Lower Duwamish Waterway Source Control Action Plan for Early Action Area 2

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Produced by

Sarah Good
Toxics Cleanup Program
Northwest Regional Office
Washington State Department of Ecology
Bellevue, Washington

and

Science Applications International Corporation
18912 North Creek Parkway, Suite 101
Bothell, WA 98011

With Assistance from:

City of Seattle
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Executive Summary

The Lower Duwamish Waterway, located in Seattle, Washington, was added to the National Priorities List (Superfund) by the U.S. Environmental Protection Agency (EPA) on September 13, 2001. Contaminants of concern (COCs) found in waterway sediments include polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), mercury and other metals, and phthalates. These COCs may pose threats to people, fish, and wildlife.

In December 2000, EPA and the Washington State Department of Ecology (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 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 ("early action areas"). Early Action Area 2 (EAA-2) is one of seven EAAs identified by EPA and Ecology. A summary of information pertinent to sediment recontamination at EAA-2 is presented in *Summary of Existing Information and Identification of Data Gaps* (SAIC 2007a), which serves as the basis for the source control actions described in this Source Control Action Plan (Action Plan).

Sections 1 and 2 of this Action Plan provide background information about the Lower Duwamish Waterway site and EAA-2. PCBs, bis(2-ethylhexyl) phthalate (BEHP), mercury, lead, zinc, DDT, and dieldrin are considered the major COCs in EAA-2 sediments. While this Action Plan focuses on these COCs, other chemicals that could result in sediment recontamination will be addressed as sources are identified.

Section 3 describes potential sources of contamination that may affect sediments in EAA-2, including piped outfalls, spills to the waterway, adjacent properties, and upland properties; evaluates the significance of those potential sources; and identifies the actions that are planned or underway to control these potential sources. Section 4 discusses monitoring activities that will be conducted to identify additional sources and assess progress. Section 5 describes how source control efforts will be tracked and reported.

Table ES-1 lists the source control actions that have been identified for EAA-2. This table includes a brief description of the potential contaminant sources for each property, source control activities to be conducted, parties involved in source control actions for each property or task, and milestone/target dates for completion of the identified action items. 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.

A removal action at EAA-2 was not scheduled at the time this Action Plan was prepared.

Table ES-1. EAA-2 Source Control Actions

Potential Sources	Action Items	Milestones and Parties Involved
Industrial Container Services / Trotsky Property		
Potential historic source: Data indicate that spills and releases of pollutants may have occurred during the 60+ years of barrel reconditioning operations at this site. Contaminants were present in soil and groundwater during the most recent sampling conducted in 1991. The presence of seeps along the banks of the EAA-2 inlet indicates that groundwater transport of contaminants to the inlet may be occurring.	Conduct additional site characterization to evaluate current concentrations of COCs in groundwater, bank and intertidal sediments, and seeps.	Ecology – August 2007 (In Progress)
	Identify additional data gaps based on sampling results, and determine means to fill them.	Ecology – 2007
	Conduct cleanup as needed to eliminate sources of contaminants to EAA-2.	Industrial Container Services/Trotsky – 2008
	Issue Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) 104(e) letter to facility/site/property owners to obtain additional information on historic sources of contamination.	EPA – October 2006 (Done)
	Review responses to CERCLA 104(e) letter.	EPA, Ecology - 2007
Potential ongoing source: Facility is authorized by King County to discharge stormwater to the combined sewer system. Stormwater is pretreated prior to discharge. Roof drains in the northwest corner of the property may drain to a pipe along First Avenue S.; it is not clear where this pipe discharges. A multimedia inspection was conducted in 2003; no significant concerns were identified. The facility is regulated by the Puget Sound Clean Air Agency (PSCAA) under Permit No. 11683.	Conduct periodic inspections to verify that facility complies with applicable regulations and best management practices (BMPs).	King County Industrial Waste (KCIW) – Ongoing
	Investigate destination of roof drainage from northwest corner of property.	King County, Ecology, Seattle Public Utilities (SPU), Industrial Container Services – 2007
	Evaluate the need for stormwater characterization (solids and whole water) from this facility if overflow occurs during heavy rainfall events.	Ecology-Water Quality (WQ), KCIW, SPU - 2007
	Conduct periodic air permit inspections to ensure compliance with permit conditions and BMPs.	PSCAA – Ongoing/As Needed
Alaska Marine Lines Dock 2 / Douglas Management Company		
Potential historic source: Past activities at the site include a sand and gravel batch plant, bus parking and maintenance, barge mooring, equipment storage, and marine cargo handling. Remediation was performed in the early 1990s for a leaking petroleum underground storage tank (LUST). The presence of contaminants in soil and groundwater beneath the site cannot be ruled out. The occurrence of seeps along the banks of the EAA-2 inlet indicates that groundwater transport of contaminants (if present) to the inlet may be occurring.	If granted access, conduct groundwater sampling along the southern portion of the property (adjacent to the EAA-2 inlet) to evaluate the potential for groundwater transport of contaminants from this site. Collect bank and seep samples as needed.	Ecology – Fall 2007 (In Progress)
	Identify additional data gaps based on sampling results, and determine means to fill them.	Ecology – 2007
	Conduct cleanup as needed to eliminate sources of contaminants to EAA-2.	Alaska Marine Lines/Douglas Management Company – 2008
	Issue CERCLA 104(e) letter to facility/site/property owners to obtain additional information on historic sources of contamination.	EPA – October 2006 (Done)
	Review responses to CERCLA 104(e) letter.	EPA, Ecology - 2007

Table ES-1. EAA-2 Source Control Actions (Continued)

Potential Sources	Action Items	Milestones and Parties Involved
Potential ongoing source: According to Alaska Marine Lines' Stormwater Pollution Prevention Plan (SWPPP) for this site, stormwater runoff flows from the site into a storm drain and directly to the Lower Duwamish Waterway through an outfall located along the northeastern side of the site. It is not clear whether stormwater on the southern portion of the site (near the EAA-2 inlet) drains to the EAA-2 inlet or to the storm drain.	Continue periodic inspections as needed to verify that site operations do not result in the release of contaminants to EAA-2. Verify storm drainage pathway on the southern portion of the site.	Ecology, SPU – Ongoing/As Needed
	If stormwater discharge to EAA-2 is confirmed, assess the need for stormwater characterization (solids and whole water). Collect stormwater samples as needed.	Ecology-WQ, SPU, Alaska Marine Lines/Douglas Management Company – 2007
Second Avenue S. Storm Drainage		
Potential ongoing source: A variety of industrial facilities discharge stormwater to the Second Avenue S. storm drain, which consists of ditches, culverts, and pipes. Contaminants in stormwater from upland facilities may be transported to EAA-2 via this storm drain. Inline sediment samples indicated the presence of arsenic, zinc, phthalates, PAHs, and other contaminants.	Collect storm drain outfall pipe sediment and water samples to evaluate whether contaminants are currently being transported to the EAA-2 inlet via this pathway.	Ecology – August 2007 (In Progress)
	Collect additional inline sediment samples to evaluate the levels of COCs with respect to sediment recontamination in this drainage.	SPU – 2007/2008
	If COCs are present in the storm drain line, conduct source tracing to identify sources of contaminants.	SPU – 2008
	Review and update National Pollutant Discharge Elimination System (NPDES) permits as needed.	Ecology-WQ – Ongoing
	Conduct source control inspections of upland sites as needed (see below)	SPU, Ecology
Boyer Towing / Boyer Alaska Barge Lines / Boyer Logistics		
Potential ongoing source: Boyer Towing owns or leases a large portion of the EAA-2 upland area. Little is known about historic or current operations at these parcels. EPA has recently issued CERCLA 104(e) letters to the property owners. Additional information is needed to assess whether activities at these parcels may pose a potential risk of sediment recontamination at EAA-2.	Issue CERCLA 104(e) letter to facility/site/property owners to obtain additional information on historic sources of contamination.	EPA – October 2006 (Done)
	Review responses to CERCLA 104(e) letter.	EPA, Ecology – 2007
	Continue source control inspections to verify that facility complies with applicable regulations and BMPs; verify storm drainage pathway on the southern portion of the site.	SPU – 2007
	If stormwater discharge to EAA-2 is confirmed, assess the need for stormwater characterization (solids and whole water) and conduct review of facility's SWPPP. Collect stormwater samples as needed.	Ecology-WQ, SPU, Boyer Towing – 2007
	Continue periodic inspections as needed to verify that site operations do not result in the release of contaminants to EAA-2.	Ecology, SPU – Ongoing/As needed

Table ES-1. EAA-2 Source Control Actions (Continued)

Potential Sources	Action Items	Milestones and Parties Involved
Other Upland Properties		
Potential ongoing sources: Several upland properties may contain COCs and are potential sources of sediment recontamination via the stormwater drainage system. These include: Pacific American Commercial (PACO), PCT Construction, WHECO, Cunningham Manufacturing, United Iron Works, Ferguson Construction, and Automatic Transmission Parts/ATC Distribution. Spills at adjacent and upland properties may result in transport of contaminants to EAA-2.	Conduct inspections/re-inspections to promote pollution prevention practices and conduct source control, as needed.	Ecology, SPU – 2007/2008
	Review facility SWPPPs as needed to ensure control of potential contaminant releases to EAA-2 sediments.	Ecology, SPU – 2007
	Monitor upland spills; depending on the nature of the spill, track origin of the spill and cleanup activities to identify any post-spill source control that may be needed.	Ecology, SPU, EPA – Ongoing/as needed
Atmospheric Deposition		
Localized or widely dispersed air pollutants may be deposited within the EAA-2 drainage basin and contribute to contaminant concentrations in stormwater that discharges to the EAA-2 inlet.	Evaluate atmospheric deposition to assess whether this pathway is a potential source of phthalates and other contaminants, such as PCBs, in stormwater runoff at EAA-2.	Not Scheduled

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Beth Schmoyer, PE, Seattle Public Utilities

Kristine A. Flint, Environmental Scientist & Remedial Project Manager for Sediment Source Control, Region 10, U.S. EPA Environmental Cleanup Office

Brad Helland, Project Manager, Washington State Department of Ecology, Toxics Cleanup Program

Dan Cargill, Source Control Project Manager, Washington State Department of Ecology, Toxics Cleanup Program

Mark Edens, Hydrogeologist, Washington State Department of Ecology, Toxics Cleanup Program

Richard Thomas, Source Control Specialist, Washington State Department of Ecology, Toxics Cleanup Program

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Acronyms/Abbreviations

ATSDR	Agency for Toxic Substances and Disease Registry
BEHP	bis(2-ethylhexyl)phthalate
bgs	below ground surface
BMP	best management practice
BTEX	benzene, ethylbenzene, toluene, and xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
CSL	Cleanup Screening Level
CSO	combined sewer overflow
DMC	Douglas Management Company
DW	dry weight
EAA-2	Early Action Area 2
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
FS	Feasibility Study
KCIW	King County Industrial Waste
LDWG	Lower Duwamish Waterway Group
LUST	leaking underground storage tank
MTCA	Washington State Model Toxics Control Act
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OC	organic carbon
PACO	Pacific American Commercial
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PSCAA	Puget Sound Clean Air Agency
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
SAIC	Science Applications International Corporation
SCWG	Source Control Work Group
SD	storm drain
SMS	Sediment Management Standards
SPU	Seattle Public Utilities
SQS	Sediment Quality Standards
SVOC	semivolatile organic compound
SWPPP	Stormwater Pollution Prevention Plan
TOC	total organic carbon
TPH	total petroleum hydrocarbons
UST	underground storage tank
VOC	volatile organic compound
WQ	Water Quality
WSDOT	Washington State Department of Transportation

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1.0 Introduction

This Source Control Action Plan (Action Plan) describes potential sources of contamination that may affect sediments in and adjacent to Early Action Area 2 (EAA-2).[1] The purpose of this plan is to evaluate the significance of these sources and to determine if actions are needed to minimize the potential for recontamination of EAA-2 sediments after cleanup. In addition, this Action Plan 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
- How these source control efforts will be tracked and reported.

The information in this document was obtained from a variety of sources, including the following documents:

- *Lower Duwamish Waterway, Early Action Area 2, Summary of Existing Information and Identification of Data Gaps*, Science Applications International Corporation (SAIC), February 2007, located on Ecology's website: http://www.ecy.wa.gov/programs/tcp/sites/lower_duwamish/sites/early_action_area_2/early_action_area2.htm
- *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
- Seattle Public Utilities (SPU) Business Inspections Forms, September 2002 through April 2003

1.1 Organization of Document

Section 1 of this Action Plan describes the Lower Duwamish Waterway site, the strategy for source control, and the responsibilities of the public agencies involved in source control for the Lower Duwamish Waterway. Section 2 provides background information on EAA-2, including a description of the contaminants of concern (COCs) for sediments. Section 3 provides an overview of potential sources of contaminants that may affect EAA-2 sediments, including piped outfalls, spills, properties adjacent to EAA-2, and upland properties. 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 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 Action Plan by appending Technical Memoranda to the original Action Plan.

