EAST WATERWAY OPERABLE UNIT
SUPPLEMENTAL REMEDIAL INVESTIGATION/ FEASIBILITY STUDY
SOURCE CONTROL EVALUATION APPROACH MEMORANDUM

For submittal to

The U.S. Environmental Protection Agency
Region 10
Seattle, WA

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1 INTRODUCTION

1.1 Purpose

The purpose of this Source Control Evaluation Approach Memorandum (Memorandum) is to provide a plan for the evaluation of potential sources to the East Waterway (EW), including a description of task objectives, strategy, approach, and relationships to the overall Supplemental Remedial Investigation and Feasibility Study (SRI/FS) process for the EW. This Memorandum describes the scope of the Source Control Evaluation approach in terms of technical and programmatic assumptions, the participating and cooperating parties (Port of Seattle [Port], City of Seattle [City], and King County [County]), and how source control-related programs and data implemented by those parties will be integrated into the SRI/FS. The Port, City, and County are coordinating on their Source Control Evaluation efforts for the EW to meet the U.S. Environmental Protection Agency's (EPA's) Source Control Evaluation requirements for the SRI/FS.

This memorandum is a required deliverable set forth in the SRI/FS Workplan for the EW Operable Unit (OU) (Anchor and Windward 2007), prepared in response to the Administrative Settlement Agreement and Order on Consent (ASAOC) and Statement of Work (SOW) (EPA 2006).

The primary purpose of this Memorandum is to describe how the evaluation of potential sources of sediment recontamination to the EW will be performed for the SRI/FS, and how this work will be coordinated with other SRI/FS activities described in the SRI/FS Workplan.

Other EW SRI/FS deliverables required as part of the source evaluation process include the Existing Information Summary Report (EISR), Conceptual Site Model (CSM), Data Gaps Analysis Report, and Quality Assurance Project Plans (QAPPs) and Data Reports. The SRI/FS tasks and their relationship to the Source Control Evaluation are discussed in more detail in Section 3.4.

1.2 East Waterway Site Background

The EW is bound on the west shore by Harbor Island and on the east shore by multiple properties, the largest of which are Terminals 25 and 30. The southern boundary of the EW is approximately in line with the southern end of Harbor Island, and the northern boundary

extends from the northern end of Harbor Island to just north of Slip 36 (on the east side of the EW) (Figure 1).

The EW has been identified as an OU of the Harbor Island Superfund Site. The Soil and Groundwater OU encompasses a majority of the Harbor Island shoreline along the west side of the EW site and addresses the cleanup of soil and groundwater within that OU.

SRIs were carried out for Harbor Island OU sediments under previous ASAOCs with EPA, beginning in 1994. Three marine sediment OUs, which have already received Records of Decision (RODs), were separated from the Harbor Island Marine Sediment OUs. The North Harbor Island Sediment area of interest was separated from the Harbor Island Sediment OU, leaving the EW Sediment OU as the only unfinished sediment OU. The current work on the EW is to establish a cleanup decision for this Harbor Island Sediment OU subunit.

The EISR will provide a discussion of previous sediment dredging and remediation activities, previous environmental investigations, information related to completed and current EW source control activities, figures illustrating the EW and vicinity (including EW stormwater and combined sewer drainage areas and locations of nearshore cleanup sites), and other relevant information.

