983b). Lone Star recycled kiln dust into the cement production process to avoid being classified as a waste generator. Cement kiln dust is known industry wide as a hazardous material (Bureau of Mines 1983). In May of 1984, waste kiln dust and clinker were removed and used as soil stabilizer, but no mention of final destination was given in the resulting activity report (OPCC 1984).

In 1995, Ash Grove Cement began receiving mill slag from Teck Cominco's plant in Trail, BC. The estimated amount of slag shipped to the company was approximately 36,000 tons. On May 20, 1996, an internal Ash Grove Cement memo describes the results of analytical testing done on a sample of the Cominco slag. A Toxic Characteristics Leachate Procedure (TCLP) analysis showed that all metals were below the regulatory limits. The highest constituent levels were observed for antimony at 16 percent and lead at 13 percent of the regulatory limit, respectively (AGC 1996). In 2005, Ash Grove Cement began to use iron grit in place of the Teck Cominco mill slag (AGC 2005).

Building & Operational Materials

Some building and operational materials may have been sources of COCs. A 1989 laboratory report from Northwest Laboratories of Seattle, Inc. (NWL) indicates that building materials from burners and precipitators on the site were bulk sampled and tested for asbestos. Results show that amosite and chrysotile were found to contain asbestos levels from 45-90% (NWL 1989a). A second report from the same laboratory and the same year indicates similar levels of asbestos were found in building materials in the cyclones, exhaust stacks, duct blankets and coverings, and the drying oven (NWL 1989b). No information was found to determine if these structures were those removed during demolition, or if they remain on the site. Nevertheless, in the event of any future ground disturbance or building demolition, the risk of asbestos exposure should be considered.

During the demolition work for the facility modernization chromium and asbestos-containing industrial materials, including kiln brick and insulation, were reported to have been identified, removed, and disposed of properly. However, prior to 1981, spent kiln bricks were disposed on site and kiln bricks were encountered during construction excavation (E & E 1987).

In 1991 samples from truck waste oil and unused oil product were analyzed for waste profiling. The results showed that the materials were composed of water, oil hydrocarbons, and 1,1,1-Trichloroethane (TCA) (Chemical Handling Corporation 1991a & b). This is the first evidence of chlorinated solvents being used on this site, and it is possible that TCA contamination or its daughter products could still be present.

3.4.3 Regulatory History and Violations

Over the course of the site's history, various regulations have applied to the operations and waste handling practices. Numerous violations can be found in the available records; however, many of the records give only partial information about a given incident. As with other elements of the site history, some information obtained from Ecology's files could not be referenced separately. Violations have been associated with air emissions, discharges to the waterway, storage practices and various waste handling practices.

In July 1980, the company received a $250 penalty and Notice of Violation for "Tower 12." No other information was found regarding the cause for or description of this violation.

The EPA filed a lawsuit in the U.S. District Court in August 1984 against Ash Grove Cement for violation of the Clean Water Act. Ash Grove Cement received a notice of a pollution incident from the U.S. Coast Guard on April 8, 1985 for an unspecified spill into the Duwamish River. The letter stated an investigation into the incident would be conducted (USCG 1985).

Apparently as a consequence to the pollution incident noted by the U.S. Coast Guard, Ash Grove Cement pled guilty in October 1985 to one criminal count of violation of the River and Harbors Act for dumping solidified cement into the waterway from the dock and paid a fine of $5,000. PSCAA also fined the company $1,000 for fugitive dust releases.

An incident with the dust collector in 1990 resulted in a Notice of Violation (#27004) to be issued to Ash Grove Cement. A response letter from the company to PSCAA dated July 10, 1990, described how the dust collectors on site had shut down, causing an emission of process air and dust to the environment. Ash Grove Cement indicated intent to install alarm systems to signal when such shut downs occurred in the future (AGC 1990). The original Notice of Violation was not available for further details. PSCAA was also notified of an overfilled silo in February 1992.

On September 12, 2003, the Department of Ecology granted Inactive Facility Status and exempted Ash Grove Cement from having to submit further Pollution Prevention Planning documents or Annual Progress Reports. Ash Grove Cement was granted this status because it generates less than 2,640 pounds of dangerous wastes annually, and there are no opportunities to reduce hazardous substance use any further (AGC 2003a). This status was conditional upon Ash Grove Cement staying within Conditionally Exempt Small Quantity Generator (CESQG) thresholds, since it would still be operational (Ecology 2003b).

3.4.4 Environmental Site Inspections and Cleanups

The records contain reports from various site inspections. As with other records, many of the available documents on inspections were incomplete. The examples provided here illustrate the long period of time that the site has been targeted for reviews. Many of the earlier examples indicated less concern than the more recent site reviews.

Ecology conducted a site inspection of Lone Star on May 15, 1974, and rated the operations as "fair." The inspector verified that the site setup did not require a NPDES permit, as all water was collected and incorporated into makeup water (Ecology 1974).

Ecology again inspected the site on October 13, 1977. The inspector noted that the general conditions were much the same as noted in a 1975 inspection (record not found). He also noted a gas pump and a diesel tank in the shop area that did not have proper containment. At this time the plant was importing clinker from Japan and Canada as it could not produce enough to meet demands (Ecology 1977).

During a plant visit in 1979, an internal company inspector with Lone Star noted that the general conditions of kilns and coolers were the worst he had ever seen. He recommended that they not continue operation until fixing or replacing the equipment (Lone Star 1979).

In October 1984 METRO noted problems with storage and containment at the facility. In January 1985, Ash Grove Cement responded by agreeing to store oil indoors and remove all coal, fly ash, and slag from the property by May 1985 (AGC 1985a). In October 1985, a METRO representative inspected the facility to follow up on the storage and containment issues. The inspector noted that coal and slag still remained on site and concerns of contaminants leaching to groundwater were expressed in a follow up letter (AGC 1985b, Ecology 1985, Ecology 1986).

In October 1985 two USTs were removed, and another two were removed in April of 1986. An internal memo states that no other USTs remain on site (AGC 1989).

In 1986, Ash Grove Cement began meeting with an EPA subcontractor (E & E) to discuss a site inspection to determine the possibility of Superfund status at the plant site. This inspection was performed on July 30, 1987. E & E and EPA agreed that no further action was needed at this site. The rationale given was that since the samples taken from the settling pond dredge material showed no contaminant exceedances, the potential for detecting hazardous levels of contamination in the soil and/or groundwater was low. No further investigation or action was performed at that time (E & E 1987).

On April 17, 2000, Ecology conducted a Dangerous Waste Compliance Inspection of the Ash Grove Cement site. The inspector noted issues of non-compliance, including many instances of poor containment of solvents and other chemicals. There were many unlabeled and unmarked barrels, drums, and buckets containing unknown liquid waste or solvents. These containers were often dented, damaged, or uncovered and had no secondary containment measures in place to prevent environmental release. Ash Grove Cement was required to become compliant and resolve these violations by May 2000 (Ecology 2000).

On April 27, 2005, the City of Seattle and King County performed a joint initial inspection of the Ash Grove Cement facility and notified the company of some areas of concern. Many of the concerns were related to a lack of proper secondary containment of oils, lubricants, automotive liquid products, and other liquids. Ash Grove Cement was asked to resolve these issues and informed that a second, unannounced inspection would follow in subsequent months. This inspection occurred on December 20, 2005, and Ash Grove Cement was declared in compliance

(King County 2005a, b). A timeline summary of inspections and cleanup actions is shown in Figure 23.

3.4.5 Air Emissions

Since the Ash Grove Cement site has a significant history of air emissions more information is included on this pathway than for other sites. According to Ecology's files, in early 1993 Ash Grove Cement began to burn waste oil in its kiln. The oil was contained in two holding tanks of 750 gallons each. PSCAA advised the company that the waste oil should be tested for metals, chlorides, PCBs, and flash point. In 1996, PSCAA developed a new system of addressing violations. A civil penalty policy was implemented that elevated chronic repeat violations to Notices of Violation (NOVs) and directed civil penalties for these assessments. NOVs were issued to Ash Grove Cement for violations including fugitive dust release, illegal emissions, operating and maintenance plan deviations, and other items. Many penalties contained more than one type of violation. Many NOVs have been issued to Ash Grove Cement in its history, and since development of the new violation system, 33 have been elevated to civil penalties. On May 15, 2003, PSCAA issued a Title V Air Operating Permit (AOP) (No. 11339) to Ash Grove Cement. This AOP is required of any company listed as a major source of any pollutant. A "major source" is defined as an air pollutant source that potentially emits more than 100 tons per year of any criteria pollutant, 10 tons per year of any single hazardous air pollutant, or 25 tons per year of any combination of hazardous air pollutants. This permit regulated the entire facility as well as specific components of the processing equipment.

3.4.6 Potential for Future Release

Historical contamination or contaminants from current operations at the site could recontaminate sediments near the RM 0.0-0.1 East Source Control Area via stormwater, groundwater or spills:

3.4.6.1 Stormwater

The raw materials used to make cement and the hazardous materials used in site operations have a high possibility of reaching the LDW through one or more stormwater pathways. Although there are currently no indications of any constructed stormwater outfalls to the LDW, the recent inspection indicates that some stormwater from the site runs off directly into the LDW. Both engineered containment and BMPs can reduce the risk of contaminant migration via direct runoff.

Information from the recent inspection has confirmed that stormwater and waste water are discharging to the city storm drain system that leads to the South Hind St. outfall. Further inspection is necessary to ascertain which waste water streams are co-mingling with the stormwater in the currently designed collection system. Once it is determined which streams are entering the stormwater system, an adequate treatment system can be designed and implemented to insure that contaminants do not reach the LDW or the East Waterway via this active pathway.

There is no CSO discharge within the RM 0.0-0.1 East Source Control Area. However, since contaminants are released to the County combined sewer a CSO event could release these contaminants to another point along the LDW.

3.4.6.2 Groundwater

Records of historical operations on the Ash Grove Cement site indicate that many contaminants were used or stored on the property. However, due to the lack of sampling and monitoring the extent and status of any groundwater or soil contamination is poorly understood. Historical operations, spills, regulatory infractions, sampling events and minimal remedial actions indicate that the potential for past contamination to persist on site is very high.

In addition, although most of the site is paved, current operations still pose a risk of releasing hazardous materials to the ground which could then migrate to the LDW via groundwater. Specific information about the groundwater well used to pump cooling water was not available. This well should be inspected to assure that, when not in use, it cannot act as a conduit for contamination to reach the aquifer. Until both the past and present sources of contamination are thoroughly delineated and contained, the risk of these constituents migrating to the waterway via groundwater is also very high.

3.4.6.3 Spills

In February 1992, an investigation found that a Merlino employee pumped water from an excavation directly into the river and a complaint was filed with the U.S. Coast Guard. In April 1992, Ash Grove Cement notified Ecology that 3-4 cubic yards of crushed limestone had been accidentally dropped into the Duwamish River due to improperly functioning mechanisms on the unloading barge. Ash Grove Cement later installed an automated system to shut down conveyer belts in emergencies (AGC 1992).

On November 19, 2003, Ash Grove Cement notified a number of agencies regarding a spill incident into the Duwamish. Approximately two gallons of diesel fuel leaked from a hydraulic line onto a barge. Rain then washed the fuel into the waterway, and a sheen developed on the water surface (AGC 2003b). On November 20, 2003, Ash Grove Cement was issued a Letter of Warning from the United States Coast Guard, stating no penalties were given (USCG 2003).

A similar event occurred on May 2, 2005, when one quart of mineral oil leaked into the Duwamish from a dockside crane. A sheen developed on the waterway from the incident. On May 31, Ash Grove Cement was issued a Letter of Warning from the United States Coast Guard, stating no penalties were given (USCG 2005).

In 1999, approximately 750 cubic yards of gravel was spilled into the LDW at the south end of the facility's waterfront, and subsequently removed. In 2002, modifications began to help prevent additional spillage into the waterway. A large hopper and dockside conveyer system were installed on the barge unloading dock. Yearly monitoring of nearby bathymetry helped ensure that maintenance dredging was only removing intended material from the sediment. In May 2008 a barge docked at the facility broke in half, spilling part of its reportedly clean gravel load into the LDW (Seattle Post-Intelligencer 2008). It is expected that Ash Grove Cement will dredge out the spilled material according to its current dredging schedule (EPA 2008).

Although preventive measures have been taken, numerous spill events have occurred at Ash Grove Cement as described above. Given the nature of the material transfer operations at the dock as well as the inadequately contained storage areas in other parts of the facility, there continues to be a high risk of contaminant spill releases to the environment.

3.4.7 Source Control Actions

The following source control actions will be conducted:

- Ecology will negotiate an agreed order for Ash Grove Cement to conduct a RI/FS that will focus on potential soil and groundwater contamination at the site.
- The Port of Seattle will obtain a new NPDES permit for discharge into the City storm drain that discharges at S. Hind Street.
- Ecology will ensure that the storm drain system structures on the site and their function are completely delineated and properly permitted with all existing drainage problems identified. Since Seattle Public Utilities has recently confirmed that waste water and stormwater is draining to the S. Hind St. storm drain system, Ecology will require Ash Grove Cement to demonstrate appropriate separation of waste water from storm water and to install an appropriate treatment system.
- Ecology will inspect the condition and operational records of the groundwater well used for cooling water to insure that it is not capable of releasing contaminants directly into the aquifer.
- Ecology and SPU will conduct additional source control inspections to ensure compliance and the use of best management practices.

3.5 Atmospheric Deposition

Atmospheric deposition occurs when air pollution deposits enter the LDW directly or through stormwater. Such deposits can become a possible source of contamination to sediments adjacent to the RM 0.0-0.1 East Source Control Area. Air pollution is generated from air emissions that can be either from a point source or widely dispersed. Examples of point source emissions include paint overspray, sand-blasting, industrial smokestacks, and fugitive dust and particulates from loading/unloading of raw materials (e.g., sand, gravel, and concrete). Examples of widely dispersed emissions include vehicle emissions and aircraft exhaust.

The Washington State Department of Health hired a consultant to model air emissions from multiple sources in south Seattle. The objective of the multiple-source air modeling project in the Duwamish valley was to identify air pollutants, key air pollution sources affecting residential areas of south Seattle, and the geographic areas of south Seattle that are affected by air pollutants. This effort is an initial step to identify priorities for future work in the area. The report from this effort was published in July 2008. It summarizes findings of the modeling effort and recommends future actions (WSDOH 2008). A study on atmospheric deposition planned by the Puget Sound Partnership has not been funded yet and no schedule has been developed. Ecology will continue to monitor these efforts (Ecology 2008).

Out of concern for phthalate recontamination at sediment cleanup sites in the larger Puget Sound region, the Sediment Phthalates Work Group was formed in 2006. One accomplishment of this work group was reviewing existing information to explore the potential for phthalate recontamination via atmospheric pathways. The group concluded that phthalates reach sediments via a complex pathway involving off-gassing to air followed by attachment to particulates, deposition to the ground, and transport to sediments through stormwater (Sediment Phthalates Work Group 2007).