[1] This Action Plan incorporates data published through May 1, 2007. Section 6, Tracking and Reporting of Source Control Activities, describes how newer data will be disseminated.

1.2 Lower Duwamish Waterway Site

The Lower Duwamish Waterway 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 Lower Duwamish Waterway 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 industry, the river is 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 to the river. Some of the largest restoration projects are at Herring House Park/Terminal 107, Turning Basin 3, Hamm Creek, and Terminal 105.

The presence of chemical contamination in the Lower Duwamish Waterway has been recognized since the 1970s (Windward 2003a). In 1988, the United States Environmental Protection Agency (EPA) investigated sediments in the Lower Duwamish Waterway as part of the Elliott Bay Action Program. Problem chemicals 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 of the waterway, from the southern tip of Harbor Island to just south of the turning basin near the Norfolk combined sewer overflow (Weston 1999). This study confirmed the presence of PCBs, PAHs, phthalates, mercury, and other metals. These contaminants may pose threats to people, fish, and wildlife.

In December 2000, EPA and the Washington State Department of Ecology (Ecology) signed an agreement 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 Lower Duwamish Waterway to assess potential 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 Lower Duwamish Waterway sediments, develop preliminary risk estimates, and identify candidates 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, a Feasibility Study is being conducted that will address cleanup options for contaminated sediments in the Lower Duwamish Waterway.

On September 13, 2001, EPA added the Lower Duwamish Waterway 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, 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 were recommended (Figure 1). The sites are:

- Area 1: Duwamish/Diagonal combined sewer overflow (CSO) and storm drain (SD)
- Area 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
- Area 3: Slip 4, approximately 2.8 miles from the south end of Harbor Island
- Area 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
- Area 5: Terminal 117 and adjacent properties, approximately 3.6 miles from the south end of Harbor Island, on the west side of the waterway
- Area 6: East side of the waterway, approximately 3.8 miles from the south end of Harbor Island
- Area 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: Slip 4, Terminal 117, Boeing Plant 2, Duwamish/Diagonal CSO/SD, and Norfolk CSO/SD. EPA is the lead for managing cleanup at Terminal 117 and Slip 4. The other three early action cleanup projects were begun before the current Lower Duwamish Waterway RI/FS was initiated. Cleanup at Boeing Plant 2, under EPA Resource Conservation and Recovery Act (RCRA) management, is currently in the planning stage. The Duwamish/Diagonal and Norfolk CSO/SD cleanups are under King County management as part of the Elliott Bay-Duwamish Restoration Program. Cleanup at Duwamish/Diagonal was partially completed in March 2004; a partial sediment cleanup was conducted at Norfolk CSO/SD 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 Lower Duwamish Waterway can be found at:
http://yosemite.epa.gov/r10/cleanup.nsf/sites/lduwamish and
http://www.ecy.wa.gov/programs/tcp/sites/lower_duwamish/lower_duwamish_hp.html.

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 Lower Duwamish Waterway. The basic plan is to identify and manage sources of potential contamination and recontamination in coordination with sediment cleanups. The goal of the strategy is to minimize the potential for recontamination of sediments to levels exceeding the Lower Duwamish Waterway sediment cleanup goals and the Sediment Management Standards

(WAC 173-204). Existing administrative and legal authorities will be used to perform inspections and require necessary source control actions.

The strategy is being implemented through the development of a series of detailed, area-specific Action Plans that will be coordinated with sediment cleanups, beginning with the EAAs. Each Action Plan will document what is known about the area, the potential sources of recontamination, actions taken to address them, and how to determine when adequate source control is achieved for an area. Because the scope of source control for each site will vary, it will be necessary to adapt each plan to the specific situation at that site. The success of this strategy depends on the coordination and cooperation of all public agencies with responsibility for source control in the Lower Duwamish Waterway area, as well as prompt compliance by the businesses that must make necessary changes to control releases from their properties.

The source control strategy focuses on controlling contamination that affects Lower Duwamish Waterway sediments. It 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 Ecology's Sediment Management Standards (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 site be evaluated, investigated, and controlled as necessary. Dividing source control work into specific Action Plans 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.

Source control priorities are divided into four tiers. Tier One consists of source control actions associated with the EAAs identified to date. Tier Two 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 Three consists of source identification and potential source control actions in areas of the waterway that are not identified for cleanup, but where source control may be needed to prevent future contamination. Tier Four consists of source control work identified by post-cleanup sediment monitoring (Ecology 2004). This document is a Tier One Source Control Action Plan for an early action sediment cleanup.

Further information about the Lower Duwamish Waterway Source Control Strategy can be found at: http://www.ecy.wa.gov/biblio/0409052.html and http://www.ecy.wa.gov/programs/tcp/sites/lower_duwamish/lower_duwamish_hp.html.

1.4 Source Control Work Group

The primary public agencies responsible for source control for the Lower Duwamish Waterway are Ecology, the city of Seattle, King County, Port of Seattle, city of Tukwila, and EPA. Because the city of Tukwila and Port of Seattle have no jurisdiction over the areas that drain to EAA-2, they are not directly involved in source control activities for EAA-2.

In order 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 Action Plans, jointly implement source control measures, and share progress reports on source control activities for the Lower Duwamish Waterway 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).

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2.0 Early Action Area 2

EAA-2 is located approximately 2.2 miles from the south end of Harbor Island on the west bank of the Lower Duwamish Waterway, just south of the First Avenue S. bridge in King County, Washington (Figure 2). It consists of a small inlet, approximately 80 feet wide at its mouth and tapering to a narrow stream at its head. Sediments in the EAA-2 inlet have accumulated chemical contaminants from numerous sources, both historical and potentially ongoing. These chemicals may have entered the slip through direct discharges, spills, bank erosion, groundwater discharges, surface water runoff, atmospheric deposition, or other non-point source discharges.

Properties immediately adjacent to EAA-2 are currently owned by Douglas Management Company to the north and Herman and Jacqualine Trotsky to the south (Figure 3). Most of the submerged portion of the EAA-2 inlet is owned by Trotsky (Figure 4). Boyer Towing, Inc. owns the land just east of the Trotsky property, extending from the mouth of the inlet along the Lower Duwamish Waterway to the south, and including the area upland from the Waterway beyond Second Avenue S. to the west. Pacific American Commercial (PACO), Ferguson Construction, and ATC Distribution own large parcels of land upland of EAA-2. The South Park residential neighborhood is located to the south of the EAA-2 area.

Historical and current commercial and industrial operations in the vicinity of EAA-2 include cargo handling and storage, marine vessel salvage and construction, barrel reconditioning, warehousing, and vehicle repair and maintenance.

The EAA-2 inlet was formed when the area to the north was filled to create the triangular area that currently comprises the Douglas Management Company site; dredged material was likely used as fill (SAIC 2007a). The inlet is relatively shallow and debris is apparent along the banks, particularly on the south side. The north bank consists of concrete for at least a portion of its length. Adjacent property is composed of fill and natural sand deposits to 25 feet below ground surface (bgs) (Hart Crowser 1986). Groundwater flow in the vicinity of EAA-2 is generally toward the slip and the Duwamish Waterway. Significant tidal influence on groundwater flow direction occurs within approximately 100 feet of the slip (Hart Crowser 1987). Groundwater flow direction in this area alternates from toward land (at high tide stage) to toward the Lower Duwamish Waterway (at low tide stage).

2.1 Contaminants of Concern

Numerous environmental investigations have included the collection of sediment data near EAA-2. Four sediment investigations conducted between 1990 and 1999 included samples near EAA-2, including an Ecology Site Hazard Assessment (Parametrix and SAIC 1991), a National Oceanic and Atmospheric Administration (NOAA) sediment characterization of the Duwamish River (NOAA 1998), an EPA site investigation (Weston 1999), and the Lower Duwamish Waterway Phase 2 RI (Windward 2005, Windward and ReTec 2007).

Sediment data are detailed in *Summary of Existing Information and Identification of Data Gaps* (SAIC 2007a). Chemical data are compared to the Washington State Sediment Management Standards (SMS), which include both the Sediment Quality Standards (SQS) and Cleanup Screening Levels (CSLs) (WAC 173-204). Sediments that meet the SQS criteria have a low likelihood of adverse effects on sediment-dwelling biological resources. However, an

exceedance of the SQS numerical criteria does not necessarily indicate adverse effects or toxicity, and the degree of SQS exceedance does not correspond to the level of sediment toxicity. The CSL is defined as the maximum allowed chemical concentration and level of biological effects permissible at a cleanup site, to be achieved by year 10 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.

2.1.1 Historical EAA-2 Sediment Sampling

As detailed in the *Summary of Existing Information and Identification of Data Gaps* report (SAIC 2007a), surveys conducted between 1990 and 1999 included collection of surface sediment samples at seven locations within the EAA-2 inlet or near the mouth of the inlet (Figure 5). The data from these samples indicate that PCBs are the primary COCs in EAA-2 sediments due to their high concentrations. PCB concentrations ranged from 0.19 mg/kg dry weight (DW) (39 mg/kg organic carbon [OC]) to 5.2 mg/kg DW (477 mg/kg OC), and exceeded the SQS at six of the surface sampling locations. The highest PCB concentrations were found at location 261 during the 1998 NOAA sediment characterization.

Other chemicals exceeding the SQS or CSL in surface sediments included bis(2-ethylhexyl) phthalate (BEHP), DDT, dieldrin, lead, mercury, and zinc.

2.1.2 Recent EAA-2 Sediment Sampling

One sediment sample was collected from EAA-2 during Round 1 sediment sampling for the Phase 1 RI in 2004. PCBs at location SS84 were detected at 23 mg/kg DW (558 mg/kg OC), primarily as Aroclor 1248, although Aroclor 1254 and Aroclor 1260 were also detected. Mercury, lead, BEHP, and zinc also exceeded the SQS. The surface sediment chemistry data are discussed in more detail in the *Summary of Existing Information and Identification of Data Gaps* report for EAA-2 (SAIC 2007a).

One subsurface sediment sample was collected in February 2006 from the mouth of the inlet (location SC40, Figure 5). PCBs were detected in this sample at 0.16 mg/kg DW (21 mg/kg OC) in the 0- to 1-foot depth interval (LDWG 2007). No other chemicals exceeded the SQS or CSL in this sample.

Sample SC40 was also analyzed for dioxins. The 2,3,7,8-TCDD toxic equivalency quotient ranged from 0.36 ng/kg DW at the 2- to 4-foot depth interval to 6.7 ng/kg DW in the 0- to 1-foot depth interval (LDWG 2007). Dioxins are ubiquitous in the environment and are found at low background levels (in the ng/kg range) in air, water, and soil. A 1984 study of industrialized areas of 16 cities in the United States found 2,3,7,8-TCDD at concentrations of 0.4 to 9.4 ng/kg in soil samples (ATSDR 1998).

Based on historical and recent EAA-2 sediment sampling, the following chemicals have been identified as COCs for recontamination of EAA-2 sediments: PCBs, BEHP, mercury, lead, zinc, DDT, and dieldrin.

In early May 2007, SAIC and Ecology collected four additional sediment samples from the EAA-2 intertidal area. Results were not available at the time this Action Plan was prepared.

3.0 Potential Sources of Sediment Recontamination

Chemicals in EAA-2 sediments may have entered the slip through direct discharges, bank erosion, groundwater discharges, surface water runoff, spills, and other non-point discharges associated with historical and potentially ongoing sources. This section discusses current and historical land uses and the results of environmental investigations on properties adjacent to or discharging to the inlet. Potential sources of sediment recontamination are depicted on Figure 3 (Adjacent Properties) and Figure 6 (Early Action Area 2 Drainage Basin).

3.1 Piped Outfalls

The Lower Duwamish Waterway area is served by a combination of storm drain and sanitary sewer, and combined sewer systems. Storm drains convey stormwater runoff collected from streets, parking lots, roof drains, and residential, commercial, and industrial properties to the waterway. In the Lower Duwamish Waterway, there are both public and private storm drain systems. Most of the waterfront properties are served by privately owned systems that discharge directly to the waterway. The other upland areas are served by a combination of private and publicly owned systems.

Storm drains entering the Lower Duwamish Waterway carry runoff generated by rain and snow. A wide range of chemicals 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 be flushed into storm drains during wet weather. Storm drains can also convey materials from businesses with permitted discharges (i.e., National Pollutant Discharge Elimination System [NPDES] industrial stormwater permits), vehicle washing, runoff from landscaped areas, erosion of contaminated soil, groundwater infiltration, and materials illegally dumped into the system.