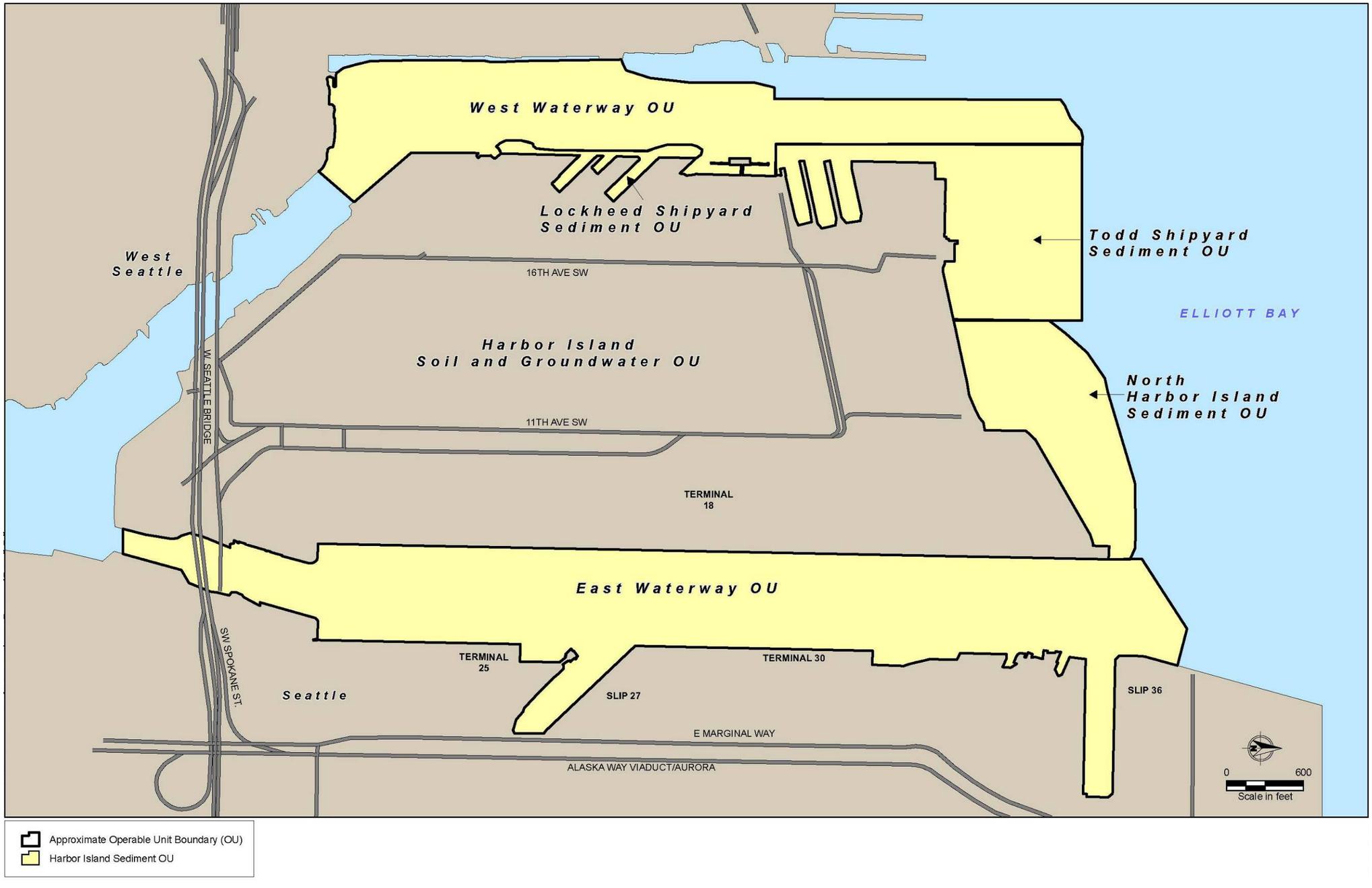

Figure 1 East Waterway OU Location

2 SOURCE CONTROL EVALUATION PARTICIPANTS

Completion of the SRI/FS, including the Source Control Evaluation described in this Memorandum, involves the coordinated efforts of the Port, City, and County. The Port, City, and County form the East Waterway Group (EWG) that is working jointly on the Source Control Evaluation. The EWG recognizes the need to evaluate potential sources of sediment recontamination and to coordinate source control activities with the SRI/FS during the course of the project.

The completion of the Source Control Evaluation will require the coordination of SRI/FS activities with other source control activities overseen by EPA. The Washington State Department of Ecology (Ecology) also may have a role in certain source control activities under its existing regulatory authorities and programs. The participants for the EW Source Control Evaluation are described below.