King County conducted atmospheric deposition sampling in the LDW area to assess whether atmospheric deposition is a potential source of phthalates and selected PAHs and PCBs (KCDNRP 2008).

Based on comparison to results from other atmospheric deposition networks that employed high-volume air sampling techniques to collect gaseous and particulate phase air samples, the total deposition results from this study are likely to be biased low for the lighter phthalates, low- to mid-range PAH compounds, and low- to mid-range PCB congeners. Because side-by-side comparison sampling of the passive atmospheric deposition samplers with high-volume air samplers was not conducted, it is not possible to assess the degree of bias (KCDNRP 2008).

The sampling stations were located at Beacon Hill, Duwamish Valley, Georgetown, KCIA, and South Park Community Center. The following range of atmospheric deposition flux values was observed (KCDNRP 2008):

Analyte	Range of Air Deposition Flux (µg/m^2/day)	Location of Highest Values
Butyl benzyl phthalate	0.163 to 7.007	South Park
Bis(2-ethylhexyl)phthalate	0.261 to 12.240	Duwamish Valley
Benzo(a)pyrene	0.008 to 2.225	KCIA
Pyrene	0.035 to 4.652	KCIA
Aroclor 1254	<0.011 to 0.044	Georgetown
Aroclor 1260	<0.011 to 0.034	Georgetown

Detailed results are provided in King County's *Monitoring Report – October 2005 to April 2007* (KCDNRP 2008).

3.5.1 Source Control Actions

Atmospheric deposition should be further evaluated to assess whether it is a potential source of phthalates (particularly BEHP) and other contaminants, such as PCBs, in stormwater discharge. However, at this time, there are no available resources to address this issue.

Air pollution is a concern for the wider LDW region. Ecology will review work on atmospheric deposition being conducted by the Washington State Department of Health and planned by the Puget Sound Partnership. If funding is available, Ecology will hire a contractor to develop options and recommendations for addressing action items relating to air pollution.

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4.0 Monitoring

Monitoring efforts by SPU, Ecology, KCIWP, and PSCAA may be used to assist in identifying and tracing ongoing sources of COCs present in LDW sediments or in upland media. This information will be used to focus source control efforts on specific problem areas within the RM 0.0-0.1 East Source Control Area and to track the progress of the source control program. The following types of samples may be collected:

- in-line and storm drain solids trap samples from storm drain systems,
- on site catch basin solids samples, and
- soil and groundwater samples as necessary.

If monitoring data indicate that additional sources of sediment recontamination are present, then Ecology will identify additional source control activities as appropriate.

Because source control is an iterative process, monitoring may be necessary to identify trends in concentrations of COCs. If necessary, monitoring may continue for some years. Any decisions to discontinue monitoring will be made jointly by Ecology and EPA, based on the evidence. At this time, Ecology plans to review the progress and data associated with the source control action items for each SCAP annually, and this information will be updated in the Source Control Status Report, which is scheduled for publication twice a year. In addition, Ecology may prepare Technical Memoranda to update the SCAPs, as needed.

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5.0 Tracking and Reporting of Source Control Activities

Ecology is the lead for tracking, documenting, and reporting the status of source control to EPA and the public. Each agency performing source control work will document its source control activities and provide regular updates to Ecology. Ecology will update information in the SCAPs in the Source Control Status Reports that are published twice a year.

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7.0 Tables

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Table 1. Chemicals Above Screening Levels in Surface Sediment: RM 0.0-0.1 East

Sampling Event	Sample Location	River Mile	Year	Chemical	Concentration	Units	TOC (% dw)	OC Normalized Conc.	SQS [1]	CSL [1]	Criteria Units	SQS Exceedance Factor [2]	CSL Exceedance Factor [2]
Metals													
EPA SI	DR001	0.1	1998	Arsenic	77.2	mg/kg dw	3.01		57	93	mg/kg dw	1.4	0.83
LDWRI-SurfaceSedimentRound2	LDW-SS6	0.1	2005	Arsenic	82.9	mg/kg dw	1.05		57	93	mg/kg dw	1.5	0.89
LDWRI-SurfaceSedimentRound3	LDW-SS305	0.1	2006	Arsenic	123	mg/kg dw	3.01		57	93	mg/kg dw	2.2	1.3
LDWRI-SurfaceSedimentRound2	LDW-SS6	0.1	2005	Lead	573	mg/kg dw	1.05		450	530	mg/kg dw	1.3	1.1
LDWRI-SurfaceSedimentRound3	LDW-SS301	0	2006	Mercury	0.91	mg/kg dw	1.55		0.41	0.59	mg/kg dw	2.2	1.5
LDWRI-SurfaceSedimentRound3	LDW-SS302	0	2006	Mercury	0.59	mg/kg dw	2.32		0.41	0.59	mg/kg dw	1.4	1
LDWRI-SurfaceSedimentRound2	LDW-SS6	0.1	2005	Zinc	553	mg/kg dw	1.05		410	960	mg/kg dw	1.3	0.58
PAHs													
LDWRI-SurfaceSedimentRound3	LDW-SS301	0	2006	Benzo(a)pyrene	2.6	mg/kg dw	1.95	130	99	210	mg/kg OC	1.3	0.62
LDWRI-SurfaceSedimentRound3	LDW-SS301	0	2006	Benzo(g,h,i)perylene	1	mg/kg dw	1.95	51	31	78	mg/kg OC	1.6	0.65
LDWRI-SurfaceSedimentRound3	LDW-SS301	0	2006	Benzofluoranthenes (total)	6.8	mg/kg dw	1.95	350	230	450	mg/kg OC	1.5	0.78
LDWRI-SurfaceSedimentRound3	LDW-SS301	0	2006	Chrysene	3.6	mg/kg dw	1.95	180	110	460	mg/kg OC	1.6	0.39
LDWRI-SurfaceSedimentRound3	LDW-SS301	0	2006	Dibenzo(a,h)anthracene	0.34	mg/kg dw	1.95	17	12	33	mg/kg OC	1.4	0.52
LDWRI-SurfaceSedimentRound2	LDW-SS2	0	2005	Fluoranthene	4.5	mg/kg dw	1.98	230	160	1200	mg/kg OC	1.4	0.19
LDWRI-SurfaceSedimentRound3	LDW-SS301	0	2006	Indeno(1,2,3-cd)pyrene	1.1	mg/kg dw	1.95	56	34	88	mg/kg OC	1.6	0.64
LDWRI-SurfaceSedimentRound3	LDW-SS301	0	2006	Total HPAH	21.4	mg/kg dw	1.95	1,100	960	5300	mg/kg OC	1.1	0.21
Phthalates													
LDWRI-SurfaceSedimentRound2	LDW-SS6	0.1	2005	Bis(2-ethylhexyl)phthalate	0.85	mg/kg dw	1.05	81	47	78	mg/kg OC	1.7	1
PCBs													
EPA SI	DR003	0.2	1998	PCBs (total calc'd)	0.267 J	mg/kg dw	2.12	13	12	65	mg/kg OC	1.1	0.19
EPA SI	*DR055*	*0.1*	*1998*	*PCBs (total calc'd)*	*210 (1)*	*ug/kg dw*	*5.88*		*130*	*1000*	*ug/kg dw*	*1.6*	*0.21*
LDWRI-SurfaceSedimentRound2	LDW-SS6	0.1	2005	PCBs (total calc'd)	1.92	mg/kg dw	1.05	183	12	65	mg/kg OC	15	2.8
LDWRI-SurfaceSedimentRound3	LDW-SS302	0	2006	PCBs (total calc'd)	0.32	mg/kg dw	2.32	14	12	65	mg/kg OC	1.2	0.22
LDWRI-SurfaceSedimentRound3	LDW-SS305	0.1	2006	PCBs (total calc'd)	0.59 J	mg/kg dw	3.01	20	12	65	mg/kg OC	1.7	0.31

Key:

DW- Dry Weight
CSL- Cleanup Screening Level
PAH- Polynuclear Aromatic Hydrocarbon
PCB- Polychlorinated Biphenol
OC- Organic Carbon
TOC- Total Organic Carbon
SQS- Sediment Quality Standard
SVOC- Semivolatile Organic Compound

Notes:

1. SQS and CSL values are substituted with AET values for dry weight comparison where organic compounds are not OC-normalized (when TOC% DW is outside of the 0.5-4.0% range).

2. Exceedance factors are the ratio of the detected concentration to the CSL or the SQS (or to AET values where applicable); exceedance factors are shown only if they are greater than 1.

Source:

Lower Duwamish Waterway Group, 2007. Online Lower Duwamish Waterway Group Draft Remedial Investigation Report (November 2007) Database. http://www.ldwg.org.

This table supersedes Table 1 as presented in the Data Gaps Report as the previous table contained errors.

Table 2. Chemicals Above Screening Levels in Subsurface Sediment: RM 0.0-0.1 East

Sampling Event	Sample Location	Depth Interval	Year	Chemical	Concentration		Concentration Units	TOC (% DW)	OC Normalized Concentration	SQS [1]	CSL [1]	Criteria Units	SQS Exceedance Factor [2]	CSL Exceedance Factor [2]
Metals														
LDW Subsurface Sediment 2006	LDW-SC4	1 to 2	2006	Arsenic	63		mg/kg dw	1.97		57	93	mg/kg dw	1.1	
LDW Subsurface Sediment 2006	LDW-SC2	0 to 2	2006	Arsenic	190		mg/kg dw	0.897		57	93	mg/kg dw	3.3	2
LDW Subsurface Sediment 2006	LDW-SC2	2 to 4	2006	Arsenic	210		mg/kg dw	6.29		57	93	mg/kg dw	3.7	2.3
LDW Subsurface Sediment 2006	LDW-SC2	4 to 6	2006	Arsenic	270		mg/kg dw	0.31		57	93	mg/kg dw	4.7	2.9
LDW Subsurface Sediment 2006	LDW-SC2	0 to 2	2006	Lead	569		mg/kg dw	0.897		450	530	mg/kg dw	1.3	1.1
LDW Subsurface Sediment 2006	LDW-SC2	2 to 4	2006	Lead	1050		mg/kg dw	6.29		450	530	mg/kg dw	2.3	2
LDW Subsurface Sediment 2006	LDW-SC2	4 to 6	2006	Lead	1210		mg/kg dw	0.31		450	530	mg/kg dw	2.7	2.3
LDW Subsurface Sediment 2006	LDW-SC4	1 to 2	2006	Mercury	0.43	J	mg/kg dw	1.97		0.41	0.59	mg/kg dw	1.05	
LDW Subsurface Sediment 2006	LDW-SC4	0 to 1	2006	Mercury	0.53	J	mg/kg dw	1.54		0.41	0.59	mg/kg dw	1.3	
LDW Subsurface Sediment 2006	LDW-SC1	0 to 2	2006	Mercury	0.61		mg/kg dw	2.1		0.41	0.59	mg/kg dw	1.5	
LDW Subsurface Sediment 2006	LDW-SC1	1 to 2	2006	Mercury	1.22		mg/kg dw	2.36		0.41	0.59	mg/kg dw	3	2.1
LDW Subsurface Sediment 2006	LDW-SC1	1 to 2	2006	Mercury	1.27		mg/kg dw	1.95		0.41	0.59	mg/kg dw	3.1	2.2
LDW Subsurface Sediment 2006	LDW-SC2	2 to 4	2006	Zinc	604		mg/kg dw	6.29		410	960	mg/kg dw	1.5	
LDW Subsurface Sediment 2006	LDW-SC2	0 to 2	2006	Zinc	748		mg/kg dw	0.897		410	960	mg/kg dw	1.8	
LDW Subsurface Sediment 2006	LDW-SC2	4 to 6	2006	Zinc	1430		mg/kg dw	0.31		410	960	mg/kg dw	3.5	1.5
SVOCs														
LDW Subsurface Sediment 2006	LDW-SC1	1 to 2	2006	1,2,4-Trichlorobenzene	0.02		mg/kg dw	1.95	1	0.81	1.8	mg/kg OC	1.2	
LDW Subsurface Sediment 2006	LDW-SC4	2 to 4	2006	2,4-Dimethylphenol	46		ug/kg dw	1.73		29	29	ug/kg dw	1.6	1.6
Phthalates														
LDW Subsurface Sediment 2006	*LDW-SC2*	*2 to 4*	*2006*	*Bis(2-ethylhexyl)phthalate*	*1800 (1)*		*ug/kg dw*	*6.29*		*1300*	*1900*	*ug/kg dw*	*1.4*	
LDW Subsurface Sediment 2006	LDW-SC1	0 to 2	2006	Bis(2-ethylhexyl)phthalate	1.8		mg/kg dw	2.1	86	47	78	mg/kg OC	1.8	1.1
LDW Subsurface Sediment 2006	LDW-SC2	0 to 2	2006	Bis(2-ethylhexyl)phthalate	0.9		mg/kg dw	0.897	100	47	78	mg/kg OC	2.1	1.3
LDW Subsurface Sediment 2006	LDW-SC1	1 to 2	2006	Bis(2-ethylhexyl)phthalate	2.4		mg/kg dw	1.95	120	47	78	mg/kg OC	2.6	1.5
LDW Subsurface Sediment 2006	LDW-SC1	1 to 2	2006	Butyl benzyl phthalate	0.098	J	mg/kg dw	1.95	5	4.9	64	mg/kg OC	1.02	
PCBs														
LDW Subsurface Sediment 2006	LDW-SC1	0 to 1	2006	PCBs (total calc'd)	0.35		mg/kg dw	1.97	18	12	65	mg/kg OC	1.5	
LDW Subsurface Sediment 2006	*LDW-SC2*	*4 to 6*	*2006*	*PCBs (total calc'd)*	*209 (1)*		*ug/kg dw*	*0.31*		*130*	*1000*	*ug/kg dw*	*1.6*	
LDW Subsurface Sediment 2006	LDW-SC4	1 to 2	2006	PCBs (total calc'd)	0.49		mg/kg dw	1.97	25	12	65	mg/kg OC	2.1	
LDW Subsurface Sediment 2006	LDW-SC1	2 to 4	2006	PCBs (total calc'd)	0.44		mg/kg dw	1.6	28	12	65	mg/kg OC	2.3	
LDW Subsurface Sediment 2006	LDW-SC4	2 to 4	2006	PCBs (total calc'd)	0.6		mg/kg dw	1.73	35	12	65	mg/kg OC	2.9	
LDW Subsurface Sediment 2006	LDW-SC1	0 to 2	2006	PCBs (total calc'd)	3.4		mg/kg dw	2.1	160	12	65	mg/kg OC	13	2.5
LDW Subsurface Sediment 2006	LDW-SC2	0 to 2	2006	PCBs (total calc'd)	1.38		mg/kg dw	0.897	150	12	65	mg/kg OC	13	2.3
LDW Subsurface Sediment 2006	LDW-SC1	1 to 2	2006	PCBs (total calc'd)	4.3		mg/kg dw	2.36	180	12	65	mg/kg OC	15	2.8
LDW Subsurface Sediment 2006	*LDW-SC2*	*2 to 4*	*2006*	*PCBs (total calc'd)*	*2900 (1)*		*ug/kg dw*	*6.29*		*130*	*1000*	*ug/kg dw*	*22*	*2.9*
LDW Subsurface Sediment 2006	LDW-SC1	1 to 2	2006	PCBs (total calc'd)	6.7		mg/kg dw	1.95	340	12	65	mg/kg OC	28	5.2

Key:

DW- Dry Weight
CSL- Cleanup Screening Level
PAH- Polynuclear Aromatic Hydrocarbon
PCB- Polychlorinated Biphenol
OC- Organic Carbon
TOC- Total Organic Carbon
SQS- Sediment Quality Standard
SVOC- Semivolatile Organic Compound

Notes:

1. SQS and CSL values are substituted with AET values for dry weight comparison where organic compounds are not OC-normalized (when TOC% DW is outside of the 0.5-4.0% range).