The sanitary sewer system collects municipal and industrial wastewater from throughout the Lower Duwamish Waterway area and conveys it to King County's West Point wastewater treatment plant, where it is treated before being discharged to Puget Sound. The smaller trunk sewer lines, which collect wastewater from individual properties, are owned and operated by the individual municipalities (e.g., cities of Seattle and Tukwila) and local sewer districts. The large interceptor system that collects wastewater from the trunk lines is owned and operated by King County. A King County interceptor extends along the east side of West Marginal Way S., adjacent to the west side of the EAA-2 upland properties (Figure 6).

Some areas of the Lower Duwamish Waterway are also served by combined sewer systems, which carry both stormwater and municipal/industrial wastewater in a single pipe. These systems were generally constructed before about 1970 because it was less expensive to install a single system rather than separate storm and sanitary systems.

During large storm events, the volume of stormwater can sometimes exceed the capacity of the combined sewer system. The collection system designed for the West Point treatment plant contains relief points called combined sewer overflows (CSOs) to control the amount of combined sewage and stormwater that could enter the system and especially the Elliott Bay Interceptor. The CSOs prevent the combined system from backing up and creating flooding

problems. During large storm events, these CSOs release a mixture of stormwater and sanitary sewage to the waterway. There are no CSOs discharging to EAA-2.

According to the city of Seattle's 2004 Comprehensive Drainage Plan, the EAA-2 area is served by a partially separated drainage system, which means that the area is served by both separated storm drains and combined sewers (SPU 2005).

Two public outfalls discharge to EAA-2: a reservoir overflow and the Second Avenue S. storm drain. SPU operates an overflow from the West Seattle reservoir that discharges excess water to the head of the inlet (Figure 3). While no pollutants are expected to be present, flow of water from this outfall may contribute to the movement of contaminants in inlet sediments towards the Lower Duwamish Waterway. The 24-inch Second Avenue S. outfall is described in Section 3.1.2 below. Four private outfalls, including a 4-inch pipe near the mouth of the inlet, are located along the Lower Duwamish Waterway adjacent to the Boyer properties (Figure 6).

3.1.1 NPDES Permits

In 2004, the city of Seattle conducted a comprehensive survey of outfall or outfall-like structures terminating in the Lower Duwamish Waterway. The survey identified 211 active outfalls or structures, four channels/ditches, and seven major seeps. Sixty one of the structures are publicly-owned outfalls (city, county, Port of Seattle, Washington State Department of Transportation [WSDOT]), 111 were identified as privately owned outfalls, and 39 were listed as "unknown." Some of these discharges are permitted under the NPDES. There are six types of NPDES permits covering the Lower Duwamish Waterway:

- ***Phase I Municipal Stormwater Permit***—This permit covers stormwater outfalls owned by the city of Seattle, the Port of Seattle, and King County, including the Second Avenue S. outfall, which is located in the EAA-2 drainage basin. The 2006 revisions to the Phase I Municipal Stormwater Permit require monitoring for a greater number of analytes than do general permits; in addition, the municipal permit requires monitoring of the solids portion (e.g., sediments). For complete monitoring requirements, see Special Conditions S8 in the Phase I Permit, issued on January 17, 2007. The stormwater monitoring portion of the permit does not require monitoring of all outfalls. Monitoring is limited to only three basins or subbasins considered representative of residential, commercial, and industrial use. Any monitoring required under this permit is of limited value to the Lower Duwamish Waterway source control effort. The Phase I permit is heavily dependent on best management practices (BMPs) of the permittee, such as street sweeping and catch basin cleaning. An additional key component is the requirement placed on permit holders to detect, remove, and prevent illicit connections and illicit discharges, including spills, into the municipal separate storm drain system (Special Condition 5.8). This condition has resulted in city and county programs and ordinances governing stormwater and surface water within their jurisdictions.
- ***Phase II Municipal Stormwater Permit***—This permit includes any city of Tukwila outfall. EAA-2 is not located within the city of Tukwila.
- ***Industrial Stormwater General Permit***—This permit covers 112 industries within the natural drainage basin of the Lower Duwamish Waterway. The permit covers Boyer Logistics, United Iron Works, and Alaska Marine Lines Dock 2 within the EAA-2 drainage basin. Coverage under the Industrial Stormwater General Permit requires a

facility to monitor its stormwater discharge for copper, zinc, oils, and total suspended solids.

- ***Sand & Gravel General Permit***—This permit provides coverage for discharges of process water, stormwater, and mine dewatering water associated with sand and gravel operations, rock quarries, and similar mining activities, including stockpiles of mined materials, concrete batch operations, and hot mix asphalt operations. There are five Sand & Gravel General Permit holders along the Lower Duwamish. The Sand & Gravel Permit generally requires a facility to monitor for pH, turbidity, total suspended solids, total dissolved solids, temperature, oils, and flow rate. There are no sand and gravel operations in the EAA-2 drainage basin.
- ***Boatyard General Permit***—This permit covers a commercial business engaged in the construction, repair, and maintenance of small vessels, 85 percent of which are 65 feet or less in length, or which have revenues constituting more than 85 percent of gross receipts. The Boatyard General Permit requires monitoring for copper, oils, and total suspended solids. These permits do not specifically require monitoring of the solids portion of stormwater flow. There are two permitted boatyards in the Lower Duwamish Waterway (South Park Marina and Delta Marine Industries). The RiverView Marina, located on Boyer Towing property near EAA-2, does not appear to drain to EAA-2 and therefore is not considered part of the early action area. It is not required to have an NPDES permit.
- ***Individual Permit***—This type of permit is written for a specific activity or facility to regulate discharges at a specific location. Individual permits may be written for industrial or municipal types of discharges at the discretion of the permitting agency (EPA or Ecology). There are no individual NPDES-permitted facilities discharging to EAA-2, although there are four individual permits issued elsewhere within the Lower Duwamish Waterway (i.e., industrial permits to LaFarge Cement and Duwamish Shipyard and separate municipal permits to the city of Seattle and King County for CSO discharges).

3.1.2 Second Avenue S. Outfall

The Second Avenue S. storm drain serves an area of about 36 acres located between SR99 and the Lower Duwamish Waterway, from about S. Austin Street to the EAA-2 inlet (Figure 6). It is served by a system of ditches and culverts, with a piped outfall to the inlet. The main drainage ditch leading to this outfall runs along Second Avenue S., a road that is not well-paved. Beyond PACO, the ditch veers to the west and passes along the western boundary of Boyer Towing (Figure 4). It then passes along the eastern boundary of the Trotsky property in a buried pipe. A tide gate was installed in the ditch section in 2000 to reduce flooding caused by tidal influence in this drainage system (Schmoyer 2007a).

Potential sources of pollutants to this outfall include:

- Chemicals carried by stormwater runoff (e.g., street dust, atmospheric deposition, automobile emissions, fertilizers, pesticides, etc.);
- Contaminated groundwater that may have infiltrated into the system through breaks in conveyance lines; and
- Materials improperly disposed of in the storm drain system.

City and County source control activities focus on reducing the amount of chemicals discharged to publicly owned storm drains and sanitary/combined sewers through business inspections and

source identification/tracing activities. Because there are no CSOs discharging into EAA-2, source control activities have focused on stormwater discharges. The City and County provide periodic progress reports to Ecology and EPA. Detailed information is available in the June 2004, January 2005, and June 2005 reports (SPU and King County 2004, 2005a, 2005b). Business inspections specific to EAA-2 upland properties are discussed in Section 3.4 below.

3.1.3 Inline Sediment Samples

SPU collected inline sediment samples on April 13, 2005, at two locations in the drainage ditch that runs along Second Avenue S.; sample locations are shown on Figure 7. Samples were analyzed for PCBs (as Aroclors), semivolatile organic compounds (SVOCs), selected metals (arsenic, copper, lead, mercury, zinc), and petroleum hydrocarbons. Complete results are provided in the *Summary of Existing Information and Identification of Data Gaps* report (SAIC 2007a).

Storm drain sediment data were compared to the Washington State Sediment Management Standards (SMS) to provide a rough indication of overall quality. The SMS include the Sediment Quality Standards (SQS), which identify surface sediments that have no adverse effects on biological resources, and Cleanup Screening Levels (CSL), which are used as an upper regulatory threshold for making decisions about source control and cleanup. It should be emphasized that the SQS and CSL values do not apply to storm drain sediments. It is important to note that any comparison of this kind is most likely conservative given that sediments discharged from storm drains are highly dispersed in the receiving environment and mixed with the natural sedimentation taking place in the system. For organics, the measured dry weight concentrations were organic carbon (OC) normalized to allow comparison to the CSL/SQS.

Several chemicals exceeded SMS values in sample RCB44, which is the upstream sample located between Parcels 33, 34, and 42 (Figure 7):

- N-nitrosodiphenylamine was detected at 24 mg/kg DW (430 mg/kg OC), which exceeds the SQS/CSL of 11 mg/kg OC.
- Di-n-butyl phthalate was detected at 37 mg/kg DW (663 mg/kg OC), above the SQS of 220 mg/kg OC. This chemical was also detected in the blank sample.
- Zinc was detected at 444 mg/kg DW, slightly above the SQS of 410 mg/kg DW.

Sediments in the downstream sample (RCB45) located between parcels 19 and 22 (Figure 7) contained BEHP at 7.8 mg/kg DW (160 mg/kg OC), above the SQS of 78 mg/kg OC.

BEHP and zinc were identified in Section 2.1.2 as COCs in EAA-2 inlet sediments.

Although Washington State Model Toxics Control Act (MTCA) cleanup levels do not apply to sediment samples, the data were compared to MTCA cleanup levels for illustrative purposes and to put the detected concentrations in context. Arsenic, PAHs, and total petroleum hydrocarbons (TPH) exceeded the lower of MTCA Method A or B cleanup levels in one or both samples:

- ***Arsenic***—The detected concentrations of 11 mg/kg DW and 23 mg/kg DW in samples RCB44 and RCB45, respectively, exceeded the MTCA Method B (carcinogenic) cleanup

level of 0.67 mg/kg DW in both samples.[2] The MTCA Method A cleanup level for arsenic is 20 mg/kg DW.

- ***PAHs***—Detected concentrations of benzo(a)pyrene (0.27 and <0.21 mg/kg DW), benzo(b)fluoranthene (0.3 and 0.23 mg/kg DW), benzo(k)fluoranthene (0.23 and <0.21 mg/kg DW), and chrysene (0.22 mg/kg DW) exceeded the MTCA Method B (carcinogenic) cleanup level of 0.14 mg/kg DW in one or both samples. RCB44 concentrations were slightly higher than RCB45.
- ***TPH***—Petroleum hydrocarbons (residual oil) were detected at concentrations of 3,100 and 3,900 mg/kg DW), above the MTCA Method A cleanup level of 2,000 mg/kg DW.

Additional detected chemicals, although not present at concentrations above screening levels, include 2,4-dinitrotoluene, primarily used as a plasticizer in explosives, at 29 mg/kg DW in RCB44, and PCBs in both samples at concentrations of 0.12 to 0.25 mg/kg DW.

3.1.4 Source Control Actions

Stormwater discharges from piped outfalls may represent an ongoing source of COCs to the EAA-2 inlet. To minimize this potential, the following source control actions are being or will be conducted:

- Ecology collected a sediment sample from the mouth of the Second Avenue S. outfall pipe in early May 2007 to evaluate whether contaminants are currently being transported to the EAA-2 inlet via this pathway. A whole water sample from the outfall was also collected. Results were not available at the time this Action Plan was prepared.
- SPU will collect additional inline sediment samples to evaluate the levels of COCs with respect to sediment recontamination in this drainage basin.
- If COCs are present in the storm drain line, SPU will conduct source tracing to identify sources of contaminants.
- SPU and Ecology will conduct source control inspections of upland sites as needed (see Section 3.4.10).
- Ecology's Water Quality Program will continue to review and update NPDES permits as needed.

3.2 Spills to Waterway

Although upland releases have been documented, as described in Section 3.3 below, no record of spills directly into the EAA-2 inlet have been identified.

3.3 Properties Adjacent to EAA-2

In addition to discharges via the outfall described above, adjacent properties may contribute contamination to EAA-2 through discharge of contaminated groundwater to the slip, by soil erosion from the banks of the inlet, or by surface runoff. If COCs from an adjacent site reach the waterway, they could recontaminate EAA-2 sediments.

[2] It should be noted that the 90th percentile natural background concentration of arsenic in Puget Sound soils is 7 mg/kg (Ecology 1994).