2.1 EW Source Control Team

The EWG recognizes the need to coordinate source control activities of the City, County, and Port during the SRI/FS process, particularly related to potential sediment contamination from stormwater and combined sewer overflow (CSO) discharges. To help ensure this coordination is achieved, the EWG members have created a source control team. The source control team meets periodically to work on the elements of the Source Control Evaluation described in the SRI/FS Workplan, including:

- Evaluation of the availability of representative stormwater and CSO discharge source control information required for completion of the current SRI/FS as described in the SRI/FS Workplan, including potential collection and analysis of new source-related data, and providing other information relevant to the SRI/FS Source Control Evaluation
- Coordination of the EW SRI/FS and the LDW RI/FS source control evaluation efforts, including application of appropriate stormwater and CSO discharge information and protocols derived for the LDW project to the EW to help expedite the Source Control Evaluation, avoid duplication of effort, and provide consistency between the two proximate waterways, and also including application of lessons learned from the LDW project

- Coordination with EPA and Ecology to enhance or accomplish specific stormwater and CSO discharge source control efforts under their regulatory authorities (e.g., enforcement actions, if needed), and enhance communication between these agencies and the EWG members

The EW source control team consists of staff and consultants from the Port of Seattle, City of Seattle, King County, and members of the EW SRI/FS consultant team. EPA will be formally updated on the work and progress of the source control team on stormwater and CSO discharges through regularly-scheduled updates during the EW SRI/FS monthly meeting. For those meetings, a specific agenda item on Source Control Evaluation will include an update on source control evaluation and source control activities of the SRI/FS team, the source control team, and individual EWG members. In addition to the SRI/FS monthly meetings, focused meetings with EPA and Ecology will be held as needed to complete the work described in this memorandum.

2.2 Port of Seattle

The Port is the lead among the EWG members for completion of the SRI/FS. As indicated in Table 1, the Port is a participant in several source control programs. The Port owns stormwater systems that discharge directly to the EW, or indirectly through municipal-owned outfalls located along both the east and west sides of the EW. The Port is developing and conducting source-tracing investigations and sampling within these drainage areas in coordination with the City. The Port will also be conducting inspections of Port and tenant properties as part of its formal Environmental Compliance Assessment Program. The Port and its tenants are responsible for compliance with existing stormwater regulations, including ongoing development of the Phase 1 National Pollutant Discharge Elimination System (NPDES) permit requirements. The Port also manages or participates in environmental cleanup activities at several Port-owned properties along the EW shoreline. These cleanups are overseen by Ecology or EPA. Finally, as a member of the Lower Duwamish Waterway Group (LDWG), the Port is participating in activities to complete the RI/FS of the LDW.

Table 1
Summary of Individual Source Control Activities Relevant to the East Waterway

Source Control Team Participant	Programs	Source Control-Related Activities
Stormwater and CSO-Related Activities		
City of Seattle – Seattle Public Utilities	NPDES permit requirements for City-owned storm drainage system and CSOs NPDES Phase I Municipal Stormwater Permit Compliance Program Ongoing Source Control Program (City-wide)	• Help develop source control plans that address chemical sources associated with City-owned storm drain systems discharging to the EW • Inspects industrial and commercial businesses and other regulated activities located within the stormwater and CSO drainage basins • Conducts source identification sampling and inspections within City-owned storm drainage areas • Coordinates source control for tracing activities with the County and Port of Seattle, as appropriate
King County	NPDES permit requirements for County-owned CSOs Federal- and state-delegated pretreatment program for industrial users of the County sewerage system	• Help develop source control plans that address chemical sources entering the sanitary systems discharging to the EW • Inspect industrial and commercial businesses and other regulated activities entering the sanitary systems discharging at CSOs to the EW • Continue implementing CSO control program and related requirements under the County's NPDES permit program • Conducts source identification sampling in CSO drainage basins • Coordinates source control activities within CSO drainages with the City, consistent with existing City and County agreements and regulations
Port of Seattle	NPDES stormwater permit requirements	• Help develop source control plans that address chemical sources associated with Port properties that discharge stormwater directly to the EW • Conduct source identification sampling and site inspections in Port-owned or controlled stormwater drainage basins • Provide access and cooperate with municipal entities to achieve source control where Port properties discharge stormwater to municipal systems • Continue implementing stormwater-related requirements under the Port's NPDES permit program, including assurances that regulated industrial Port tenants prepare and maintain stormwater pollution prevention measures
Other General Activities		
City of Seattle – Seattle Public Utilities	Industrial and commercial inspections	• Enforce City's existing regulatory authority by using City Code to control stormwater chemicals from facilities within City limits
King County	Industrial and commercial inspections	• Enforce County's regulatory authority to correct unauthorized discharges of chemicals to the sanitary and combined sewer system
Port of Seattle	Port maintenance activities and tenant inspections Contaminated property remediation and monitoring (multiple sites)	• Conduct stormwater inspections and other activities related to Port-owned facilities as required by the Phase 1 NPDES Municipal Stormwater Permit • Evaluate and remediate, as necessary, contaminated upland properties where groundwater may be a potential source to the EW