2. Exceedance factors are the ratio of the detected concentration to the CSL or the SQS (or to AET values where applicable); exceedance factors are shown only if they are greater than 1.

Source:

Lower Duwamish Waterway Group, 2007. Online Lower Duwamish Waterway Group Draft Remedial Investigation Report (November 2007) Database. http://www.ldwg.org.

8.0 Figures

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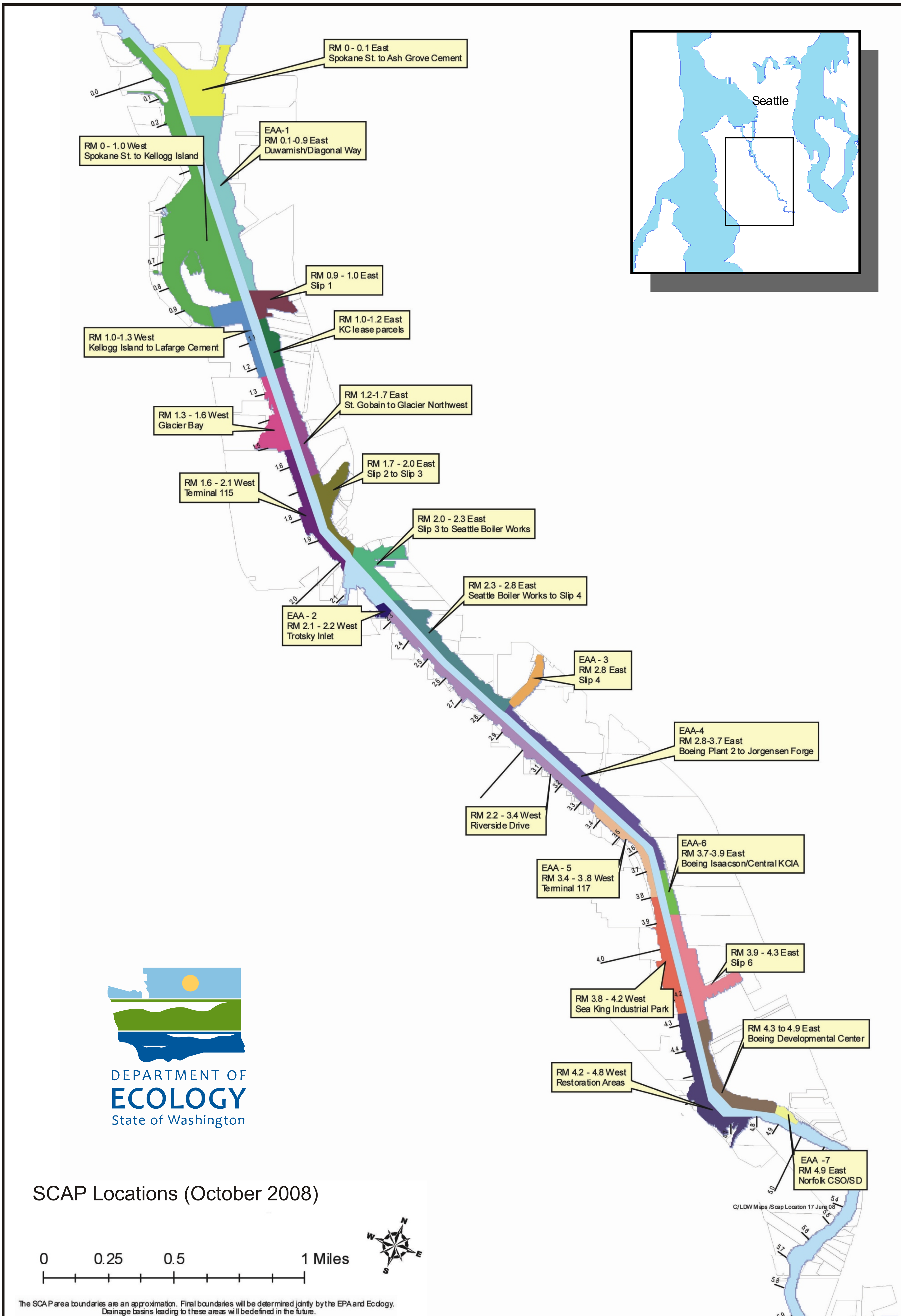

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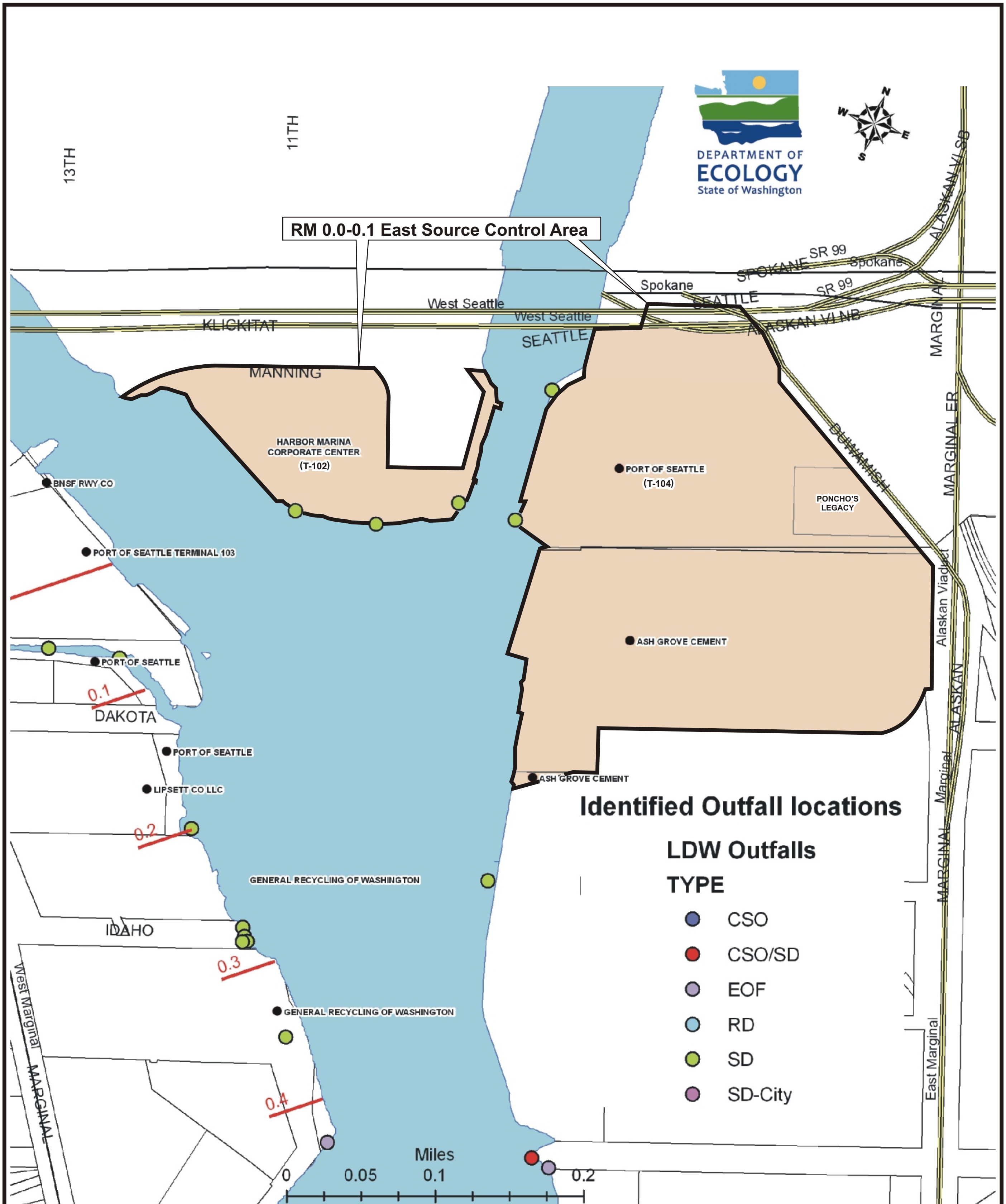
LOWER DUWAMISH WATERWAY RM 0.0-0.1 EAST Seattle, Washington	Figure 1 SOURCE CONTROL AREAS	
Base Map Reference: Department of Ecology, 2008.	Date: 6/30/09	Drawn by: AES
		10:002330WD1405\fig 1



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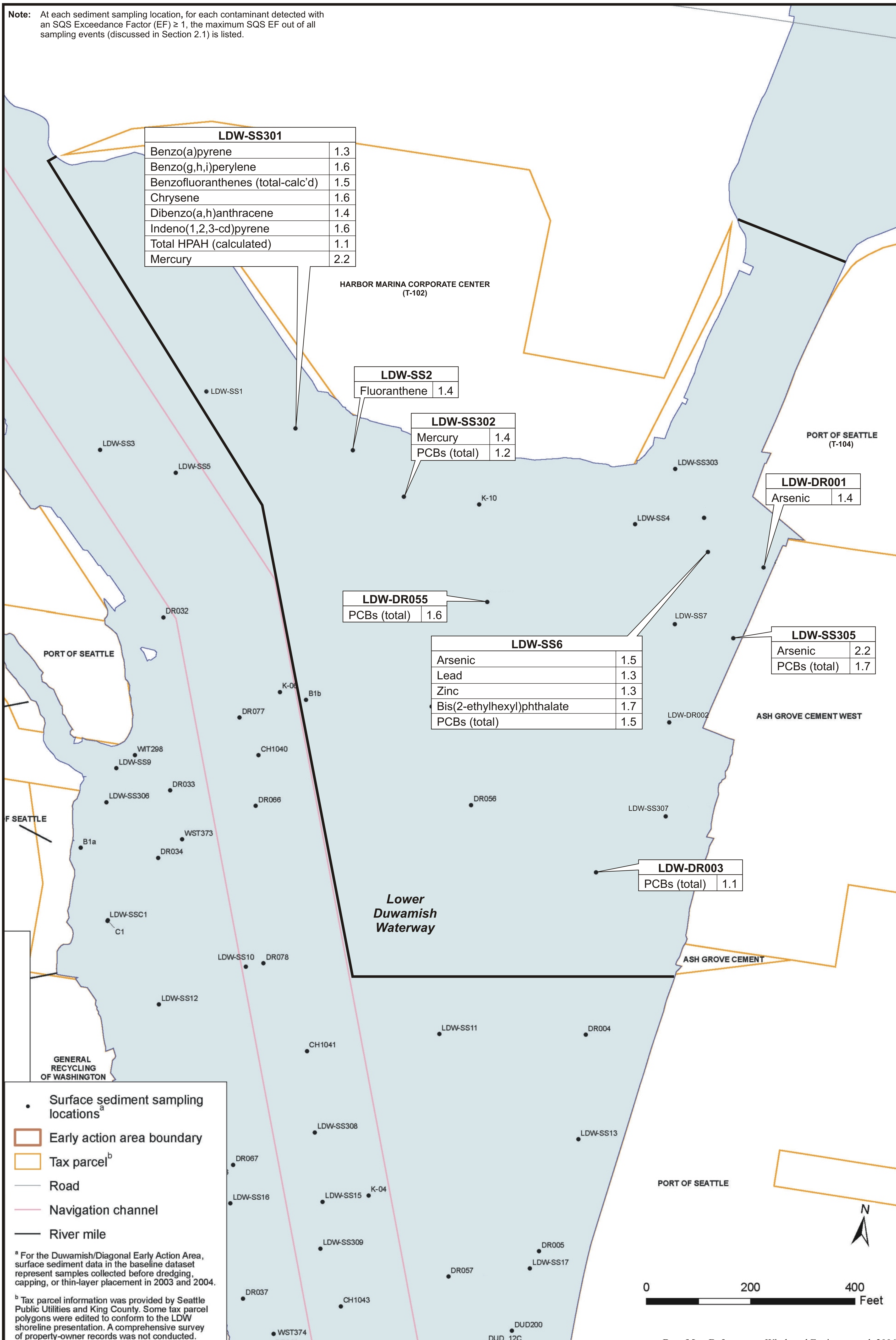
LOWER DUWAMISH WATERWAY
RM 0.0-0.1 EAST
Seattle, Washington

Figure 2
RM 0.0-0.1 EAST
SOURCE CONTROL AREA

Base Map Reference:
Department of Ecology, 2008.