Two properties are located directly adjacent to EAA-2: Industrial Container Services, LLC (the Trotsky property) to the south, and Alaska Marine Lines Dock 2 (Douglas Management Company) to the north. These are described below. Although the northern edge of Boyer Towing property extends to the mouth of the EAA-2 inlet, Boyer Towing parcels are discussed in Section 3.4 (Upland Properties).

The banks of the EAA-2 inlet are quite narrow and are largely bulkheaded, armored, or covered with dense vegetation (SAIC 2007b). Although no samples of bank sediment have been collected, samples of intertidal zone sediments were collected by SAIC and Ecology along the south (Trotsky) side of the inlet in early May 2007, as part of the source control efforts underway at this site. No results were available at the time this Action Plan was prepared.

3.3.1 Industrial Container Services (Trotsky Property/Northwest Cooperage)

Industrial Container Services, LLC, is the current owner/operator of a steel drum reconditioning facility located at 7152 First Avenue S. in Seattle. The facility has been operating at this site under several names, including Northwest Cooperage, Palex, IFCO, Mitzel & Co., and Pacific Drum Co., for over 60 years. Industrial Container Services currently leases the property from the Trotskys. Operations at the site include storage, cleaning, and repainting of empty used drums, which may have contained hazardous wastes, resins, solvents, petroleum products, paints, adhesives, food products, or pesticides.

The site is located on the south side of the EAA-2 inlet, and the property line extends into this waterway to the high tide demarcation. It is bordered to the east by Boyer Towing, to the west by First Avenue S., and to the south by other industrial properties. The site is underlain by loose fill, sandy gravel and sandy silt, and is paved. Paving of the site occurred over a period of several years, beginning in 1988. Groundwater, at a depth of approximately 10 feet bgs, is tidally influenced, but generally flows toward the inlet.

EPA, Ecology, and SPU inspected this site in February 2003 (KCIW 2004). No significant concerns were noted. Wastewater and runoff from the site are collected and routed through a pretreatment system before discharge to the sanitary/combined sewer in accordance with a discharge permit from the King County Industrial Waste (KCIW) Program (Permit No. 7130). KCIW conducts routine inspections of the facility.

The facility operates under EPA RCRA ID number WAD000066084 and Puget Sound Clean Air Agency (PSCAA) Air Permit No. 11683. The facility does not have an NPDES permit because stormwater is discharged to the sanitary/combined sewer system. Northwest Cooperage is listed in Ecology's Confirmed and Suspected Contaminated Sites List as a site that has been ranked and is awaiting remedial action (SAIC 2007a).

Current Storm Drainage

Stormwater at the site flows to the combined sewer via a wastewater pretreatment facility. According to a KCIW fact sheet for this site, the facility currently discharges approximately 1,542 gallons per day of stormwater to the sanitary sewer (KCIW 2004).

The majority of rainwater from roof drains is collected and used on site (KCIW 2004). Industrial Container Services reported to King County that roof drains from an office and small shed at the northwest corner of the property drain to a pipe along First Avenue S. SPU has no record of storm drains in this area, and it is not known whether this drainage flows to the combined sewer or to an undocumented private storm drain (Schmoyer 2007b).

Past Use

Drum refurbishing and manufacturing operations on the Trotsky property date back to the early 1940s, when Mitzel & Co. reportedly refurbished 1,500 drums per month for the U.S. government during World War II. The Trotsky family purchased the property in 1953, and operated the site as Northwest Cooperage until 1995 when the facility was sold to Consolidated Drum Reconditioning Company, Inc. The current facility operator, Industrial Container Services, leases the property from the Trotskys.

Detailed information on past use of this site is provided in *Summary of Existing Information and Identification of Data Gaps* (SAIC 2007a).

Environmental Sampling/Cleanup

A groundwater and soil quality assessment was conducted by Hart Crowser in 1986 (Hart Crowser 1986, 1987). Composite surface soil samples were collected in February 1986 from six areas (Figure 8); four to five samples were composited to make up a single sample for each area. Samples were analyzed for metals, volatile organic compounds (VOCs), SVOCs, pesticides, and PCBs. Samples indicated that onsite soils were contaminated with metals and numerous VOCs and pesticides, including methylene chloride, acetone, trichloroethylene, xylenes, pentachlorophenol, DDT, DDE, endrin, and PCBs. Three groundwater wells installed in May 1986 indicated that onsite groundwater was also contaminated with metals and VOCs including vinyl chloride, toluene, ethylbenzene, xylenes, and 2,4-dimethylphenol.

Two additional soil borings were drilled and monitoring wells were installed in late September 1986. Contaminant concentrations in groundwater and soil were consistent with previous sampling results; however, PCB concentrations were higher than had been measured previously.

During a 1991 site hazard assessment conducted for Ecology (Parametrix and SAIC 1991), a composite sample was collected from four unpaved areas of the facility east of the drum storage area in the southeast corner of the site (Figure 8). In addition, a sediment sample was collected from an onsite manhole located about 60 feet east of the drum storage area. The sample was analyzed for PAHs, VOCs, organochlorine pesticides, PCBs, cyanide, total metals, and dioxins/furans. Chromium, copper, lead, and zinc were detected in both soil and manhole sediment samples; none of the detections exceeded MTCA cleanup standards or sediment screening levels (SAIC 2007a).

In June 1991, Northwest Cooperage collected a groundwater sample from Well B-2 (Figure 8). The sample was analyzed for dissolved metals, VOCs, and SVOCs. Arsenic, chromium, nickel, zinc, cyanide, vinyl chloride, 1,1-dichloroethane, trans-1,2-dichloroethylene, benzene, ethylbenzene, toluene, and xylenes (BTEX), 2,4-dimethylphenol, and naphthalene were detected. Dissolved arsenic (17 ug/L), vinyl chloride (310 ug/L), and benzene (17 ug/L) exceeded MTCA cleanup standards.

In April 2007, SAIC (on behalf of Ecology) installed three additional groundwater monitoring wells on the Trotsky property, along the edge of the EAA-2 inlet. Subsurface soil samples were collected from each boring, and were analyzed for the full suite of SMS chemicals and TPH. Groundwater samples were collected and submitted for analysis from the three new wells and from existing wells B-1 and B-2 in May 2007. Sampling results were not available at the time this Action Plan was prepared.

Potential for Future Releases to EAA-2

Soil and groundwater underlying the former Northwest Cooperage facility are contaminated with metals, VOCs, SVOCs, and pesticides, including 2,4-dimethylphenol, arsenic, mercury, lead, zinc, DDT, 1,2-dichlorobenzene, benzene, and vinyl chloride. Although data collected at the site are relatively old (1986 through 1991) and may not accurately reflect current conditions at the site, no remediation has been conducted and these contaminants are still likely to be present today.

During a site visit by Ecology in May 2004, seeps were observed entering the inlet from the vicinity of the Trotsky property, and a variety of debris including steel drum parts such lids, rings, and bungs was observed in the south bank and under a former building near the inlet. Bank soil and seeps in the area had a petroleum odor and sheen (SAIC 2007a, Appendix A).

A survey of seeps was conducted as part of the Phase 2 RI for the Lower Duwamish Waterway (Windward 2004). Four seeps were identified in the EAA-2 inlet. Based on field notes from the seep survey, three of the seeps (53, 54, and 56) were located on the southern (Trotsky) side of the inlet (Table 1). One seep sample was collected (from Seep 54) and analyzed for metals, VOCs, SVOCs, PCBs, pesticides, petroleum hydrocarbons, and TOC. Mercury (0.58 ug/L in unfiltered sample) and PCBs (0.26 ug/L in filtered sample) exceeded the chronic marine water quality criteria; two VOCs (carbon disulfide and chlorobenzene) and three SVOCs (1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene) were also detected but did not exceed regulatory criteria or screening levels. In addition, lead (296 ug/L) and zinc (322 ug/L) were detected at concentrations above screening levels (SAIC 2007a).

Table 1. Seeps in EAA-2 Inlet

Seep Identifier	Easting (x)	Northing (y)	Location Description	Observations
Seep 53	122°19.988	47°32.357	South side of inlet; near old yellow building	Seep within very black muck; chemical/sulfide odor, no sheen, black ooze; located at bottom of channel, adjacent to horizontal timber/ties within channel
Seep 54	122°20.013	47°32.358	South side of inlet; near dock	Grey, foamy, very small seep; embankment has moderate slope with pier columns and construction/metal debris; seep located mid-bank, below decayed pier/platform; trace/very light flow
Seep 55	122°20.035	47°32.360	North side of inlet; near cement truck barrel	No odor, no sheen; trace fine brown sediments; located mid-bank at base of former cement truck tumbler, in asphalt concrete rubble with gravel; steep riprap and construction debris bank adjacent to pier/dock with structure
Seep 56	122°19.959	47°32.364	South side of inlet; near mouth	No odor, no sheen; located mid-bank in steep riprap in Trotsky channel; below vegetation and stacked drums

Source: Windward 2004, Appendix D

Given the flow of seeps containing COCs to the inlet from the vicinity of this property and the facility's proximity to the EAA-2 inlet, the presence of COCs in soil and groundwater at the site represent a potential source for recontamination of EAA-2 sediments.

Erosion of soil from the southern bank of the EAA-2 inlet, located adjacent to the main process areas of the Trotsky property, may also result in transport of contaminants to the inlet and therefore contribute to sediment recontamination.

Source Control Actions

Data described above indicate that releases of a variety of pollutants may have occurred over the 60-year history of barrel reconditioning activities at this site. Sampling conducted between 1986 and 1991 indicated the presence of metals, VOCs, PCBs, and pesticides (including DDT) in soil and groundwater (Hart Crowser 1986, Hart Crowser 1987, Parametrix and SAIC 1991). No remediation has been conducted at this site. The following source control actions will be conducted or are currently underway:

- Ecology is conducting additional site characterization (starting April 2007) to evaluate current concentrations of COCs in groundwater, bank soils, intertidal sediments, and seeps.
- Based on the site characterization results, Ecology will identify additional data gaps and determine the subsequent actions necessary to fill them.
- Based on site characterization results, the property owner/operator may be required to conduct remediation as needed to eliminate sources of contaminants to EAA-2.
- EPA has issued a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) 104(e) letter to the facility and property owners/operators to obtain additional information related to historic sources of contamination at this site.
- EPA and Ecology will review responses to the CERCLA 104(e) letter.
- King County will continue to oversee and inspect this site through the Industrial Waste Program.
- King County, SPU, Ecology, and Industrial Container Services will determine whether roof drains on the northwest corner of the property drain to the sanitary sewer or to an unidentified storm drain.
- Ecology's Water Quality Program, along with SPU and KCIW, will evaluate the need for stormwater characterization from this facility due to runoff/overflow during heavy rainfall events.
- PSCAA will conduct periodic air permit inspections to ensure compliance with permit conditions and BMPs.

3.3.2 Alaska Marine Lines Dock 2 (Douglas Management Company)

The Alaska Marine Lines/Douglas Management Company property makes up the northern boundary of the EAA-2 inlet (Figure 3), and consists of a 3.1-acre triangle-shaped parcel of land. The property is bounded on the northeast by the Lower Duwamish Waterway, on the south by the EAA-2 inlet, and on the west by First Avenue S. Douglas Management Company and Alaska Marine Lines are both subsidiaries of Lynden Incorporated.

The site is currently used by Alaska Marine Lines for storage of shipping containers. It is an auxiliary storage facility to the Alaska Marine Lines Operations & Maintenance site located at 5600 to 5610 West Marginal Way SW. In addition, a portion of the site is leased to a company that operates an automobile loading rack. The site is completely paved with concrete or asphalt. The shoreline along the EAA-2 inlet is mostly lined with ecology blocks. The facility has a moorage along the Duwamish Waterway, which is actively used.

Ecology's Underground Storage Tank (UST) list identifies two former underground petroleum storage tanks, which have been removed. In 1992, Ecology was notified of a leaking underground storage tank (LUST), which was subsequently remediated.

Current Storm Drainage

According to Alaska Marine Lines' Stormwater Pollution Prevention Plan (SWPPP) for this site, stormwater runoff flows from the site into a storm drain and directly to the Lower Duwamish Waterway through an outfall located along the northeastern side of the site. This outfall is covered under the Industrial Stormwater General Permit (SO3-002471), under the name Swan Bay Holdings Dock.

It is not clear whether stormwater on the southern portion of the site (near the EAA-2 inlet) drains to the EAA-2 inlet or to the storm drain.