2.3 City of Seattle

The City owns stormwater collection systems that discharge directly to the EW and separated and combined sewer systems that discharge to the larger County-owned sewer system. The City also operates the combined sewer system that discharges to the EW at Hinds Street. City storm drain systems and the CSO are operated and regulated under NPDES permits issued by Ecology (Ecology 2005a).

Under the Stormwater, Grading, and Drainage Control Code (SMC 22.800) and the Side Sewer Code (SMC 21.16), the City has legal authority to regulate discharges to storm drain and sanitary sewer systems and to prohibit illicit discharges within City limits. The stormwater code is supplemented by four technical manuals that set guidelines for designing stormwater collection, detention, and treatment systems; requirements for stormwater pollution prevention and source control; and requirements for construction stormwater controls.

The City has a long-standing, regionally recognized, source control program that has been successful at identifying sources and businesses practices that have recontamination potential. The program is aimed at working with business owners to minimize the amount of pollution discharged from private facilities by implementing appropriate pollution prevention practices and Best Management Practices (BMPs). This program has already canvassed the EW drainage area in 2005, but will inspect high-priority facilities in the EW basin for the EW Source Control Evaluation effort. In addition, the source control program will be collecting sediment samples throughout the conveyance system to trace sources of contamination through the conveyance system.

The City, along with the County, was a member of the Sediment Phthalates Work Group, which engaged in a regional effort to better understand how phthalates reach sediments in Puget Sound. One of the conclusions of the group was that aerial deposition was a factor in phthalate sources. Additionally, the City is evaluating the City-owned CSOs at select locations within Seattle in accordance with NPDES CSO permit requirements, to add to the existing monitoring data on the chemical composition of discharges. As a member of the LDWG, the City is participating in activities to complete the RI/FS of the LDW.

2.4 King County

The County owns the large combined sanitary/stormwater interceptor collection and conveyance systems and operates those systems under the NPDES permit issued to the County by Ecology (Ecology 2005b). The County, in cooperation with the City, is implementing a multi-year CSO reduction program, aimed at reducing the frequency and volumes of CSO discharge events.

Together with other participants, the County has been active in evaluating potential airborne chemical loading (i.e., polychlorinated biphenyls [PCBs] and phthalates) in the greater Duwamish area, and was a member of the Sediment Phthalates Work Group.

As a regulatory agency, the County administers the "[p]ermits, licenses, orders, decrees, [and] notices issued pursuant to King County Code Title 28, Metropolitan Services including Ch. 28.84 Water Pollution Abatement, especially Section 28.84.060, Industrial Waste Rules and Regulations" (Ecology 2004). These authorities apply to County municipal and industrial wastewater (including certain types of industrial stormwater discharged to the County system). These regulations form the basis for the County's source control activities, which it conducts in cooperation with other participants in the upland drainage areas. The County has the authority to regulate permitted industrial discharges to its sewer system and can take specific actions where necessary to address source-related concerns. As a member of the LDWG, the County is also participating in activities to complete the RI/FS of the LDW.