Date:	Drawn by:	
6-30-09	AES	10:002330WD1405\fig 2



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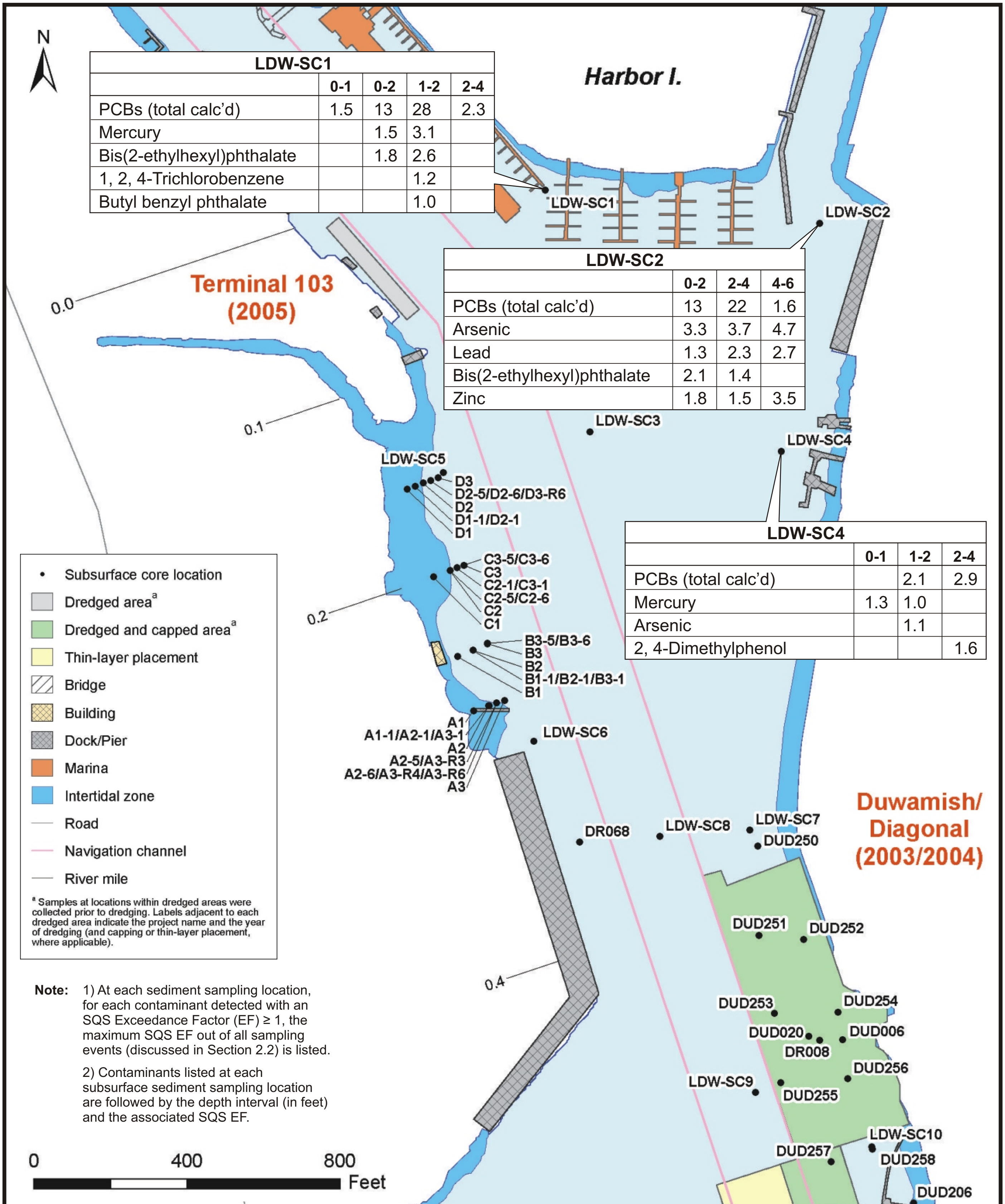
LOWER DUWAMISH WATERWAY
RM 0.0-0.1 EAST
Seattle, Washington

Figure 3

RM 0.0-0.1 EAST SURFACE SEDIMENT SAMPLING LOCATIONS

Date:	Drawn by:	
6/30/09	AES	10:002330WD1405\fig 3



LDW-SC1

	0-1	0-2	1-2	2-4
PCBs (total calc'd)	1.5	13	28	2.3
Mercury		1.5	3.1	
Bis(2-ethylhexyl)phthalate		1.8	2.6	
1, 2, 4-Trichlorobenzene			1.2	
Butyl benzyl phthalate			1.0	

LDW-SC2

	0-2	2-4	4-6
PCBs (total calc'd)	13	22	1.6
Arsenic	3.3	3.7	4.7
Lead	1.3	2.3	2.7
Bis(2-ethylhexyl)phthalate	2.1	1.4	
Zinc	1.8	1.5	3.5

LDW-SC4

	0-1	1-2	2-4
PCBs (total calc'd)		2.1	2.9
Mercury	1.3	1.0	
Arsenic		1.1	
2, 4-Dimethylphenol			1.6

Note: 1) At each sediment sampling location, for each contaminant detected with an SQS Exceedance Factor (EF) ≥ 1, the maximum SQS EF out of all sampling events (discussed in Section 2.2) is listed.

2) Contaminants listed at each subsurface sediment sampling location are followed by the depth interval (in feet) and the associated SQS EF.

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LOWER DUWAMISH WATERWAY
RM 0.0-0.1 EAST
Seattle, Washington

Figure 4

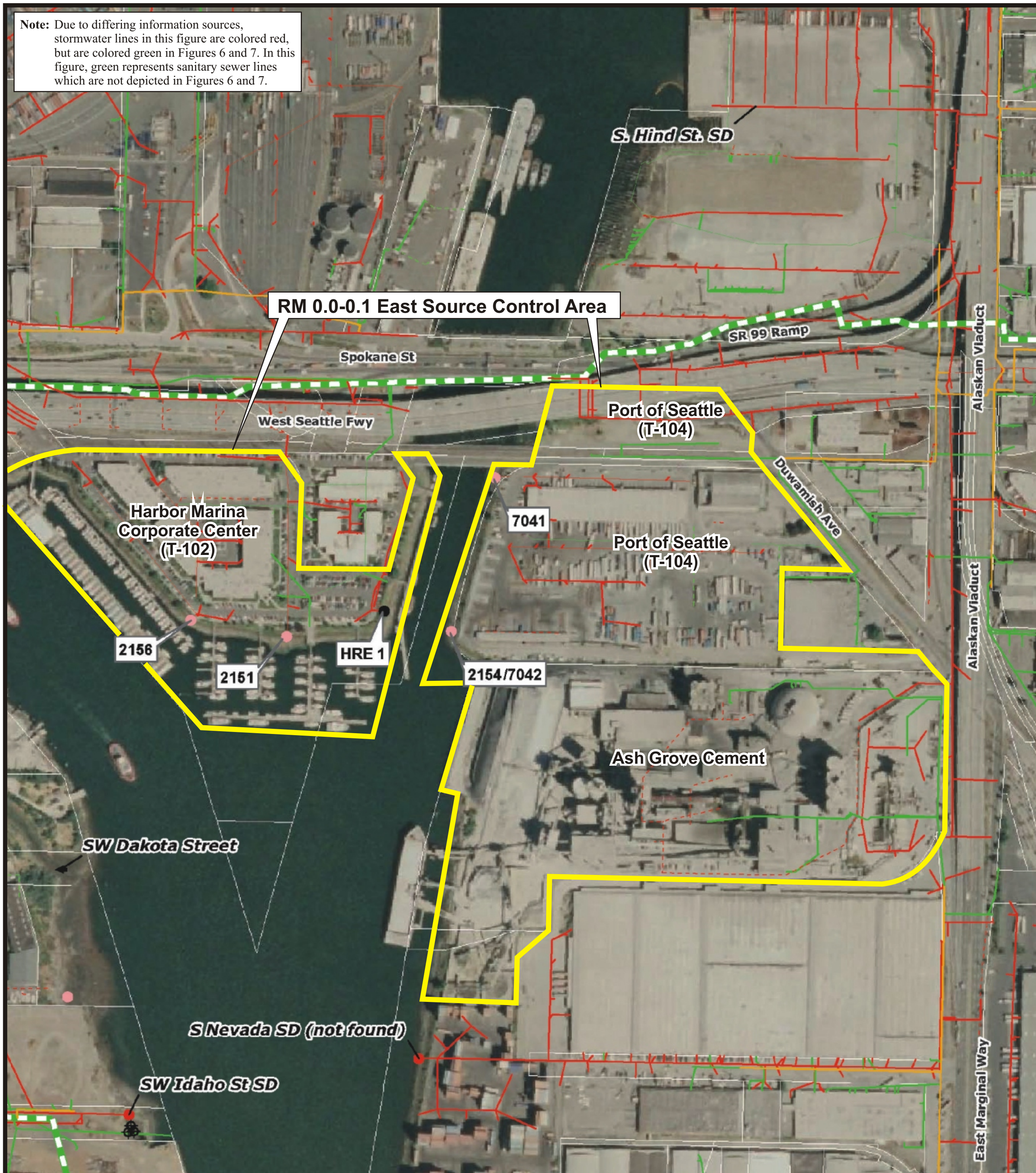
RM 0.0-0.1 EAST SUBSURFACE SEDIMENT SAMPLING LOCATIONS

Base Map Reference: Windward Environmental, 2006.

Date: 6-30-09

Drawn by: AES

10:002330WD1405\fig 4



Outfall Type		
× Abandoned	● SD-City	Drainage Mainline
◄ Channel/ditch	● SD-Port	Sanitary Mainline
● SD-Private	⊕ UNK	Combined Mainlines
		King County Mainline
		Parcel Boundary

N W E S

0 100 200 400 600 800 Feet

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LOWER DUWAMISH WATERWAY
RM 0.0-0.1 EAST
Seattle, Washington

Figure 5

STORM DRAIN SYSTEMS
WITHIN RM 0.0-0.1 EAST

Base Map Reference: GIS files provided by Seattle Public Utilities 2008.

Date:	Drawn by:	
6-30-09	AES	10:002330WD1405\fig 5

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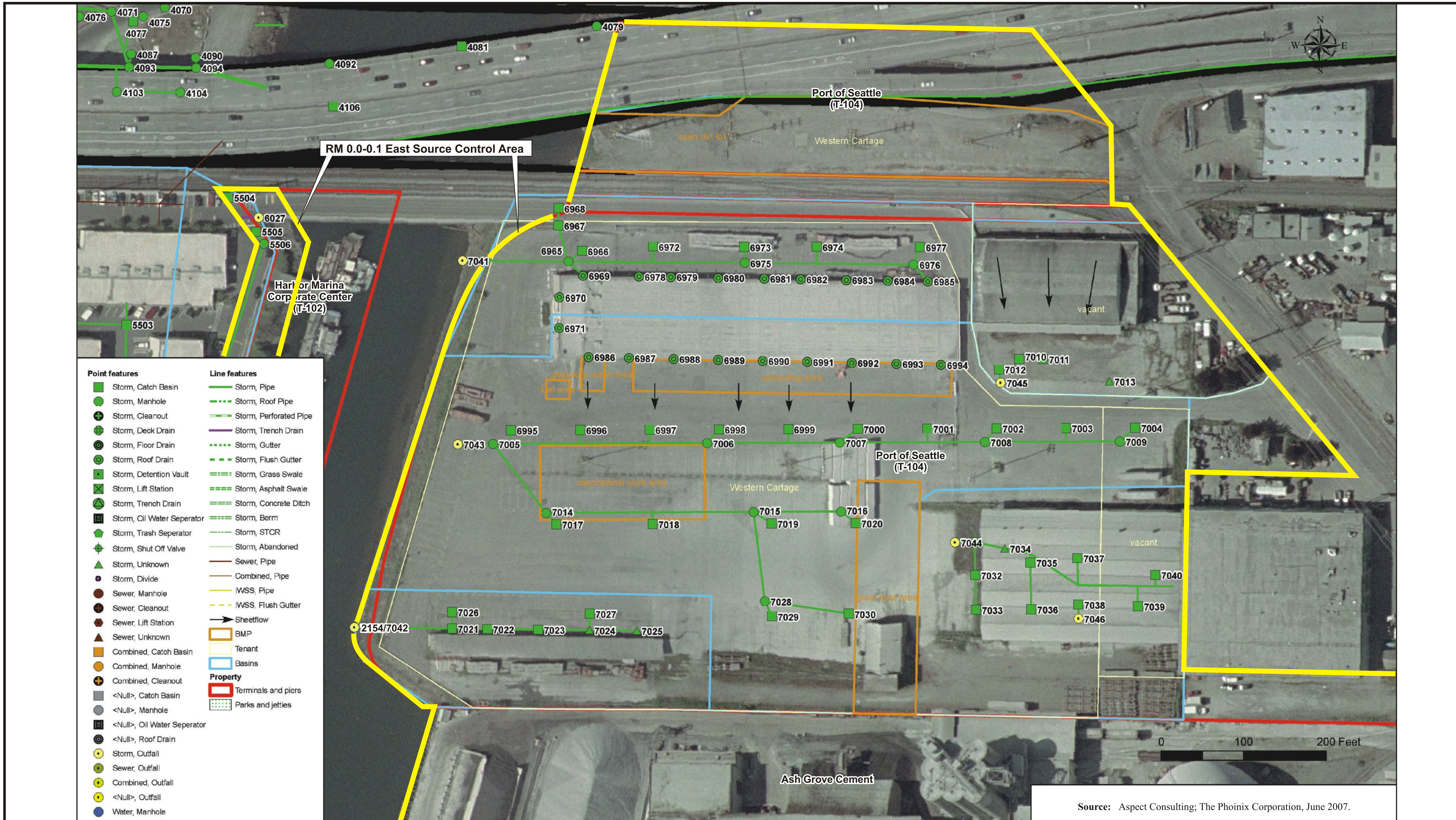
LOWER DUWAMISH WATERWAY
RM 0.0-0.1 EAST
Seattle, Washington

Figure 6
TERMINAL 102 STORMWATER STRUCTURES

Date:	Drawn by:	
6/30/09	AES	10:002330WD1405\fig 6



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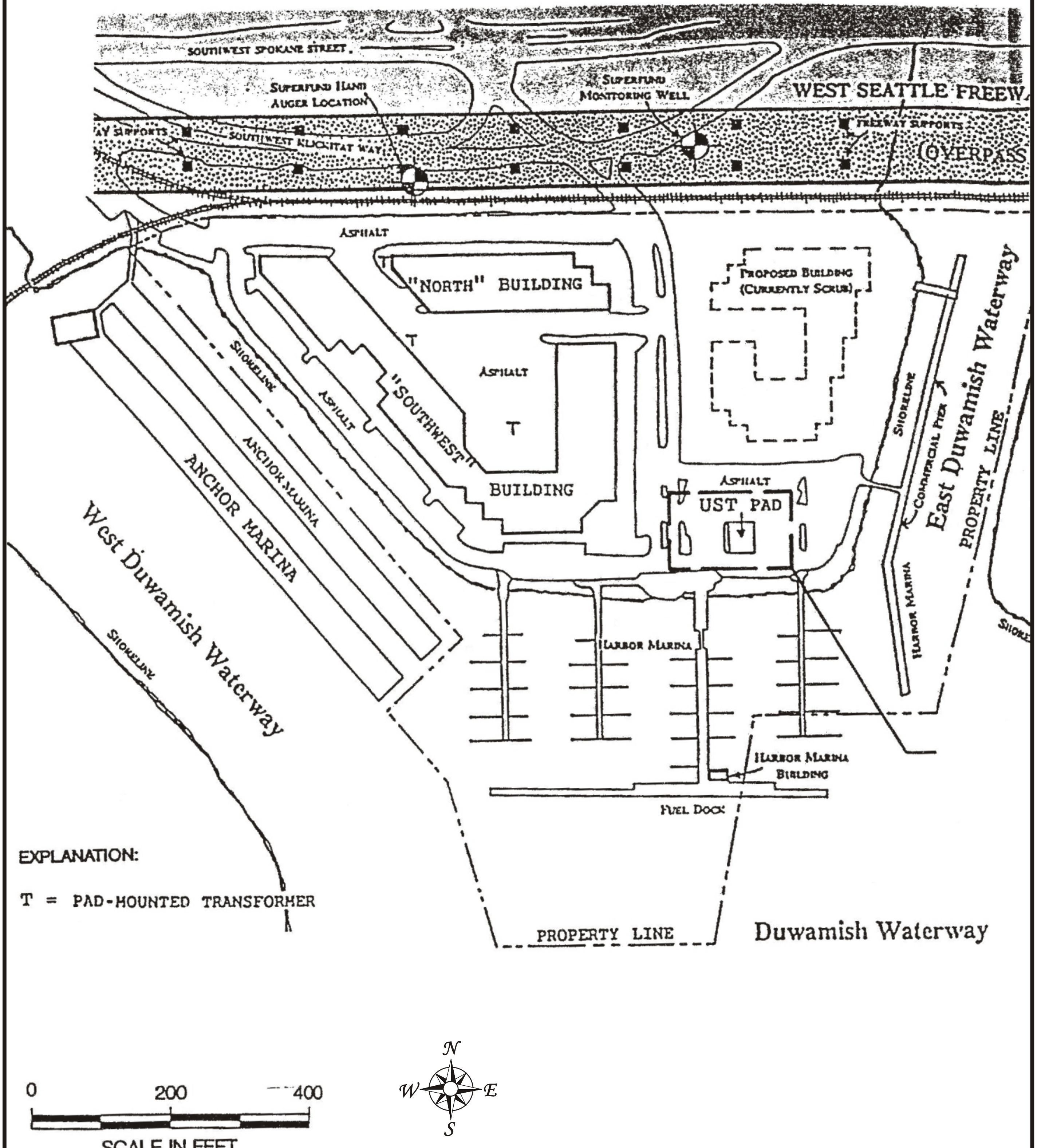
LOWER DUWAMISH WATERWAY
RM 0.0-0.1 EAST
Seattle, Washington