Past Use

The location of this property was once part of the Duwamish River. Aerial photos indicate that the site was filled in sometime between 1960 and 1969 (SAIC 2007a). Prior to filling, this area was the location of Pacific Metal and Salvage Company and Seabell Shipbuilding Company. Pacific Metal and Salvage Company specialized in dismantling, wrecking, and salvaging old boats. Seabell Shipbuilding Company engaged in construction of large wooden vessels. The wooden timbers still present across the EAA-2 inlet were likely associated with this operation.

A sand and gravel batch plant operated at this site for six to nine months in 1977; from 1977 to 1984, it was used for school bus parking and light maintenance. From 1984 to 1993 it was used as a barge terminal, and then entered its current use as an equipment storage yard and barge mooring facility and related activities (e.g., marine cargo handling). The property has also been used to transfer gravel imported by barge (DMC 2006).

Additional information on past site uses is presented in *Summary of Existing Information and Identification of Data Gaps* (SAIC 2007a).

Environmental Sampling/Cleanup

Cleanup of a leaking underground petroleum storage tank was conducted at this site during the 1990s.

Potential for Future Releases to EAA-2

As part of the Phase 2 RI, Windward Environmental surveyed seeps along the Lower Duwamish Waterway. Four seeps were identified in the EAA-2 inlet; Seep 55 was located near the head of

the inlet, on the north (Douglas Management Company) side of the inlet (Table 1). This seep has not been sampled (Windward 2004).

Because at least one seep enters the inlet from this property, and in the absence of other site characterization data, the site cannot be eliminated as a potential source for recontamination of EAA-2 sediments.

Source Control Actions

The facility operates under the Industrial Stormwater General Permit. It has not been inspected by SPU; however, Ecology conducted a stormwater compliance inspection in May 2006. It was observed at that time that wash water was draining to the storm drain system, that it was not known where the oil/water separator discharges to, and that the facility had not submitted Discharge Monitoring Reports as required by the stormwater permit (Ecology 2006). Ecology requested that the facility develop and implement a SWPPP, submit a transfer of ownership and a revised Industrial Stormwater General Permit application, begin to collect and submit stormwater sampling results as required by the permit, and refrain from discharging wash water to the storm drains. No follow-up inspection has been conducted. The destination of stormwater on the southern portion of the site is not clear from the available documents.

The following source control actions will be conducted or are currently underway:

- If the property owner grants access, Ecology will conduct groundwater sampling along the southern portion of the property (adjacent to the EAA-2 inlet) to evaluate potential groundwater transport of contaminants from the site. Bank and seep samples will be collected as needed.
- Based on sampling results, Ecology will identify additional data gaps and determine the subsequent actions necessary to fill them.
- Based on site characterization results, the property owner/operator may be required to conduct remediation as needed to eliminate sources of contaminants to EAA-2.
- EPA has issued a CERCLA 104(e) letter to the facility and property owners/operators to obtain additional information related to historic sources of contamination at this site.
- EPA and Ecology will review the responses to the CERCLA 104(e) letter submitted by Douglas Management Company on December 11 and December 21, 2006.
- Ecology and SPU verify the storm drainage pathway on the southern portion of the site.
- If stormwater discharge to EAA-2 is confirmed, Ecology's Water Quality Program and SPU will assess the need for stormwater characterization.
- Ecology and SPU will continue periodic inspections of this site as needed to verify that operations do not result in the release of contaminants to EAA-2.

3.4 Upland Properties

Upland sites may contribute contamination to EAA-2 through stormwater and other discharges to piped outfalls and through contaminated groundwater that may infiltrate into a stormwater system that discharges to the inlet. If COCs from an upland site reach the waterway, they could recontaminate the sediments. Upland properties are shown in Figures 4 and 7, and include:

- Boyer Towing, Inc.
- DaVinci Gourmet
- Wells Trucking & Leasing
- Boyer Alaska Barge Lines
- Northwest Center for the Retarded
- Pioneer Human Services
- Pacific Plumbing Supply
- Pacific American Commercial (PACO)
- PCT Construction
- WHECO
- Cunningham Manufacturing
- United Iron Works
- Ferguson Construction
- Alki Construction Company
- Hurlen Construction
- Alaska Washington Company
- Fox Plumbing & Heating
- W.G. Wright and Associates
- ATC Distribution Group, Inc./Automatic Transmission Parts
- Cascade Mattress Factory

These upland properties are described in *Summary of Existing Information and Identification of Data Gaps* (SAIC 2007a).

SPU conducted source control business inspections at some of these locations in 2002 and 2003; a second round of business inspections is planned for this area. Table 2 lists inspections that have been conducted in the Second Avenue S. drainage basin.

Information on upland properties with operations that may contribute to the transport of COCs to EAA-2 sediments is discussed briefly below.

Table 2. Source Control Inspections Conducted by SPU in the Second Avenue S. Drainage Basin

Business	Date Inspected
ATC Distribution Group, Inc.	11/18/2002
Boyer Alaska Barge Lines, Inc.	1/3/2003
Cunningham Manufacturing Company	9/17/2002
Ferguson Construction, Inc.	8/29/2002
Fox Plumbing and Heating	10/18/2002
Industrial Container Services	2/10/2003
J&M Stamp and Form	9/17/2002
M&M Roofing, Inc.	9/30/2002
NW Building Tech, Inc.	9/20/2002
Pacific American Commercial (PACO)	9/5/2002; 3/29/2007
PCI Construction, Inc.	9/19/2002
Twilley Industrial Tool	9/20/2002
United Iron Works, Inc.	8/29/2002
W.G. Wright and Associates, Inc.	9/30/2002
Wells Trucking and Leasing	9/30/2002
WHECO	10/4/2002

Source: Schmoyer 2007a

3.4.1 Boyer Towing/Boyer Alaska Barge Lines/Boyer Logistics

Boyer Towing owns 13 parcels in the EAA-2 upland area (Figure 4); activities at these parcels include operation of a commercial fishing terminal, automotive and equipment repair, equipment and vehicle storage, and operation of warehouses and a machine shop. Some of these parcels are leased to tenant businesses, such as Wells Trucking & Leasing, B&J Auto Wrecking, Alaska Washington Co., Alki Construction Co., and WHECO.

Boyer Logistics operates a terminal that provides contract stevedoring and freight operations for the company's and outside customers' barges and cargo. Since 2002, they have been shipping and providing temporary storage for untreated cut lumber from Alaska.

A January 2003 SPU inspection identified several corrective actions to reduce the potential for pollutants associated with site activities to reach the Lower Duwamish Waterway (e.g., developing and implementing a spill prevention and cleanup plan and improving waste storage and disposal practices). Sediment from an oil/water separator at the site contained the following chemicals at concentrations above the SQS:[3] phthalates (BEHP at 53 mg/kg DW [1,879 mg/kg OC[4]]; butyl benzyl phthalate at 10 mg/kg DW [355 mg/kg OC]; di-n-octylphthalate at 6.1 mg/kg [216 mg/kg OC]; diethylphthalate at 4.6 mg/kg [163 mg/kg OC]; and dimethylphthalate at 2.8 mg/kg [99 mg/kg OC]), cadmium (6.3 mg/kg DW), and zinc (1,120 mg/kg DW). Runoff from

[3] As noted in Section 3.1.3, SQS values are not directly applicable to storm drain sediments.
[4] No TOC data were available for this sample, therefore OC-normalized concentrations are estimated based on the average organic carbon concentration in EAA-2 (2.82%).

the western and southern edges of the property flows toward the Second Avenue S. drainage system. Catch basins, sumps, and oil/water separators were subsequently cleaned.

On October 10, 2006, EPA notified Boyer Towing of their potential Superfund liability associated with releases of hazardous substances to the Lower Duwamish Waterway.

Boyer Logistics was inspected by Ecology's Water Quality Program on February 28, 2007, however an inspection report was not available for review at the time this Action Plan was prepared.

Source Control Actions

Storm drains along the western and southern ends of the Boyer Towing properties discharge to the Second Avenue S. drainage system. Additional information is needed to assess whether activities at these parcels may pose a potential risk of sediment recontamination. The following source control activities will be conducted or are currently underway:

- EPA has issued a CERCLA 104(e) letter to the facility and property owners/operators to obtain additional information related to historic sources of contamination at this site.
- EPA and Ecology will review responses to the CERCLA 104(e) letter.
- SPU will conduct source control inspections at facilities located on Boyer Towing property to verify that they comply with applicable regulations and BMPs and to verify the storm drainage pathway on the southern portion of the property.
- If stormwater discharge to EAA-2 is confirmed, Ecology and SPU will evaluate the need for stormwater characterization and will review Boyer Towing's SWPPP to ensure that contaminant releases to sediment from stormwater are controlled.
- Ecology and SPU will continue periodic inspections of this site as needed to verify that operations do not result in the release of contaminants to EAA-2.

3.4.2 Wells Trucking & Leasing

This business stores and maintains semi-trailer tractors at this location; trailers are not stored at this site. At the time of a September 2002 SPU inspection, three catch basins along the western boundary of the site were covered with shipping containers. Stained soil and rocks were observed in the parking area. Vehicle wash water drained to the storm drain system and ultimately to the Second Avenue S. drainage system. Subsequently, Wells Trucking cleaned the catch basins and removed 110 gallons of oily sludge. Sludge removed from the catch basins contained the following chemicals at concentrations above the SQS: BEHP (150 mg/kg DW, 5,320 mg/kg OC[5]), butylbenzylphthalate (5.3 mg/kg DW, 188 mg/kg OC), di-n-octyl phthalate (4.2 mg/kg DW, 149 mg/kg OC), zinc (2,570 mg/kg DW), cadmium (9.0 mg/kg DW), and copper (527 mg/kg DW).

3.4.3 PACO

PACO is a heavy equipment sales and rental company. They also maintain, lubricate, paint, and wash equipment. During a September 2002 SPU inspection, it was noted that stormwater and

[5] No TOC data were available for these samples, therefore OC-normalized concentrations are estimated based on the average organic carbon concentration in EAA-2 (2.82%).

wash water from this site flows to three oil/water separators and then to drainage culverts/ ditches; at least some of these flow to the Second Avenue S. drainage system. Heavy staining was observed at the wash pad and heavy equipment storage area. The wash pad connection to the storm drain was eliminated and housekeeping issues were addressed in December 2002; no further actions were required. Another SPU inspection was conducted on March 29, 2007 (SPU 2007). Corrective actions were identified at three PACO parcels, including the following: (1) prepare update of spill plan; (2) check for leaks/stains on a regular basis; (3) cover/contain all materials that have a potential to leach or spill to stormwater, or move them indoors; and (4) install an outlet trap in the stormwater vault located on the southern portion of the property. The facility will be re-inspected to confirm that corrective actions have been undertaken.

3.4.4 WHECO

This business repairs structural, mechanical, hydraulic, and electrical components of cranes, and conducts welding and painting operations. This property is leased from Boyer Towing. At the time of an October 2002 SPU inspection, a catch basin was observed to be sealed with concrete. Water was flowing out of the drain from the roof drains north onto Fontanelle Street. Floor drains inside the building drain to a vault in the south parking lot and then to the sanitary sewer. No corrective actions were required.

3.4.5 Cunningham Manufacturing

Cunningham conducts metal machining operations, specifically the fabrication of air and hydraulic cylinders using sheet aluminum and bronze. During a September 2002 SPU inspection, two catch basins were observed to be very full. These catch basins drain to the Second Avenue S. drainage system. Catch basins were cleaned and housekeeping issues were addressed. No further action was required during the November 2002 re-inspection. Potential pollutants handled at this site include cutting oil, solvents, coolant, hydraulic oil, primer, and reducer.

3.4.6 United Iron Works

This business fabricates steel and manufactures structural buildings. The facility operates under the Industrial Stormwater General Permit (SO3-002137), and stormwater drains to the Second Avenue S. storm drain. There are no oil/water separators on site. SPU inspected this site in 2002 and did not require any corrective actions. Potential pollutants handled at this facility include solvents, petroleum products, cutting dust, and paint. United Iron Works was inspected by Ecology's Water Quality Program on February 6, 2007 (Ecology 2007). Ecology recommended that United Iron Works submit a copy of the facility SWPPP, implement the BMPs identified in the SWPPP, change the stormwater monitoring point to a more representative location, and implement good housekeeping practices.

3.4.7 Ferguson Construction

Ferguson conducted an independent remedial action for a LUST (ID 2146) at this location. A 2,000-gallon unleaded gasoline tank and pump dispenser were removed in November 1990. Approximately 600 cubic yards of petroleum-contaminated soils were removed from the site and disposed of. This site is located at the southeastern edge of the Second Avenue S. basin and may drain to the Seventh Avenue S. drainage system.