2.5 SRI/FS Consultants

The EW SRI/FS consultants are responsible for implementing the SRI/FS activities as defined in the ASAOC and the EPA-approved SRI/FS Workplan. These activities include development of the SRI/FS documents, including the Sediment Transport Evaluation. Specific to the Source Control Evaluation, tasks the SRI/FS consultants are responsible for include the following:

- Developing the Source Evaluation and Data Gaps Memorandum
- Coordinating with the EWG, source control team, and EPA regarding stormwater and CSO Source Control Evaluation issues

- Coordinating with other parties (e.g., Harbor Island Soil and Groundwater OU Group) as necessary, to obtain additional information about sources or pathways
- Supporting the other SRI/FS tasks, such as the Sediment Transport Evaluation, that may use Source Control Evaluation data

2.6 EPA and Ecology Roles

EPA is responsible for overseeing the implementation of the SRI/FS, and managing community involvement activities for the SRI/FS. EPA will manage formal communications with the stakeholders and the public relating to SRI/FS activities. As requested by EPA, the EWG will provide Source Control Evaluation information supporting EPA's community involvement programs related to the work performed pursuant to the overall SRI/FS Workplan, and will participate in public meetings that may be held or sponsored by EPA. The EPA must approve all deliverables produced as part of the SRI/FS, including the Initial Source Evaluation and Data Gaps Memorandum. Recontamination predictions will be provided in the Feasibility Study report, of which EPA approval is required prior to a cleanup decision.

Work performed as part of other source control programs will continue to be subject to regulatory reviews appropriate to the individual programs under which that work is conducted. EPA plays important roles in other regulatory programs related to source control, such as overseeing the cleanup activities at the Harbor Island Soil and Groundwater OU, and overseeing federal air quality and spill prevention and response programs.

Ecology is participating in the reviews of SRI/FS deliverables, in coordination with EPA. Ecology is also the lead agency responsible for many of the source control regulations, authorities, and programs listed in Table 1. It is expected that Ecology will continue to fulfill its authorized roles in these programs, and will assist the EWG and EPA in follow-up activities that may be appropriate to address source control concerns that could potentially be identified during the current evaluation. This may involve participation in meetings with the EWG and EPA, initiation of site inspections at specific properties, or other agency activities. Ecology will manage public involvement activities related to its existing programs and authorities.

The EW SRI/FS Workplan calls for the EWG and its consultants to meet with EPA on a monthly basis throughout the duration of the SRI/FS process to provide an update on progress and to discuss technical issues as necessary. These updates will include progress or special briefings as necessary to advise EPA of status and key findings of the Source Control Evaluation. Additional meetings will be scheduled on an as-needed basis and around key Source Control Evaluation task milestones.

2.7 Public Involvement

As described in the SRI/FS Workplan, EPA will coordinate community involvement and distribution of information to stakeholders. As requested by EPA, the EWG will provide information supporting EPA's community involvement programs related to the work performed pursuant to this source control evaluation. It is anticipated that EPA will seek review and comments from interested stakeholders on key source control-related deliverables, including this memorandum and the Initial Source Evaluation and Data Gaps Memorandum. Upon request by EPA, EWG will also participate in other stakeholder/trustee meetings.

3 SOURCE CONTROL EVALUATION APPROACH

3.1 Source Control Evaluation Goals

The overall goal of the EW SRI/FS Source Control Evaluation is to understand the potential for ongoing sources to cause sediment recontamination after completion of remedial actions within the EW. Specific goals of the evaluation, as defined in the SRI/FS Workplan, include:

1. Identifying potential sources of contamination to EW sediments
2. Understanding the potential for these sources to recontaminate the EW sediments
3. Assessing the role of ongoing sources on the CSM for the EW
4. Defining a process for identifying source control data gaps relevant to SRI/FS conclusions, and identifying a process for collecting relevant field data, if necessary
5. Providing a basis for evaluating recommendations for managing sources through efforts such as inspections, investigation, or other actions and identifying the processes and authorities for source control activities to continue post-ROD in the EW area
6. If applicable, a prediction of potential recontamination and its effect on a cleanup decision

The SRI/FS Workplan also specifies that if Source Control Evaluation data gaps relevant to the SRI/FS conclusions are identified, then these data gaps will be described in a deliverable submitted to EPA for review and approval following the Source Control Evaluation Approach Memorandum. The deliverable will identify how those data gaps will be filled in parallel with the other SRI/FS activities.