Figure 7
TERMINAL 104 STORMWATER STRUCTURES

Date:	Drawn by:	
6/30/09	AES	10:002330WD1405\fig 7



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Seattle, Washington

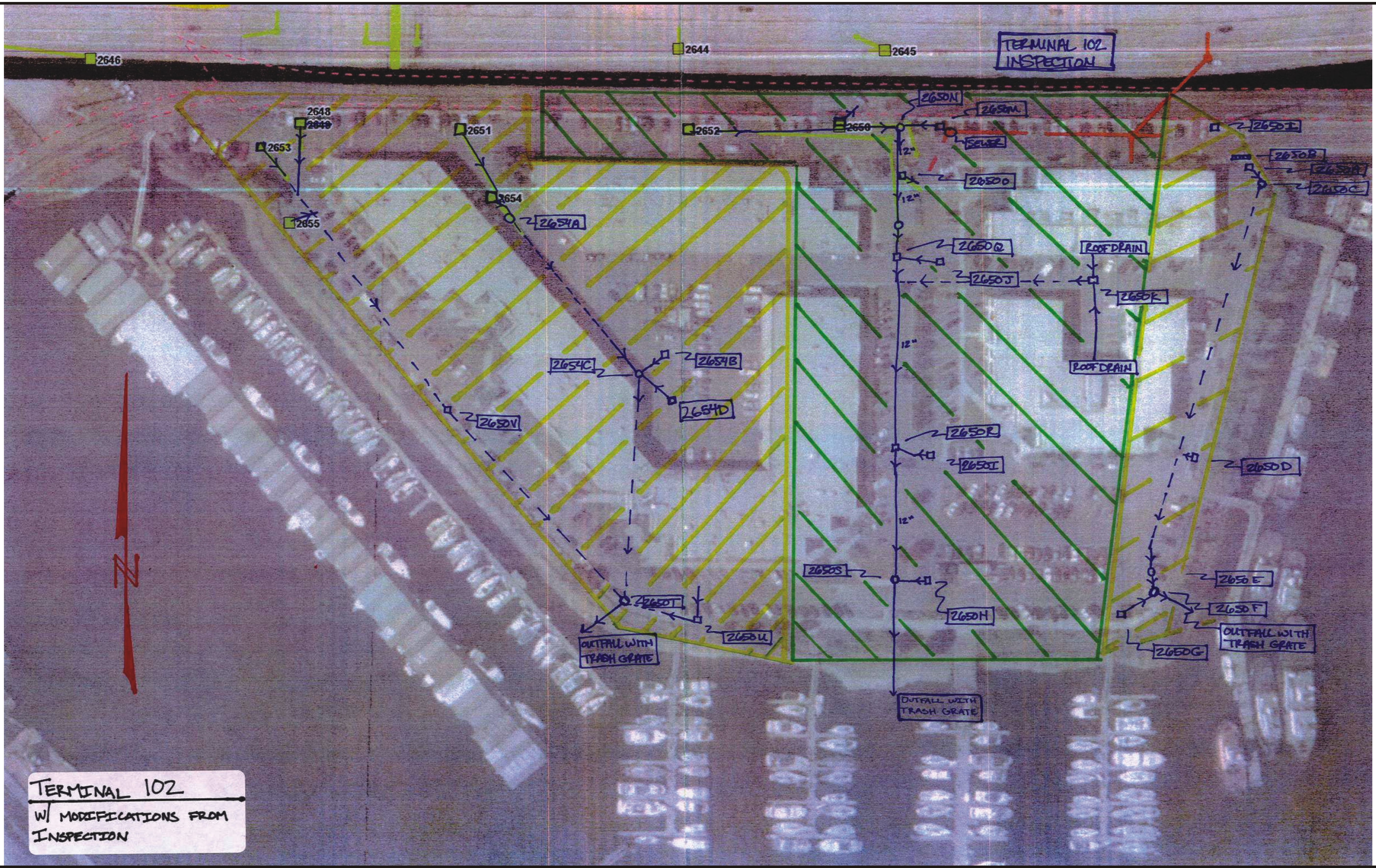
LOWER DUWAMISH WATERWAY
RM 0.0-0.1 EAST
Seattle, Washington

Figure 8

HARBOR MARINA CORPORATE CENTER
HISTORIC UST LOCATION

Base Map Reference: GeoEngineers, 1996.

Date:	Drawn by:	
6-30-09	AES	10:002330WD1405\fig 8



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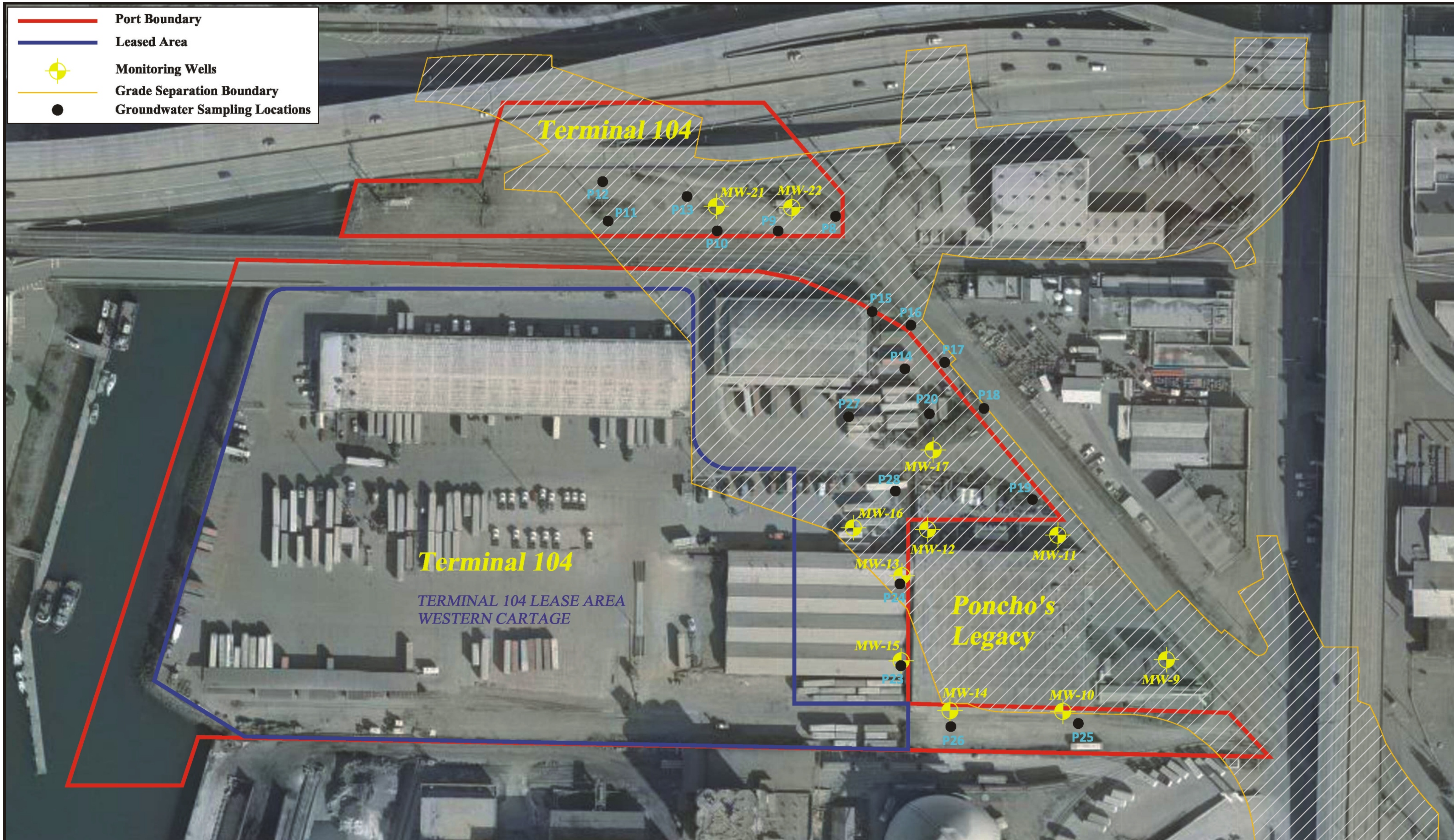
Seattle, Washington

LOWER DUWAMISH WATERWAY
RM 0.0-0.1 EAST
Seattle, Washington

Source: The Phoinix Corporation, 2006.

Figure 9
HARBOR MARINA CORPORATE CENTER
STORMWATER STRUCTURES

Date:	Drawn by:	
6/30/09	AES	10:002330WD1405\fig 9



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Seattle, Washington

N W E S

0 60 120
Approximate Scale in Feet

LOWER DUWAMISH WATERWAY
RM 0.0-0.1 EAST
Seattle, Washington

Source: Port of Seattle, 2007.

Figure 10

TERMINAL 104 CURRENT LEASE LINES

Date:	Drawn by:	
6/30/09	AES	10:002330WD1405\fig 10

ecology and environment, inc.
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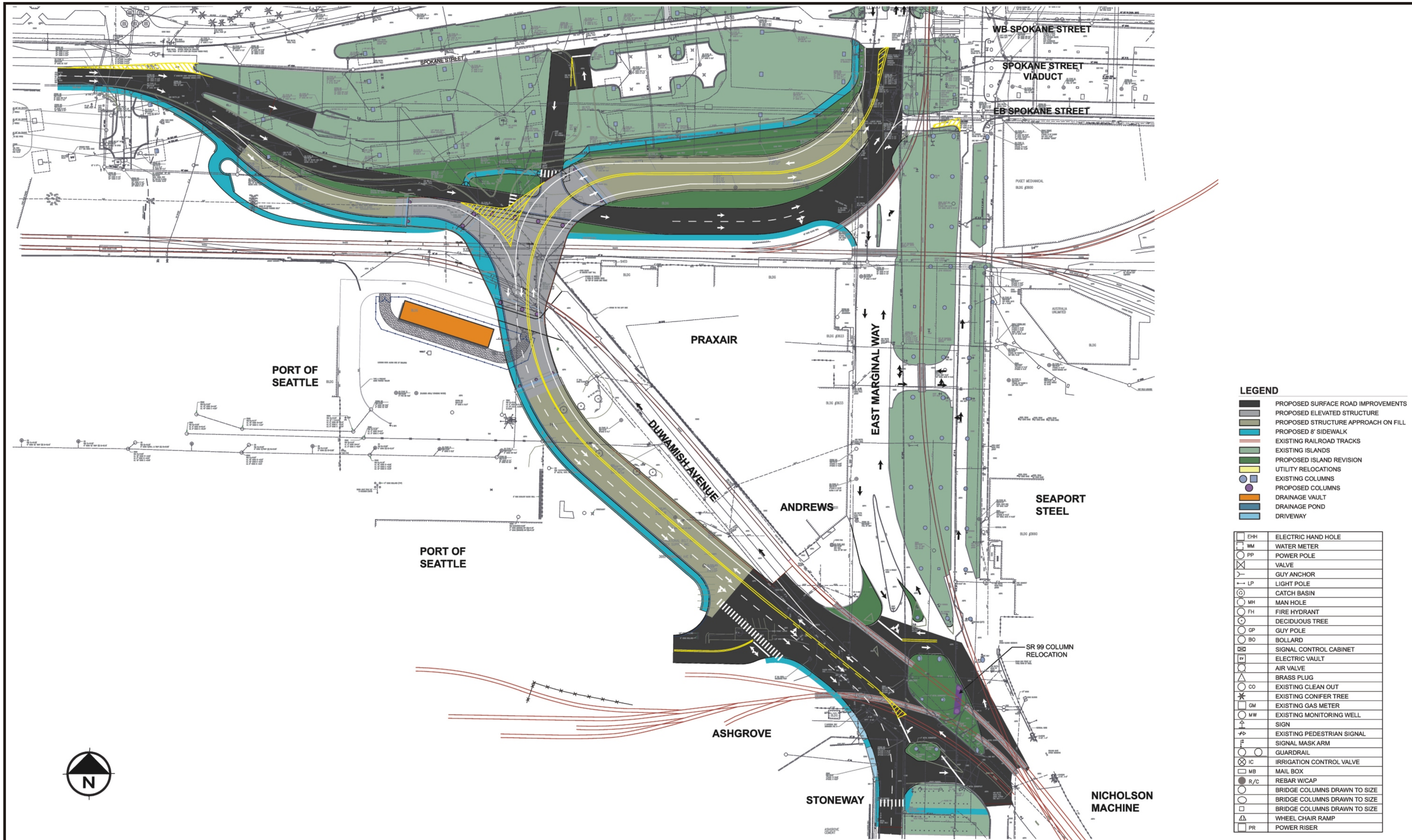
Seattle, Washington

LOWER DUWAMISH WATERWAY
RM 0.0-0.1 EAST
Seattle, Washington

Source: Port of Seattle, 2008.

Figure 11
EAST MARGINAL WAY GRADE SEPARATION PROJECT
CONCEPTUAL IMAGE

Date:	Drawn by:	
6/30/09	AES	10:002330WD1405\fig 11



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LOWER DUWAMISH WATERWAY
RM 0.0-0.1 EAST
Seattle, Washington

Source: Seattle Department of Transportation, 2008.