3.4.8 Fox Plumbing & Heating

An October 2002 SPU inspection found accumulation of sediments in one of the onsite catch basins. The owner cleaned the catch basin in December 2002 and no further action was required. Potential pollutants handled at this facility include oil, antifreeze, and waste oil.

3.4.9 ATC Distribution Group

ATC Distribution operates an automotive parts distribution facility and an automotive transmission repair shop at this location. About 800 gallons of transmission fluid are drained each year. During a November 2002 SPU inspection, two sumps in the parking lot were filled with sludge. According to facility personnel, these sumps were not connected to the storm drain system. The sumps were cleaned and other housekeeping issues had been addressed at the time of the February 2003 re-inspection.

Previously, two underground unleaded gasoline storage tanks were present at this location (registered under the name RPM Merit). One tank was listed on Ecology's LUST list (ID 2703); cleanup of soil and groundwater was listed as "started" as of June 1, 1995. No additional information was available.

3.4.10 Source Control Actions at Upland Sites

Several upland properties in addition to Boyer Towing may generate COCs and are potential sources of sediment recontamination via the stormwater drainage system. A recent basin reconnaissance indicated that some new businesses have begun operating in the basin in the past four to five years. Therefore, in 2007, SPU will re-inspect businesses in the Second Avenue S. drainage basin to update information about business activities and to ensure that businesses are complying with City code requirements for stormwater pollution prevention. This second round of inspections is expected to be completed in 2007.

The following source control actions will be conducted at upland sites:

- SPU will conduct inspections/re-inspections as needed to promote pollution prevention practices and conduct source control.
- Ecology and SPU will review SWPPPs as needed to ensure that releases of contaminants in stormwater to EAA-2 sediment are controlled.
- Ecology will conduct inspections of NPDES-permitted facilities as needed to ensure compliance with permit conditions.
- Upland spills will be monitored on an ongoing basis by Ecology, SPU, and EPA. Depending on the nature of the spill, the origin of the spill will be identified and cleanup activities will be evaluated to determine appropriate post-spill source control activities that may be required.

3.5 Atmospheric Deposition

Air pollution can enter the Lower Duwamish Waterway directly or through stormwater, thus becoming a possible source of sediment contamination to EAA-2. Air pollution can be localized, resulting from paint overspray, sandblasting, and fugitive dust and particulates caused by

loading/unloading of raw materials such as sand, gravel, and concrete. Air pollution can also be widely dispersed from vehicle emissions, industrial smokestacks, and other sources.

King County and SPU have been monitoring atmospheric deposition to assess whether it is a potential source of phthalates, particularly BEHP, in stormwater runoff (King County and SPU 2005). Passive deposition samplers (i.e., stainless steel bowls that drain into a glass bottle) were placed at four locations in the Lower Duwamish Waterway area as well as in surrounding neighborhoods to collect samples of both wet and dry atmospheric deposition. Results showed PAHs, butyl benzyl phthalate, and BEHP in the Duwamish Valley at concentrations two to three times higher than outside the valley during the winter months (King County and SPU 2005). This finding is consistent with previous sampling results by PSCAA showing atmospheric particulate concentrations trending higher during fall/winter months than during spring/summer months.

The King County/SPU study (2005) concluded that the Lower Duwamish sample results compared well with studies conducted within the same airshed (i.e., Georgia Basin) and with other regions (i.e., Great Lakes and Roskilde Fjord [Denmark] studies). PAH values observed in Lower Duwamish samples (0.006 to 0.28 ug/m^2/day) were comparable to the average values reported for the Georgia Basin airshed (0.004 to 0.36 ug/m^2/day). The Lower Duwamish Waterway BEHP values (0.23 to 3.5 ug/m^2/day) were higher than the Georgia Basin average values (0.3 to 0.6 ug/m^2/day), but were comparable with the results from the Denmark study (0.068 to 2.16 ug/m^2/day). The study noted that further atmospheric deposition testing was needed to evaluate the reproducibility of results and to perform correlations with existing atmospheric measurements (e.g., particulate concentrations).

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 runoff. However, at this time, there are no available resources to address this issue.

King County and SPU have set up a special work group to deal with phthalate issues. Members of the phthalate work group include staff from KCIW, King County Hazardous Waste, King County Environmental Laboratory, and SPU. Any future work to assess atmospheric deposition as a potential source of phthalates and other contaminants in stormwater will consider the findings and recommendations of the Phthalate Work Group.

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4.0 Monitoring

Monitoring efforts by SPU, Ecology, KCIW, and PSCAA will continue to assist in identifying and tracing ongoing sources of the COCs present in Lower Duwamish Waterway sediments. This information is being used to focus source control efforts on specific problem areas within the EAA-2 drainage basin and to track the progress of the source control program. The following types of samples will continue to be collected:

- Inline sediment trap samples from storm drain systems,
- Onsite catch basin sediment 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 is necessary to identify trends in concentrations of COCs. Monitoring is anticipated to 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 Action Plan annually, and will periodically prepare Technical Memoranda to update the Action Plans.

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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. In turn, source control activities will be documented by the appropriate agency performing the source control work. The agencies will provide reports to Ecology, who will provide waterway-wide and basin-specific reports.

The management of information and data is divided into two levels. The first level is documentation and tracking, where information is organized so that Ecology can track and manage source control activities at a given source or within a given basin. The second level is reporting to EPA. Please refer to the Lower Duwamish Source Control Strategy for further details (Ecology 2004).

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Figures

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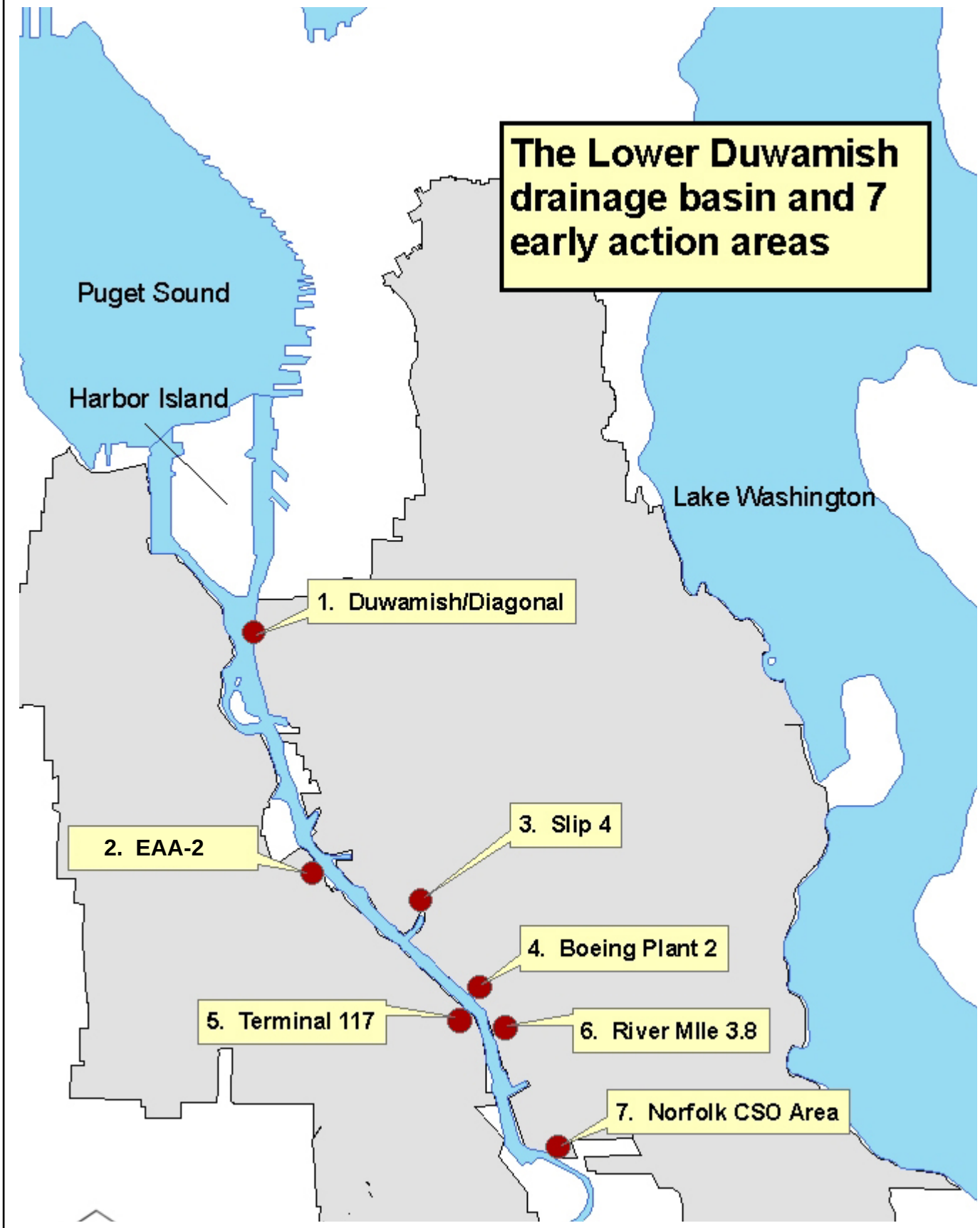

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Figure 1. Lower Duwamish Waterway Early Action Areas

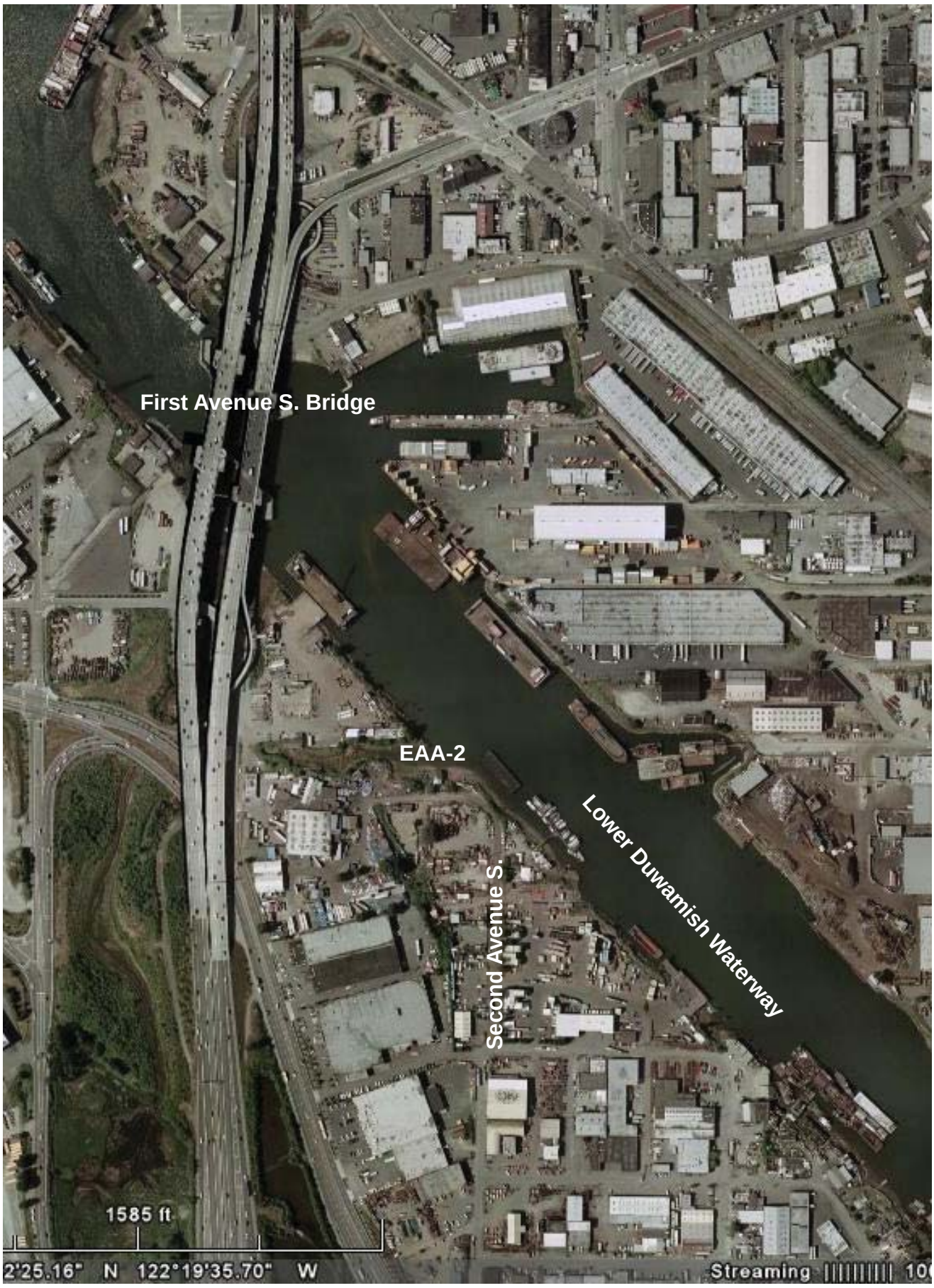

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Figure 2. Location of Early Action Area 2
Source: Google Earth 2007