3.2 Existing Source Control Information

The EISR will present a summary of relevant information regarding potential sources and completed and ongoing Source Control Evaluation activities. Figure 2 illustrates the range of potential ongoing chemical sources. Table 2 provides a summary of information relevant to each of these sources. This information will be reviewed as part of the EISR. A brief description of these types of sources commonly present in industrialized river/estuary systems is provided below:

- **Over-water Uses and Spills:** Sediment contamination can occur through direct discharge of pollutants to the water body from over-water uses and spills. The potential for spills and unintentional discharges from over-water uses have been

generally reduced through improved material and cargo handling technologies and methods; centralizing of fuel/product transfers at specialized and controlled facilities; spill contingency planning and spill prevention and countermeasure regulations managed by various federal, state, and local regulatory programs; and pollution control measures implemented by industries. These measures require reporting of spill events and implementation of cleanup measures after spills are reported.

- **Wastewater Discharges:** The term "wastewater" is used here to describe wastewaters other than CSOs and stormwater discharges. Currently, there are no reported permitted municipal or industrial wastewater outfalls within the EW. Domestic and industrial wastewater discharged to local sanitary sewers is conveyed to the County's West Point Wastewater Treatment Plant (WWTP) in the Magnolia neighborhood of Seattle, where these wastewaters are treated prior to final discharge at the West Point WWTP outfall in Puget Sound.
- **Combined Sewer Overflows:** Municipal sewer systems collect water from a variety of industrial, commercial, and residential facilities. In portions of older urban areas, including portions of the EW drainage basin, the sewer and stormwater systems are not completely separated and the flows of sewage and stormwater can exceed the capacity of the sewer conveyance system during extreme rain events. To prevent system failures (e.g., sewage backflows onto streets) overflow outfalls are used to discharge combined flows of sewage and stormwater to surface waters when the flow volume exceeds the storage and transport capacity of the combined sewer conveyance system. These CSO structures are regulated by state permits. In the vicinity of the EW, City and County CSO control programs are intended to ultimately reduce overflow discharge frequency and severity.
- **Stormwater Discharges:** Municipal and private stormwater systems have been installed in urban areas to convey excess rainfall or snowmelt runoff from developed areas to surface water discharge points. In some cases, these systems are completely separate from municipal sanitary sewer and CSO systems (i.e., separated stormwater piping and discrete stormwater outfall locations) and, therefore, consist of just stormwater. Stormwater can entrain pollutants from the atmosphere, and can become contaminated through contact with pollutants on the ground. Stormwater regulations and permit programs have been developed to regulate stormwater

quality. These regulations include requirements for stormwater source control and treatment applicable to different types of land uses and site conditions.

- **Nearshore Contaminated Sites:** In some cases, contaminated sites located in nearshore areas (nearshore cleanup sites) can result in recontamination of adjacent sediments through one of three mechanisms. Where the shoreline is actively eroding, contaminated soils may enter the water body directly, potentially resulting in localized sediment contamination. At most locations within the EW, the existing sea walls and armoring of shorelines minimize the potential for this type of contamination by controlling shoreline erosion. The second potential mechanism is the discharge of contaminants via groundwater, either as dissolved contaminants or as product seepages in locations where nonaqueous phase liquids (NAPLs) may be present in proximity to the shoreline. The third mechanism by which cleanup sites can affect sediment quality is through discharge of soil-adsorbed pollutants through overland flow, into stormwater, or through seepage of contaminated groundwater into damaged storm drainage systems.
- **Sediment Transport:** Resuspension, transport, redeposition, and accumulation of sediments can result through a combination of processes. Sediments can be disturbed, resuspended in the water column, and then carried by currents and waves to redeposit in new locations. For the EW, sediment transport could potentially include transport of upriver sediments into the EW from the Green/Duwamish River system, from the Lower Duwamish Waterway (LDW), or inshore from Elliott Bay during flood tides. Similarly, sediments could potentially be transported from the EW to Elliott Bay. Sediment transport in the EW is being evaluated as part of the SRI/FS, consistent with the SRI/FS Workplan.
- **Atmospheric Deposition:** Airborne pollutants can reach sediments through the deposition of airborne particulate matter directly onto the water or onto surfaces within the drainage basin. This can occur directly (e.g., settling of dust onto the water body or entrainment of dust into precipitation that falls on the water body) or indirectly (e.g., transport of atmospheric contaminants to the water body through stormwater).