Figure 12
EAST MARGINAL WAY GRADE SEPARATION PROJECT
GENERAL LAYOUT

Date:	Drawn by:	
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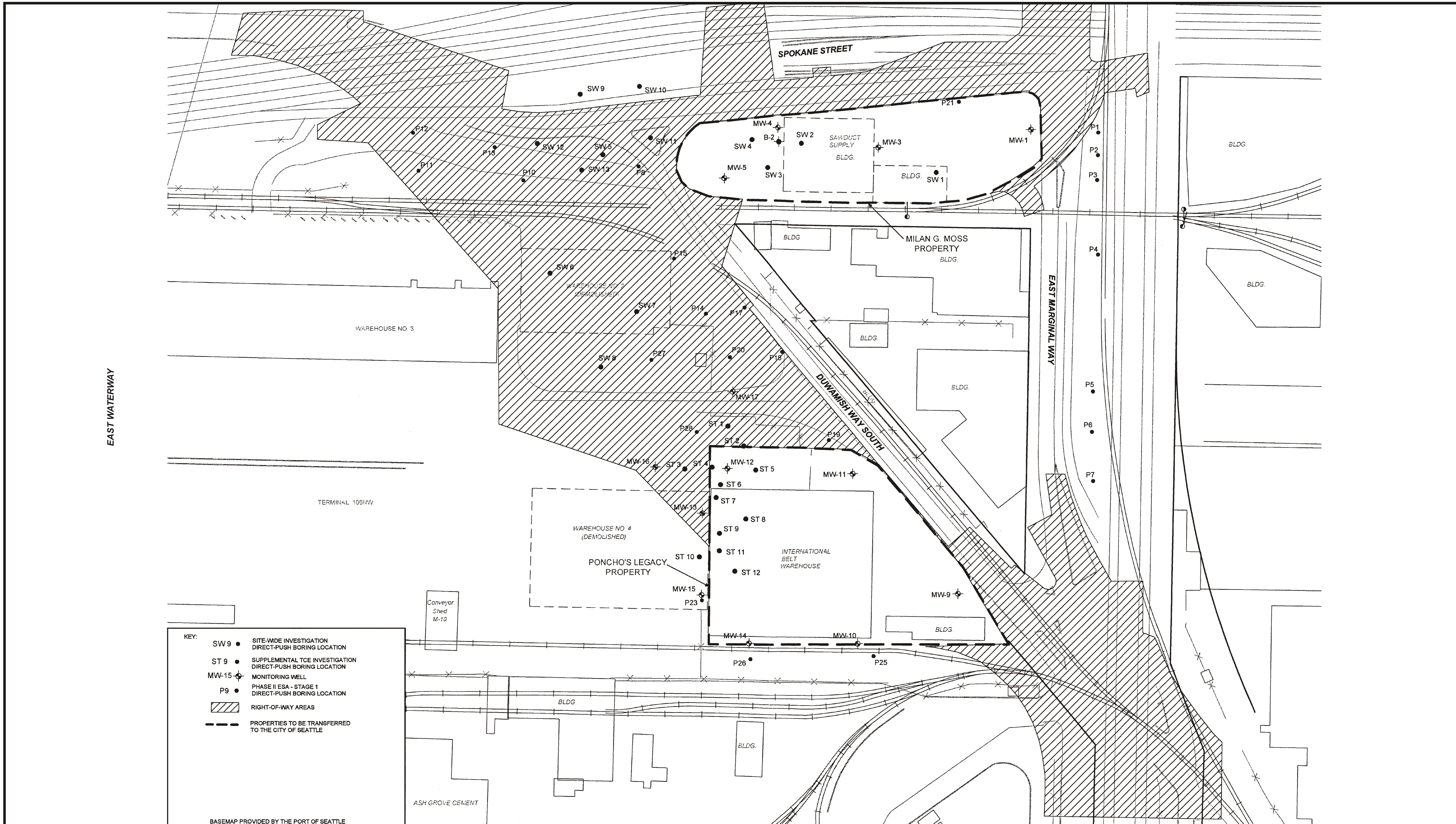

N W E S

0 50 100
Approximate Scale in Feet

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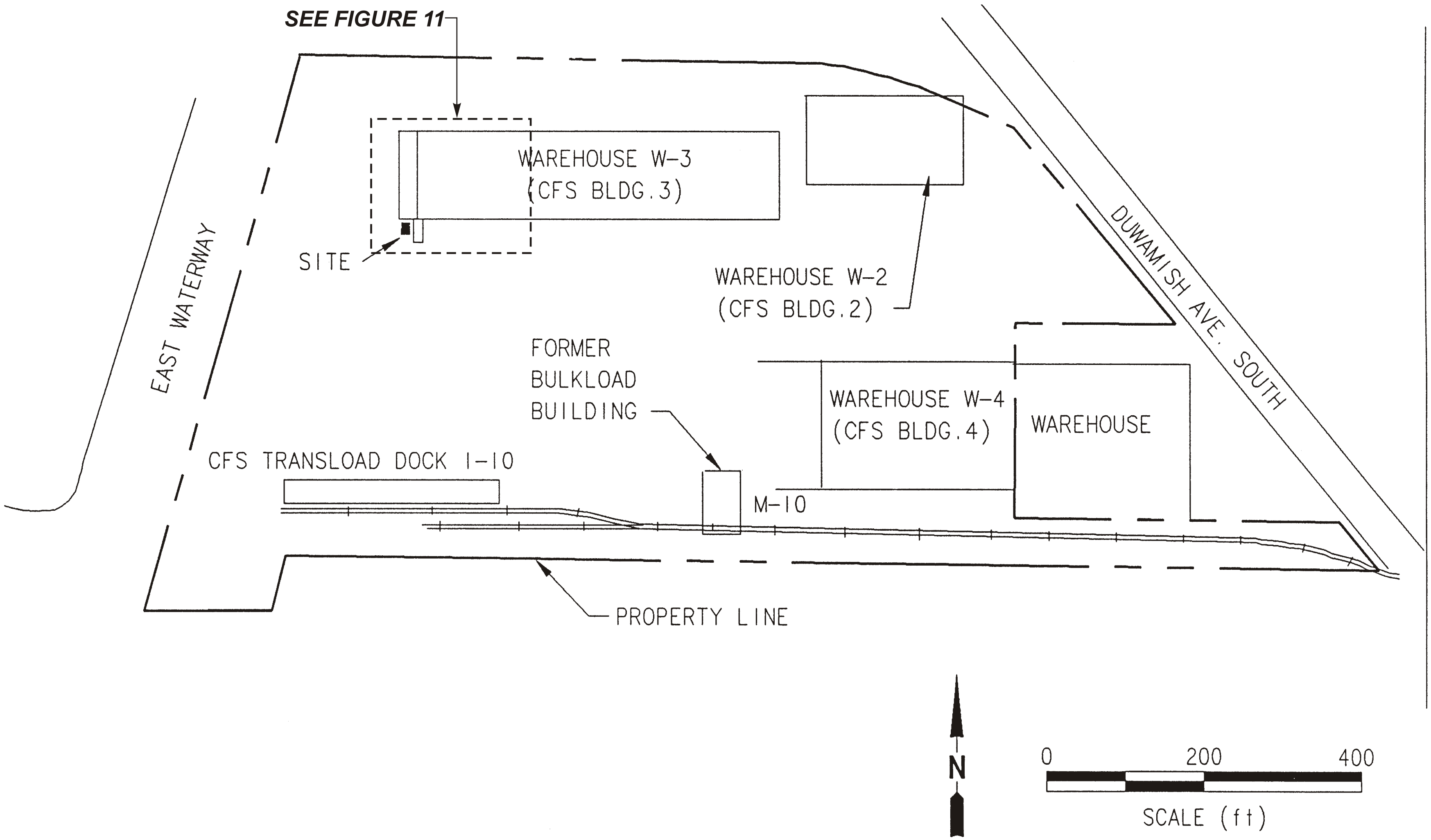
LOWER DUWAMISH WATERWAY
RM 0.0-0.1 EAST
Seattle, Washington

Source: Environmental Partners, Inc., April 2007.

Figure 13
SITE-WIDE T-104 SAMPLING AND MONITORING LOCATIONS

Date:	Drawn by:	
6/30/09	AES	10:002330WD1405\fig 13



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LOWER DUWAMISH WATERWAY
RM 0.0-0.1 EAST
Seattle, Washington

Source: Sweet-Edwards EMCON, December 1991.

Figure 14
HISTORIC T-104 SITE LOCATION MAP (1991)

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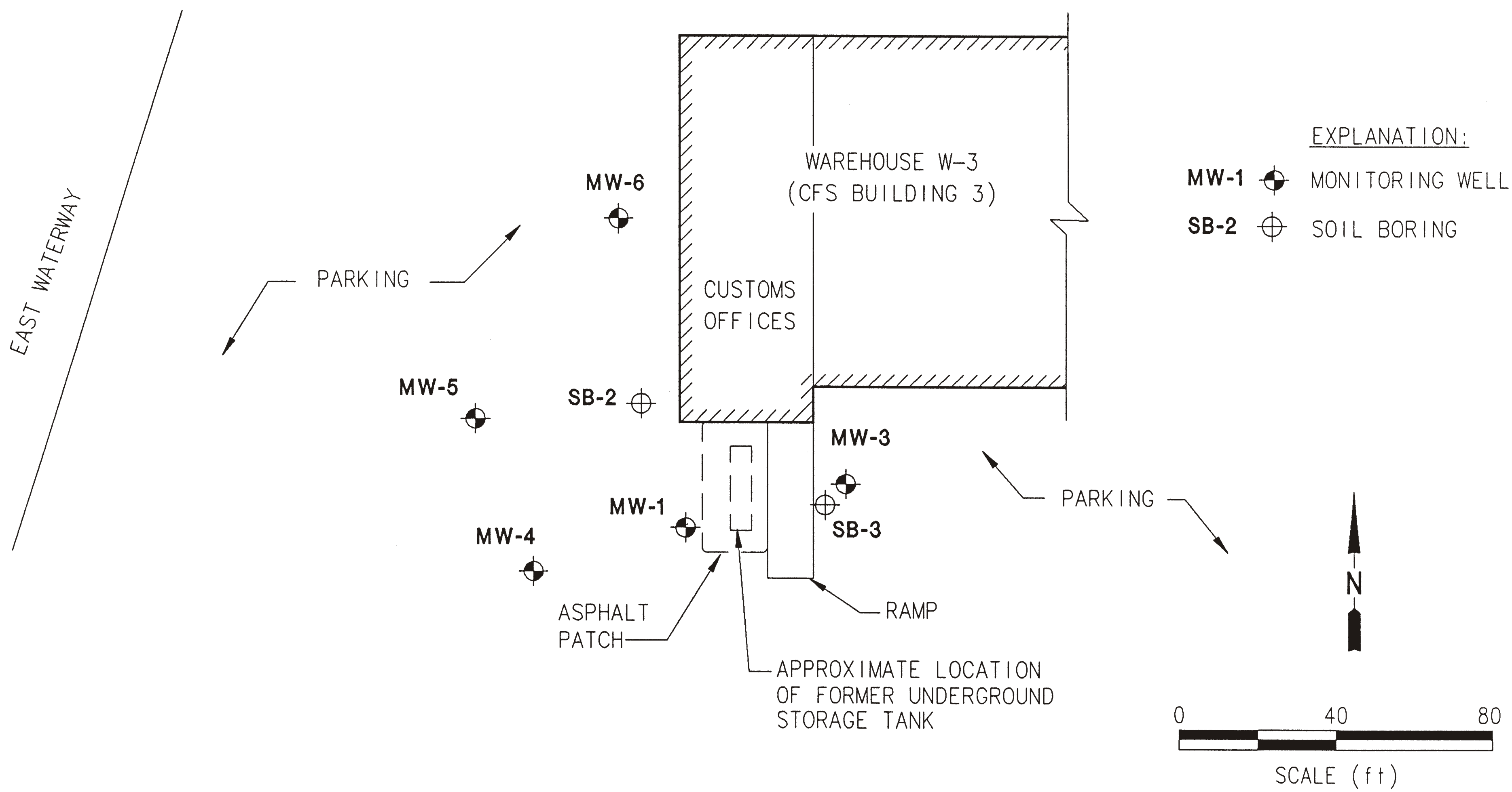
6/30/09	AES	10:002330WD1405\fig 14



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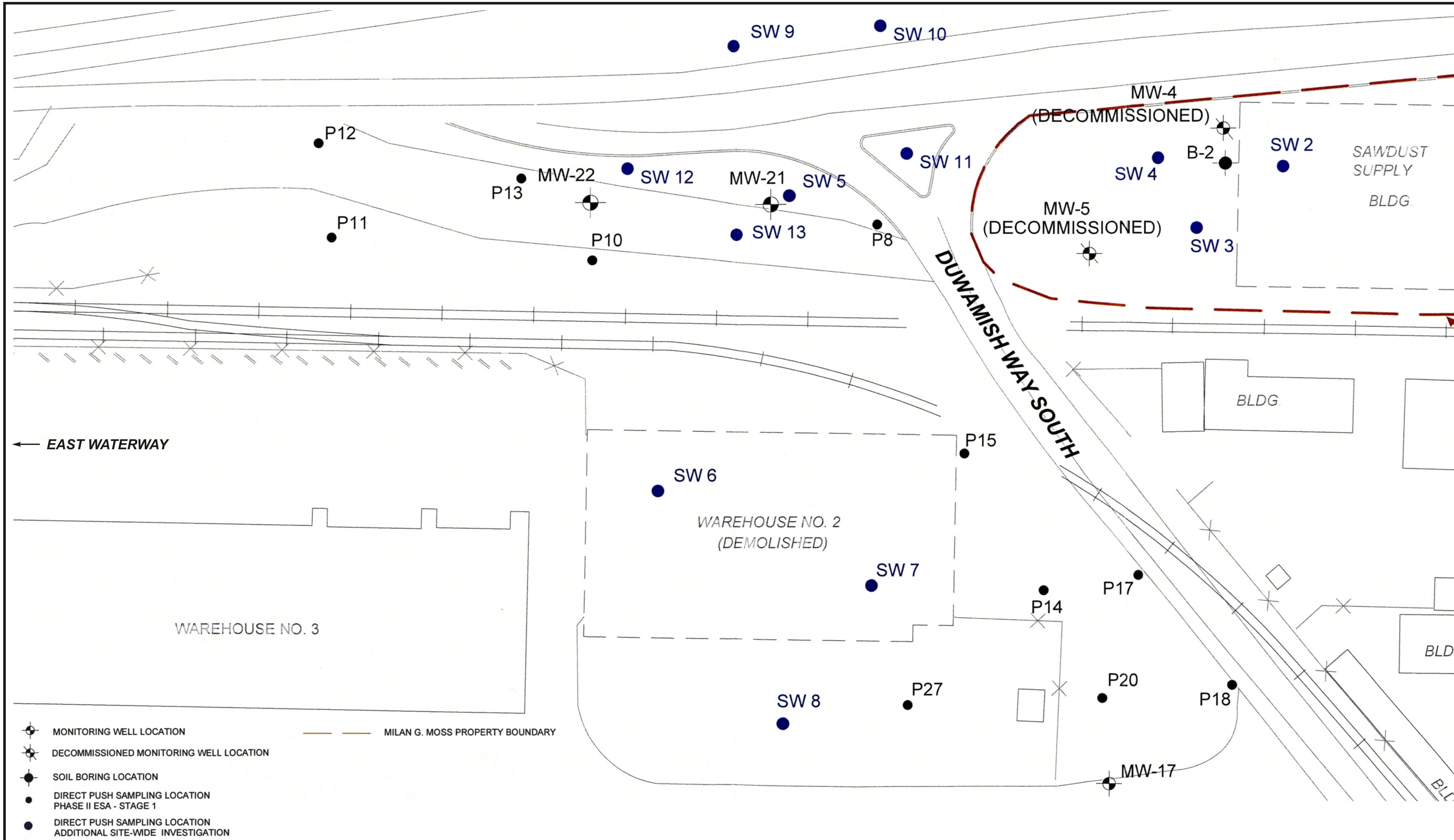
LOWER DUWAMISH WATERWAY
RM 0.0-0.1 EAST
Tukwila, Washington

Source: Sweet-Edwards EMCON, January 1992.