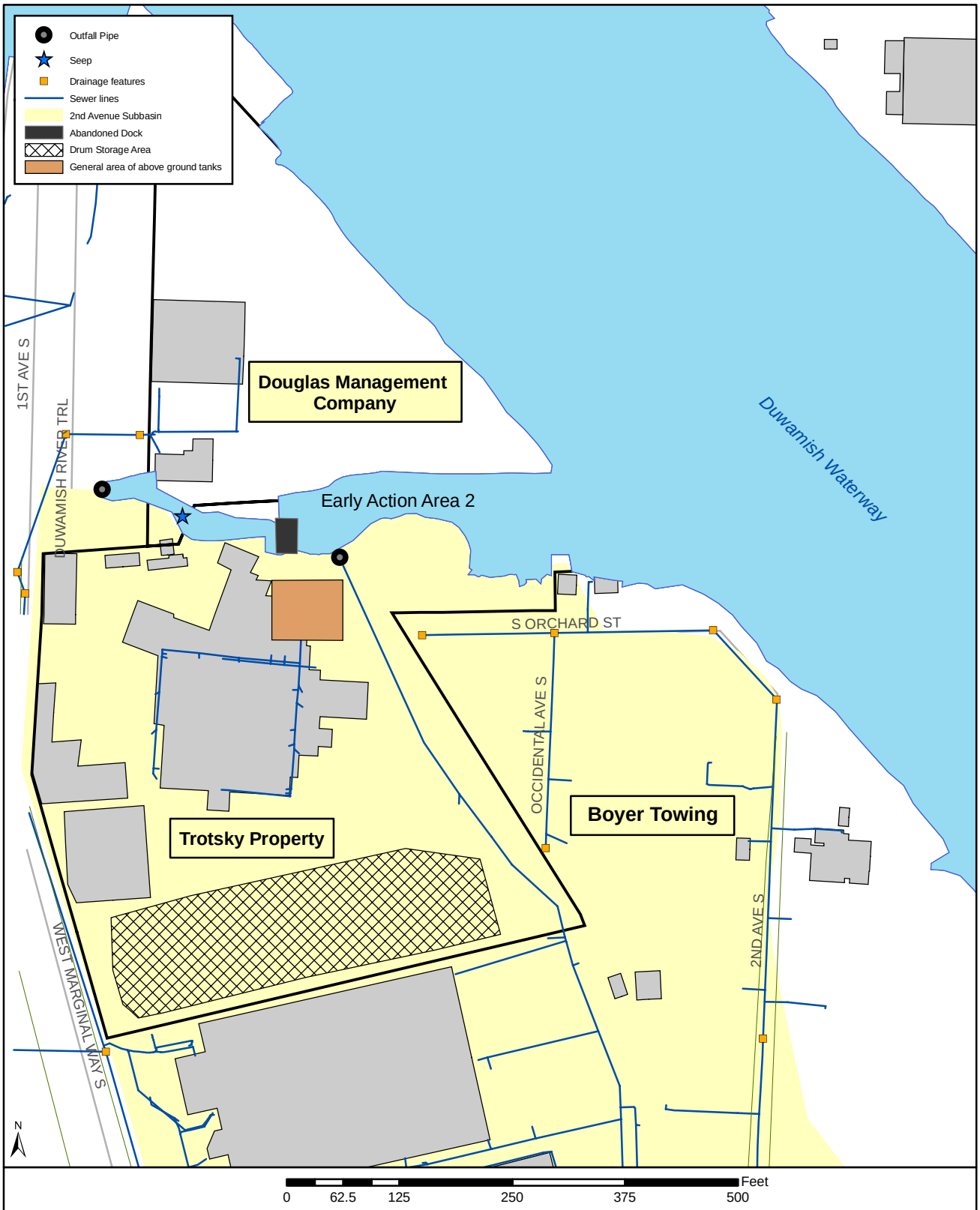

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Figure 3. Adjacent Properties — Early Action Area 2

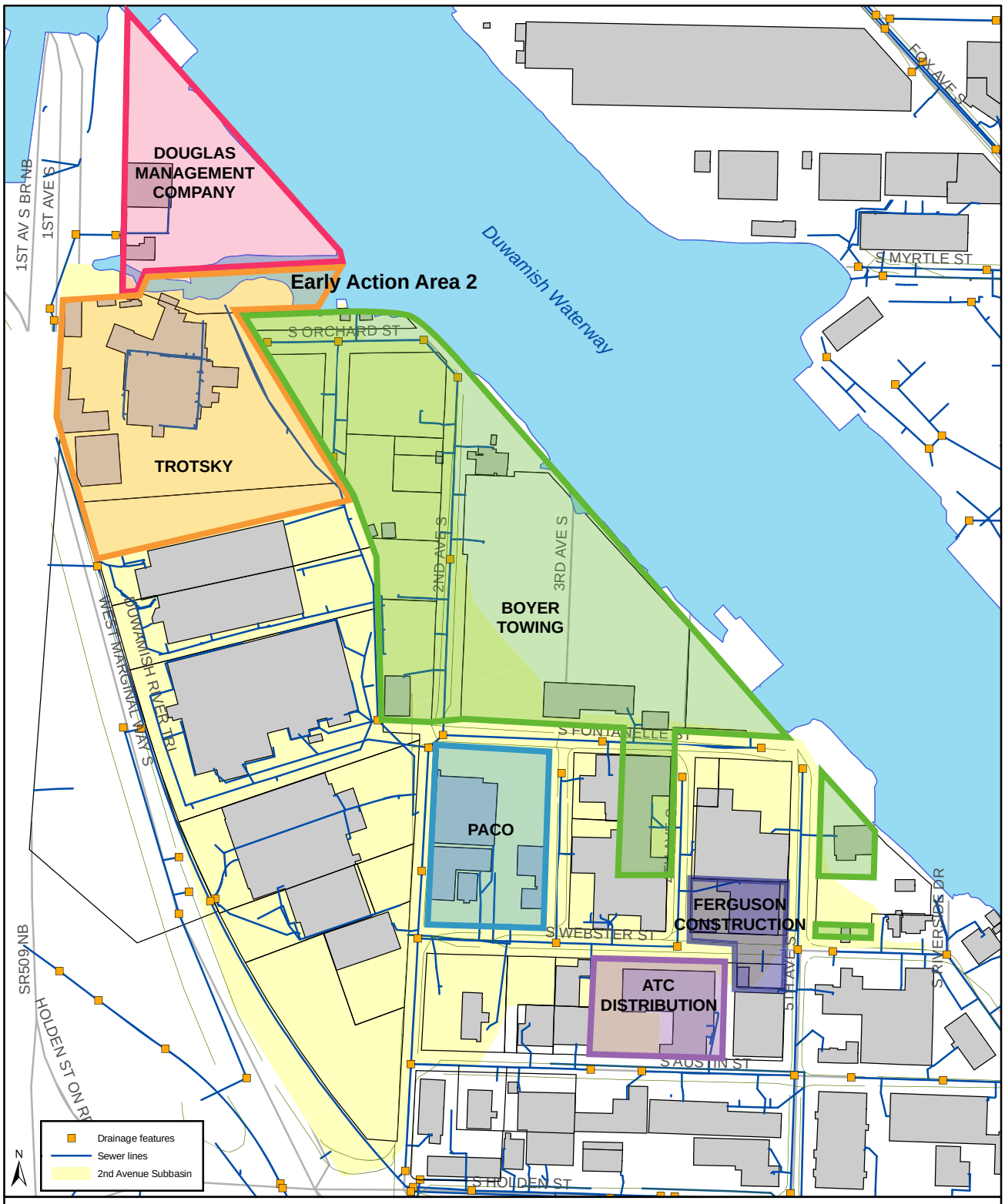

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Figure 4. Early Action Area 2 Property Ownership

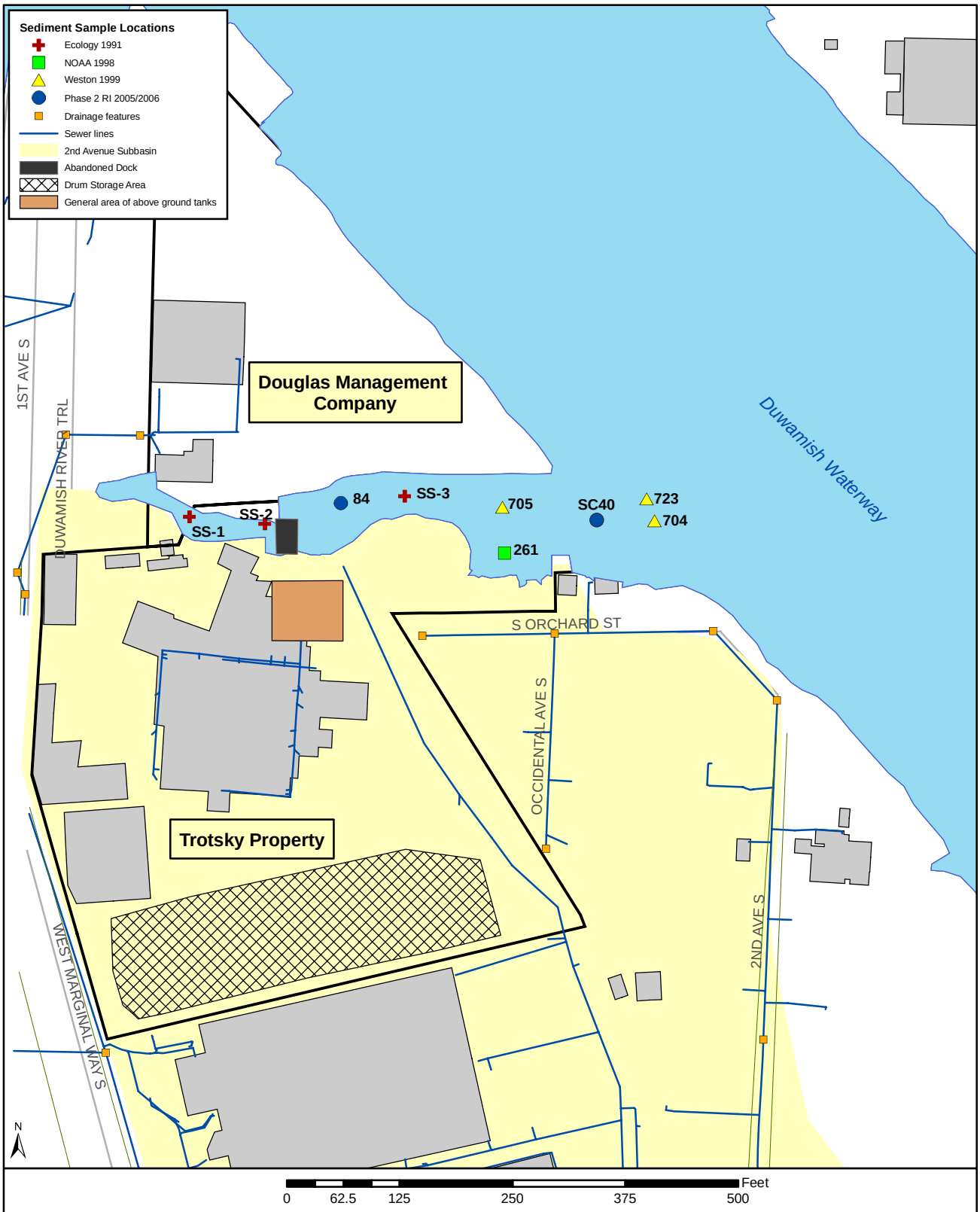
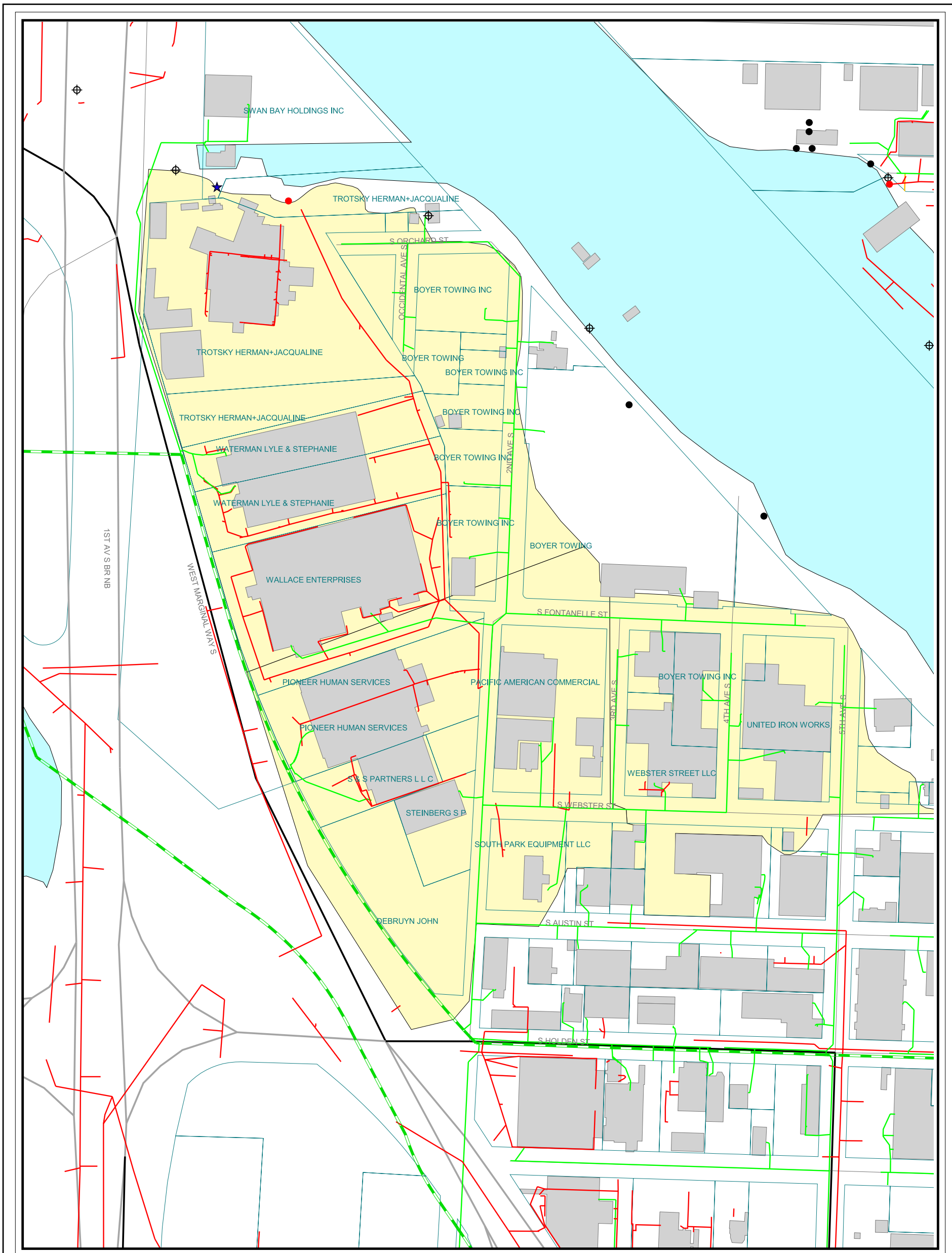