While some of these sources are intermittent or "non-point" in nature (e.g., atmospheric deposition or accidental spills), others potential sources such as CSOs, stormwater outfalls,

and nearshore cleanup sites are associated with specific locations along the EW. The locations of these potential sources are shown on Figure 3. Relevant information available for these sources is being compiled as part of the EISR.

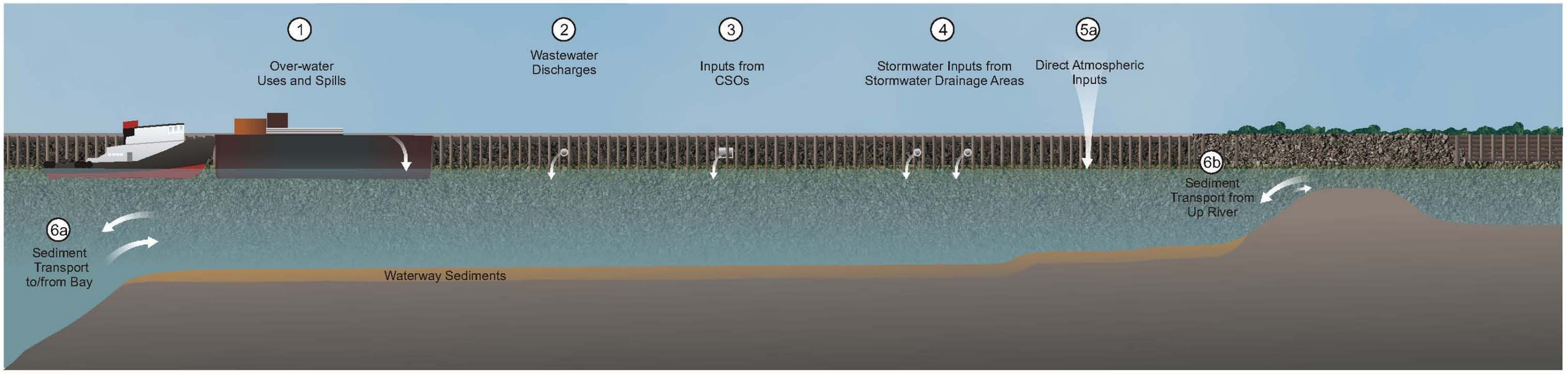

Figure 2 Types of Potential Ongoing Sources Evaluated

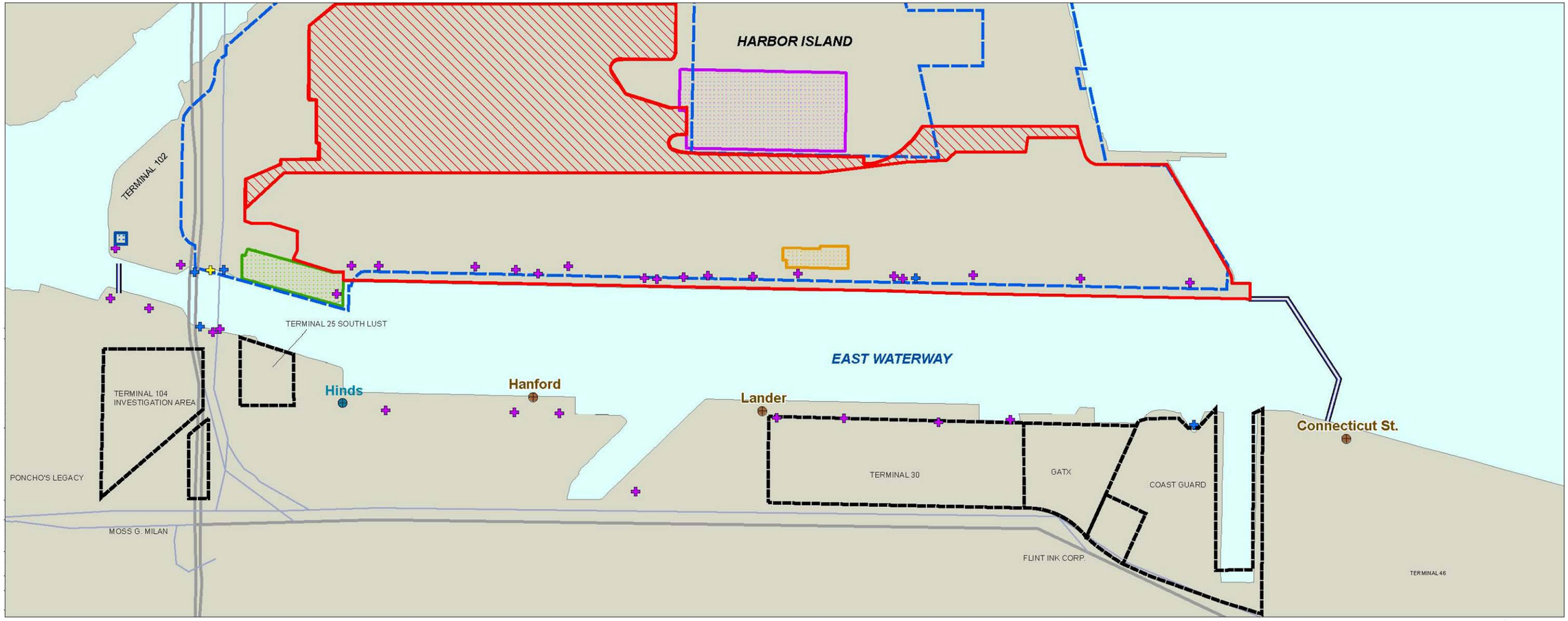

Figure 3 Locations of CSOs, Stormwater Outfalls, and Nearshore Cleanup Sites

Table 2
Preliminary Overview of Existing Information for Sources to the East Waterway [1]

Information Type	EW Investigation and Monitoring Data		Preliminary Information Regarding Potential Ongoing Sources						
	Surface and Shallow Subsurface Sediment Data	Phase 1 Cover Recontamination Monitoring	Over-Water Uses and Spills	Wastewater Discharges	CSO Discharges	Stormwater Discharges	Nearshore Cleanup Sites	Atmospheric Deposition	Sediment Transport
Overview	Characteristics of current sediments within the EW	Monitoring of recontamination for Phase 1 Removal Area	Recent reported releases of petroleum and hazardous materials to the EW	Documented wastewater discharges to the EW	Permitted discharges from combined sewer overflows in and adjacent to the EW	Stormwater discharges to the EW, including potential discharges of stormwater-entrained pollutants	Migration of groundwater from upland cleanup sites located along the EW into the EW	Direct deposition of atmospheric pollutants onto the EW, and indirect deposition onto adjacent areas draining to the EW	Potential transport of impacted sediments from the LDW or Elliott Bay into the EW