Figure 15
TERMINAL 104 GROUNDWATER
MONITORING WELL LOCATIONS (1992)

Date:	Drawn by:	
6/30/09	AES	10:002330WD1405\fig 15



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N W E S

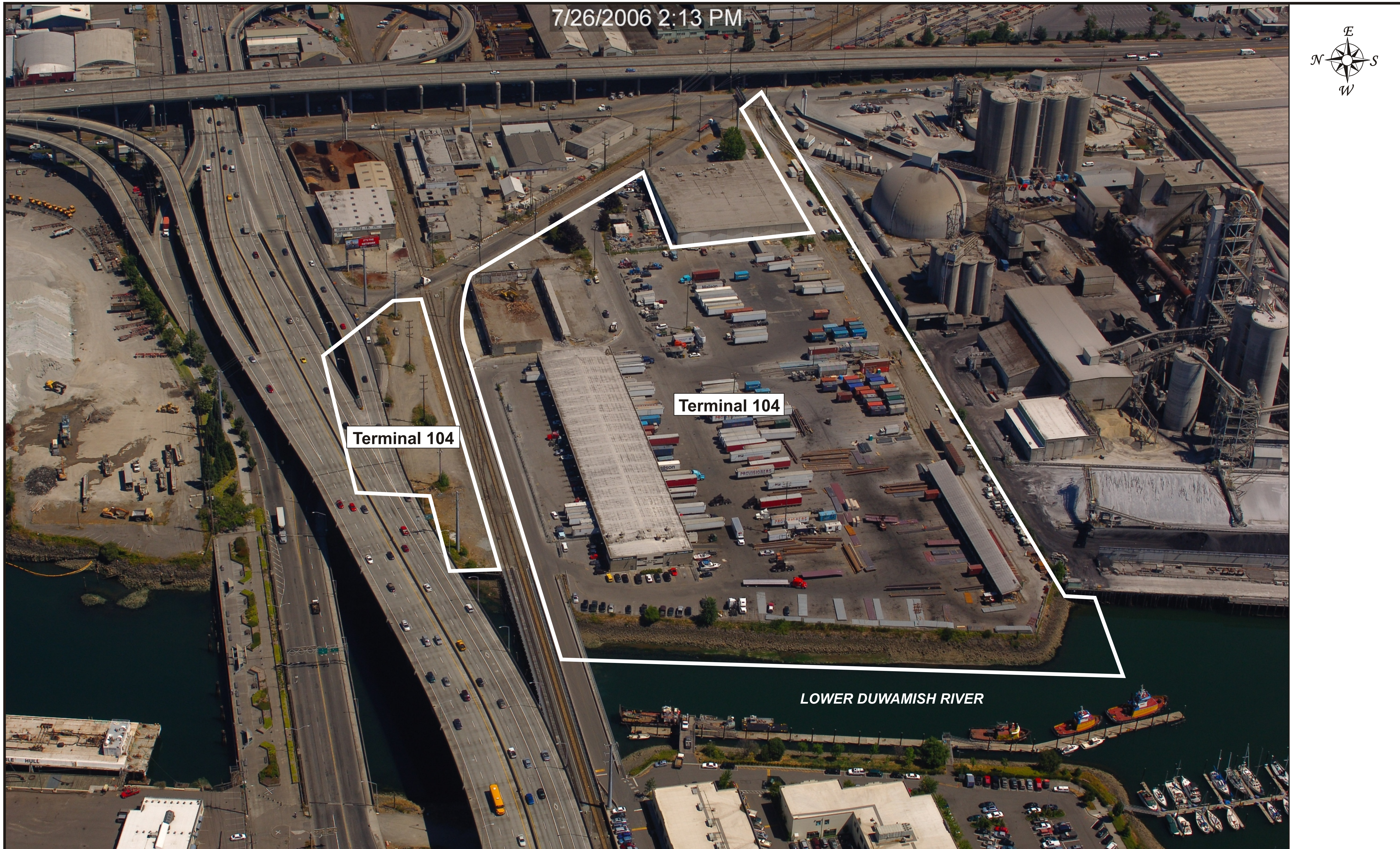
0 25 50
SCALE: 1" = 50'

LOWER DUWAMISH WATERWAY
RM 0.0-0.1 EAST
Seattle, Washington

Source: Environmental Partners, Inc., June 2007.

Figure 16
TERMINAL 104 GROUNDWATER
MONITORING WELL LOCATIONS (2007)

Date:	Drawn by:	
6/30/09	AES	10:002330WD1405\fig 16



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LOWER DUWAMISH WATERWAY
RM 0.0-0.1 EAST
Seattle, Washington

Figure 17

COASTAL ATLAS PHOTO: TERMINAL 104

Base Map Reference: Department of Ecology, 2006.

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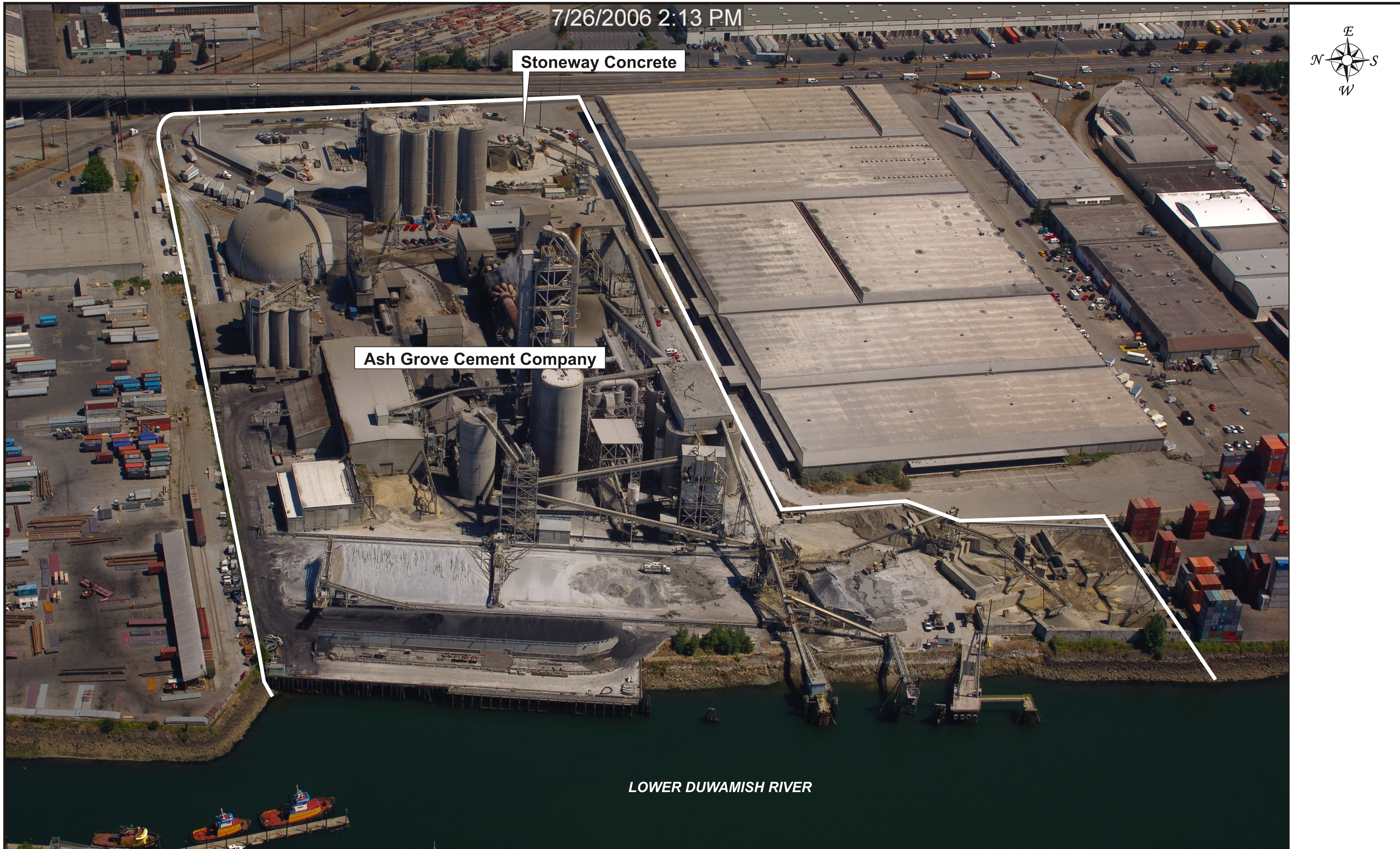

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RM 0.0-0.1 EAST
Seattle, Washington

Base Map Reference: Department of Ecology, 2006.

Figure 18

COASTAL ATLAS PHOTO: ASH GROVE CEMENT COMPANY

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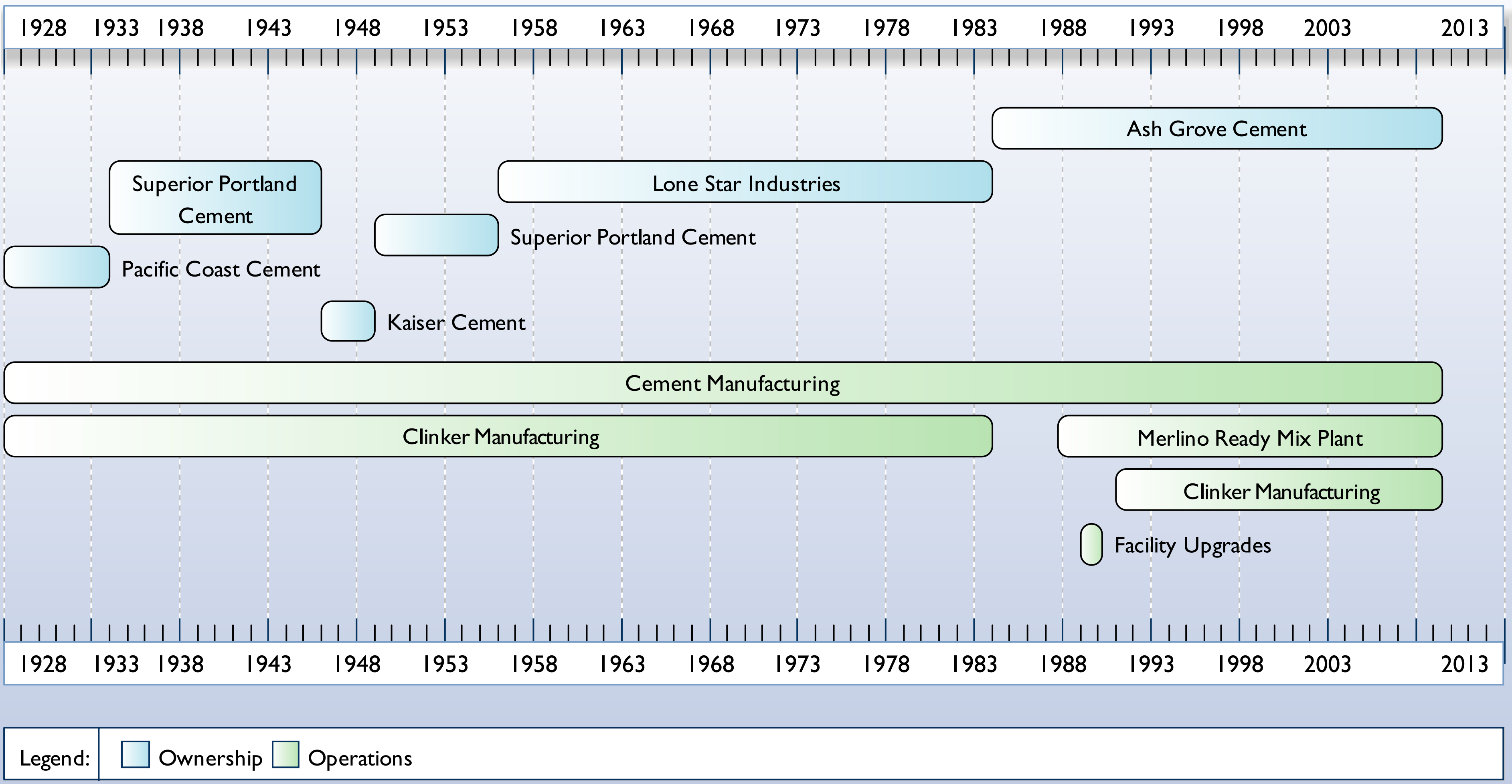
6/30/09	AES	10:002330WD1405\fig 18

Ownership & Operations History



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RM 0.0-0.1 EAST
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Figure 19
OWNERSHIP & OPERATIONS HISTORY