Figure 5. Sediment Sampling Locations — Early Action Area 2



Legend

Outfalls

- Abandoned pipe
- CSO-KC
- CSO/SD-City
- CSO/SD-SPU/KC
- Channel
- Private SD
- SD-City
- SD-KC
- SD-Port
- SD-WSDOT/City
- Seep
- Unk

Utilities

- Storm drain
- Sanitary sewer
- Combined sewer
- King County interceptor
- 2nd Ave S SD basin

100 0 100 200 Feet

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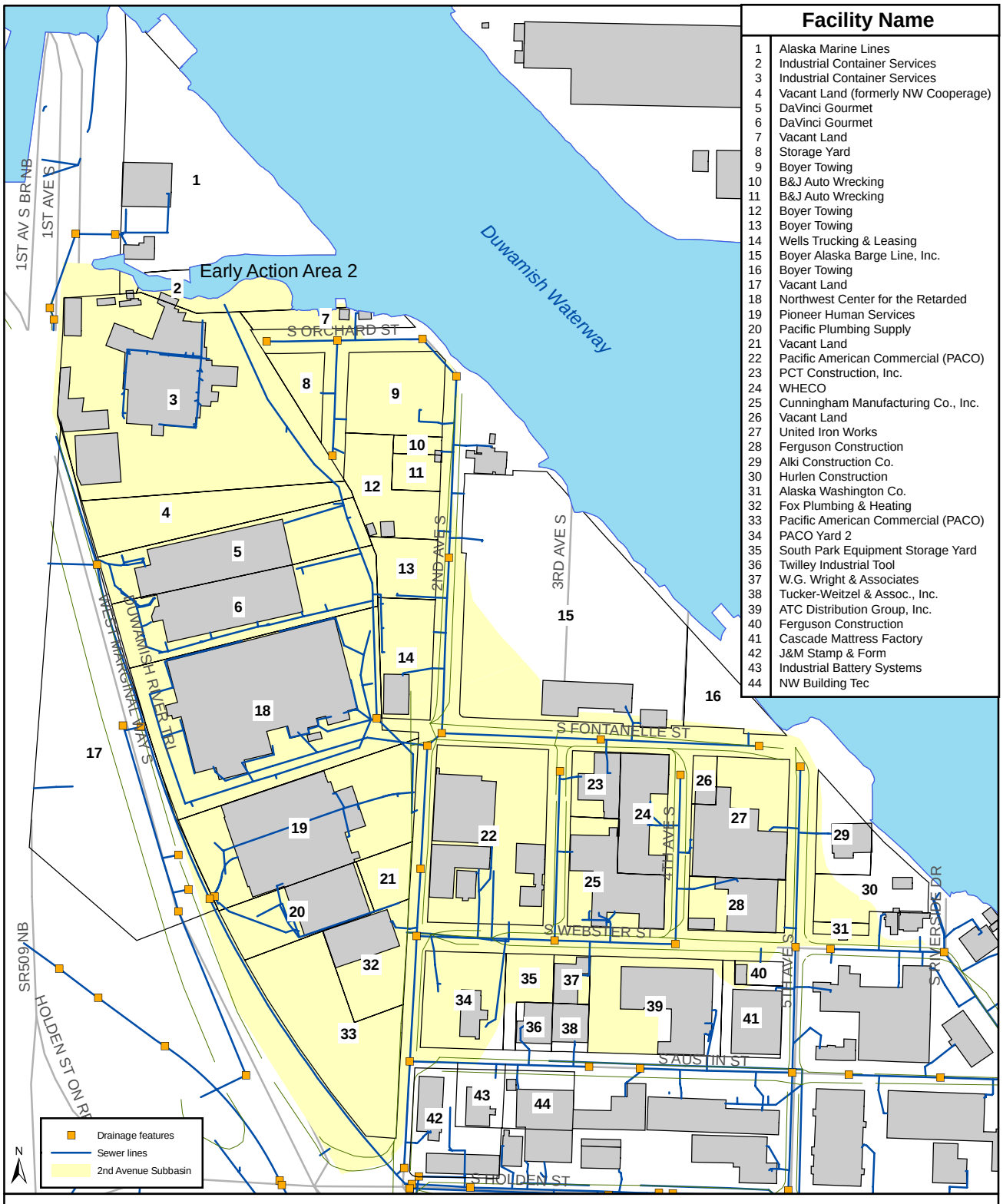
Figure 6. Early Action Area 2 Drainage Basin



Facility Name	
1	Alaska Marine Lines
2	Industrial Container Services
3	Industrial Container Services
4	Vacant Land (formerly NW Cooperage)
5	DaVinci Gourmet
6	DaVinci Gourmet
7	Vacant Land
8	Storage Yard
9	Boyer Towing
10	B&J Auto Wrecking
11	B&J Auto Wrecking
12	Boyer Towing
13	Boyer Towing
14	Wells Trucking & Leasing
15	Boyer Alaska Barge Line, Inc.
16	Boyer Towing
17	Vacant Land
18	Northwest Center for the Retarded
19	Pioneer Human Services
20	Pacific Plumbing Supply
21	Vacant Land
22	Pacific American Commercial (PACO)
23	PCT Construction, Inc.
24	WHECO
25	Cunningham Manufacturing Co., Inc.
26	Vacant Land
27	United Iron Works
28	Ferguson Construction
29	Alki Construction Co.
30	Hurlen Construction
31	Alaska Washington Co.
32	Fox Plumbing & Heating
33	Pacific American Commercial (PACO)
34	PACO Yard 2
35	South Park Equipment Storage Yard
36	Twilley Industrial Tool
37	W.G. Wright & Associates
38	Tucker-Weitzel & Assoc., Inc.
39	ATC Distribution Group, Inc.
40	Ferguson Construction
41	Cascade Mattress Factory
42	J&M Stamp & Form
43	Industrial Battery Systems
44	NW Building Tec

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Figure 7. Upland Properties Near Early Action Area 2

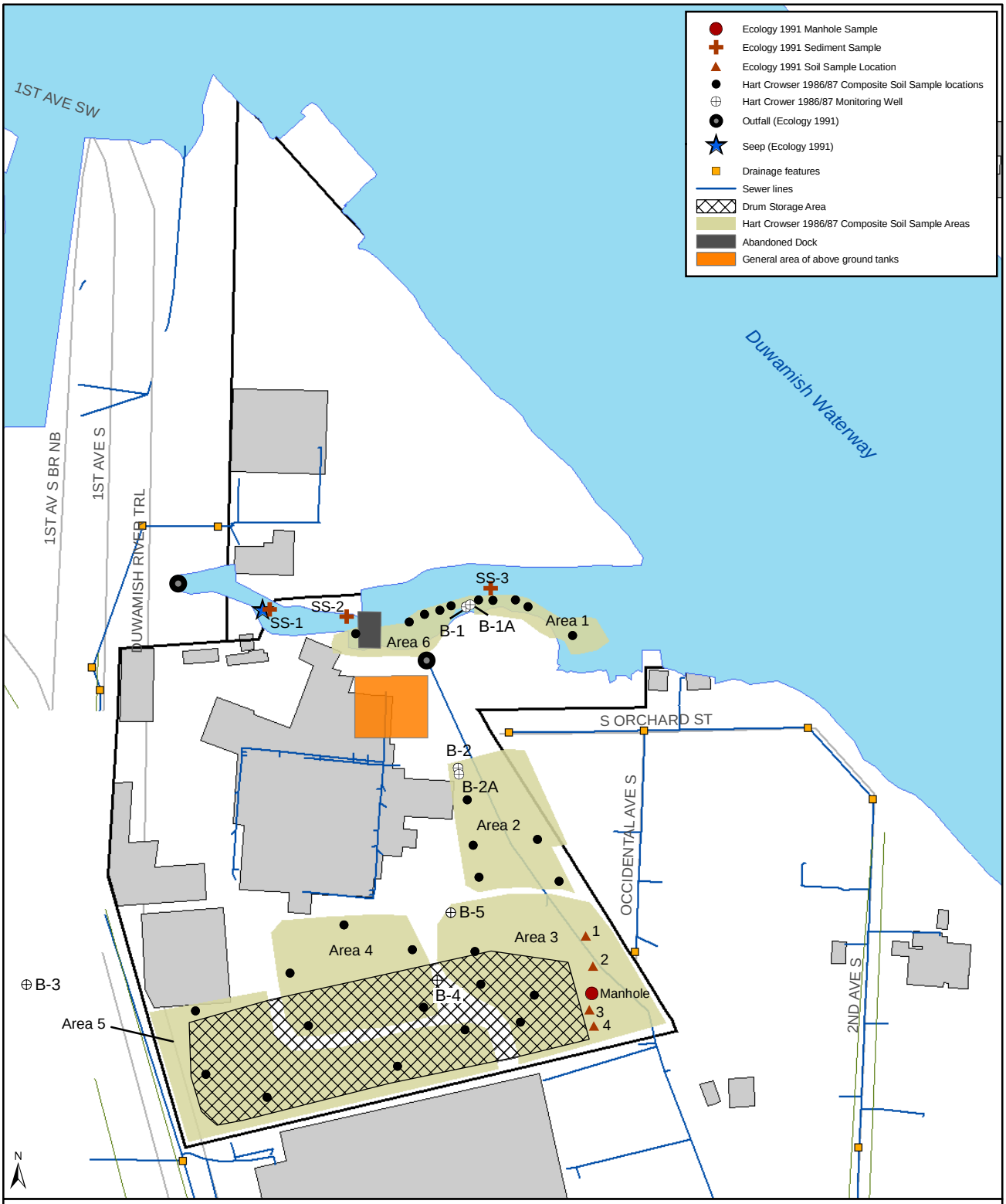

Figure 8. Sampling Locations — Trotsky Property