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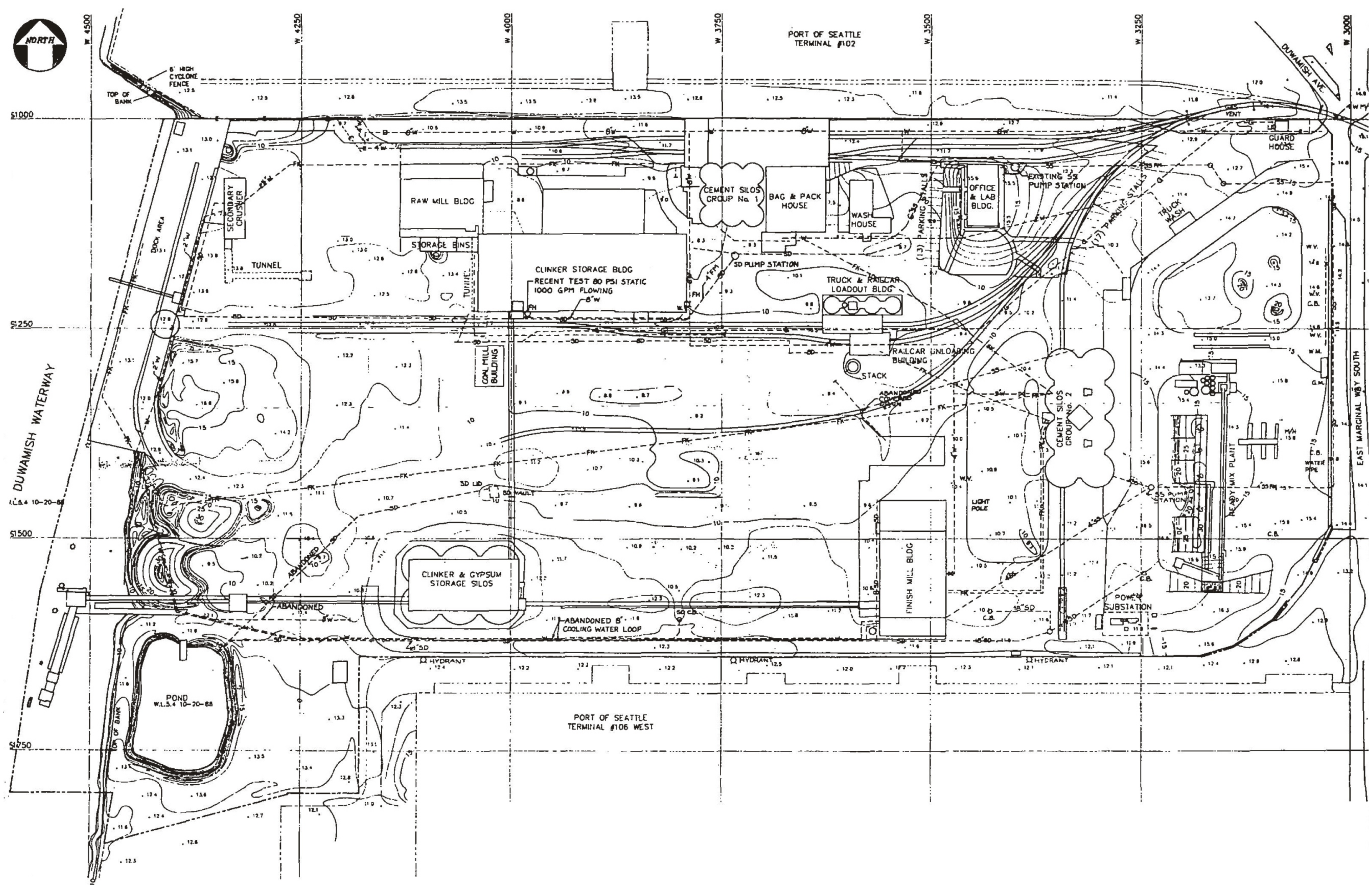

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RM 0.0-0.1 EAST
Seattle, Washington

Source: HNTB, 1992.

Figure 20
ASH GROVE CEMENT SITE LAYOUT
1992

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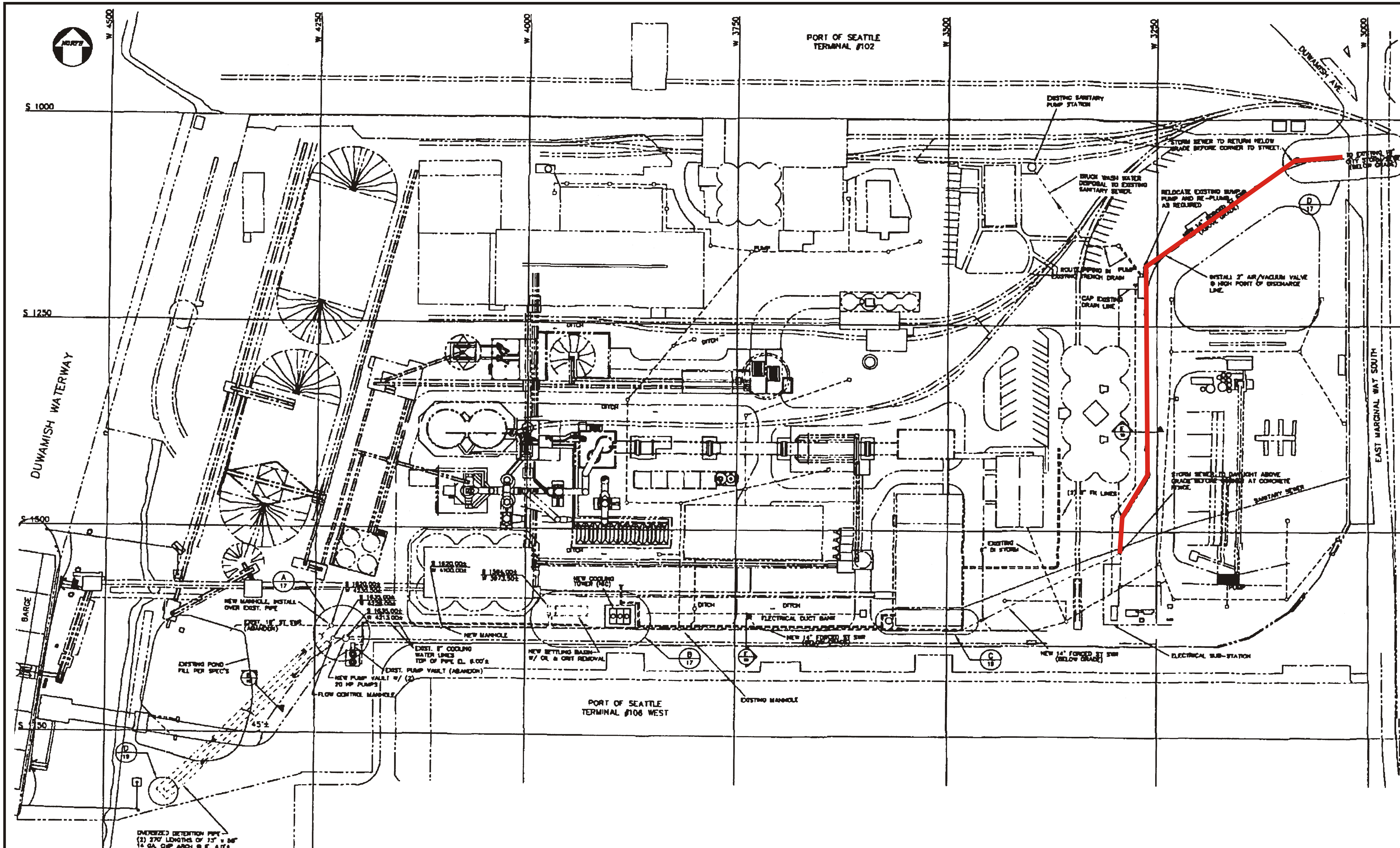

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Seattle, Washington

Source: Smith & Monroe & Gray Engineers Inc., 1990.

Figure 21
ASH GROVE CEMENT SITE DRAINAGE PLAN

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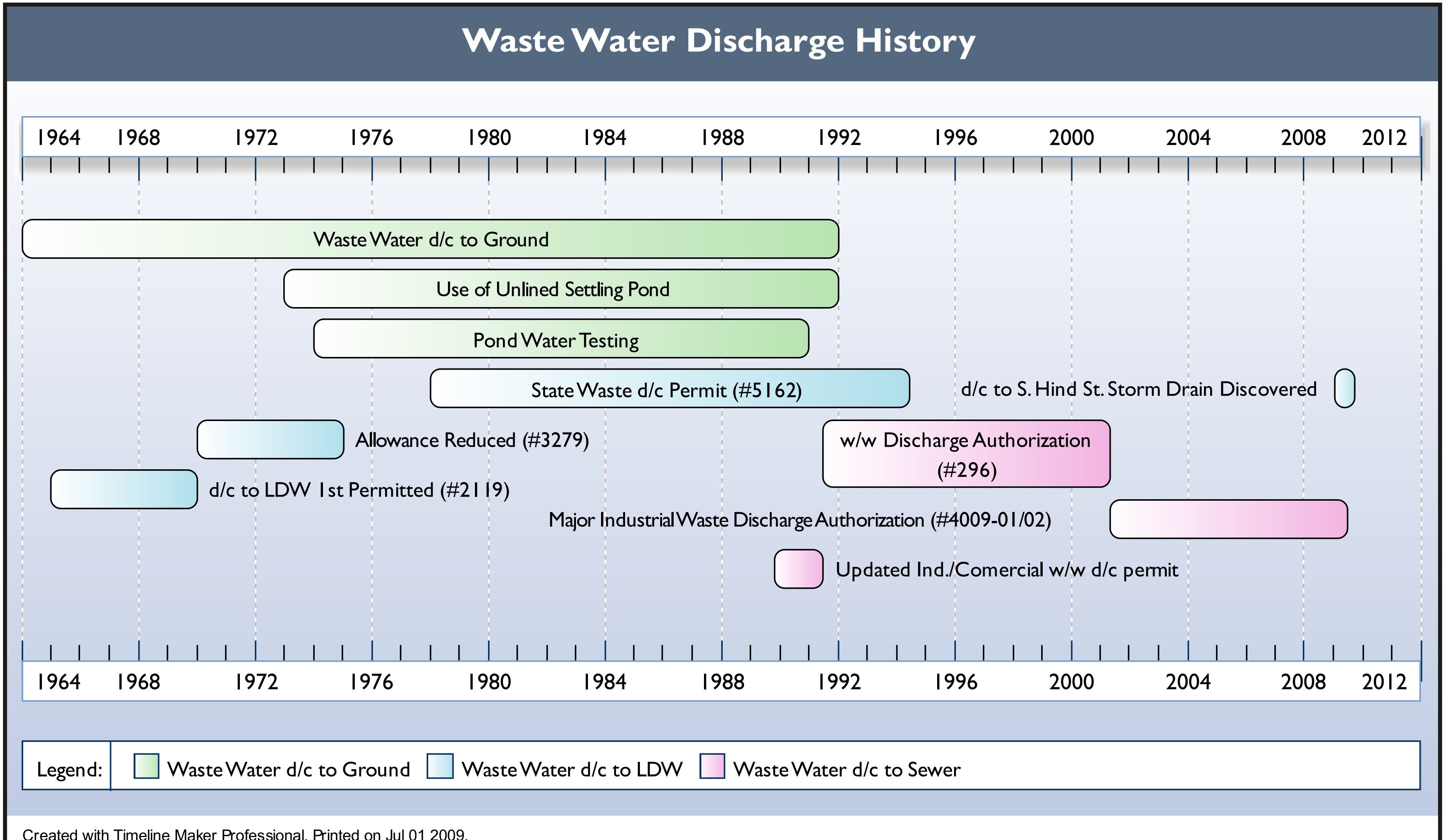

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RM 0.0-0.1 EAST
Seattle, Washington

Figure 22
WASTE WATER DISCHARGE HISTORY

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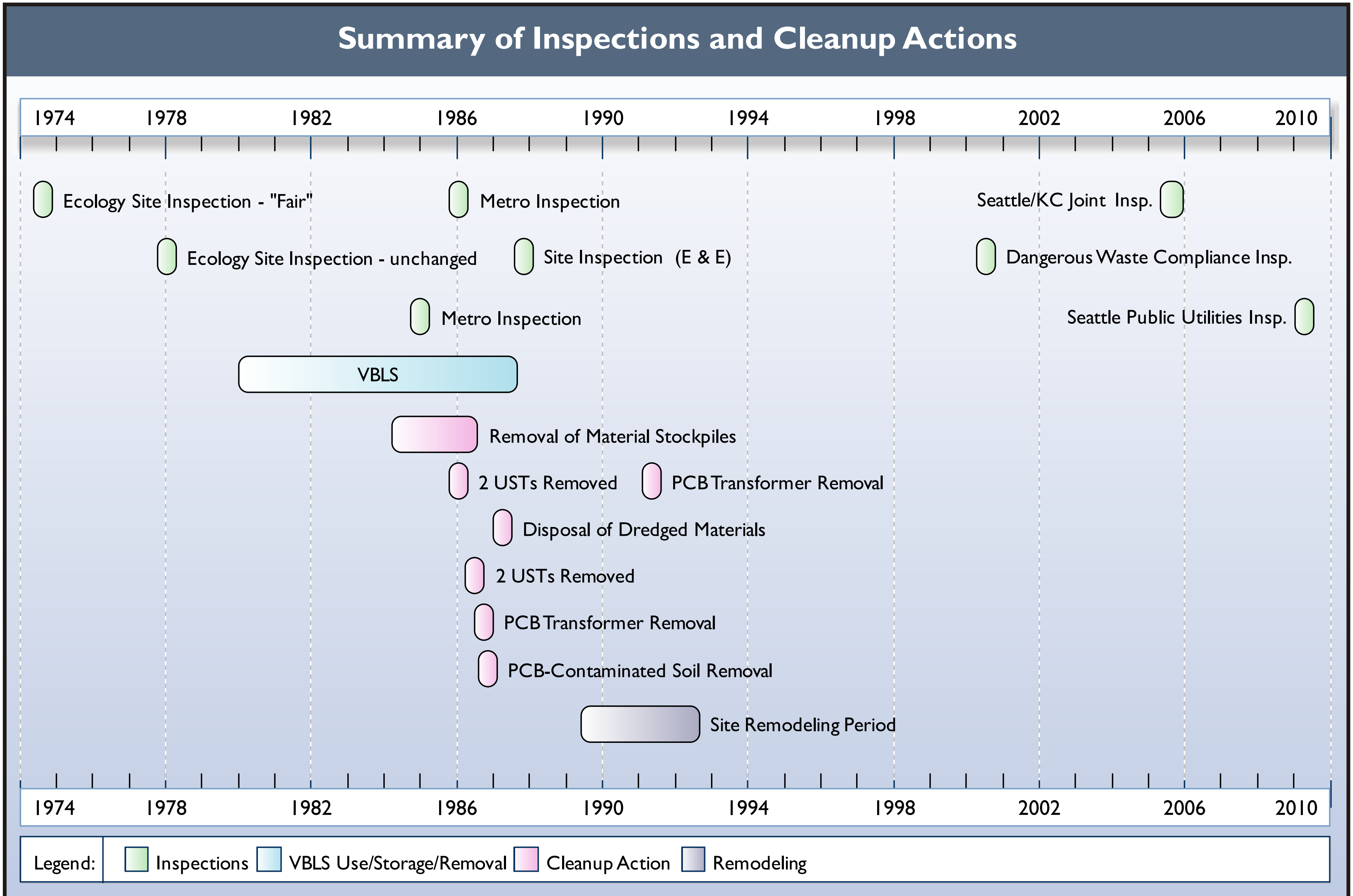
6/30/09	AES	10:002330WD1405\fig 22



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ecology and environment, inc. International Specialists in the Environment Seattle, Washington	LOWER DUWAMISH WATERWAY RM 0.0-0.1 EAST Seattle, Washington	Figure 23 SUMMARY OF INSPECTIONS AND CLEANUP ACTIONS Date: 6/30/09 — Drawn by: AES — 10:002330WD1405\fig 23