Relevant Regulatory Authorities	Ongoing CERCLA RI/FS process	Ongoing CERCLA RI/FS process and non-time- critical removal action	State and federal spill prevention and reporting regulations	State and federal waste discharge permitting with primary oversight by Ecology	NPDES permitting and associated CSO control programs	State, federal, and local stormwater regulations	CERCLA (Harbor Island) and MTCA (other sites) cleanup programs	Federal, state, and local air quality regulations	LDW RI/FS-CERCLA cleanup process (LDW sediments) and MTCA Source Control Program; CERCLA and MTCA cleanup programs (Elliott Bay sediments)
Lead Regulatory Agencies	EPA	EPA	Ecology, U.S. Coast Guard, EPA	Ecology	Ecology	Ecology	EPA (CERCLA projects) and Ecology (MTCA projects)	EPA, Ecology, Puget Sound Clean Air Agency	EPA
Lead Parties Associated with Completed and Current Source Control Activities	EWG and other potentially responsible parties	EWG and other potentially responsible parties	Parties handling petroleum and hazardous substances	Industrial or municipal dischargers	City (Hinds Street CSO) and County (Lander, Hanford #2, and Connecticut Street CSOs)	City, County, and Port in coordination with the Washington State Department of Transportation, property owners, and private businesses within the stormwater drainage basins	Harbor Island Soil and Groundwater OU Group (Harbor Island), Port of Seattle (multiple sites), U.S. Coast Guard (Pier 35)	Operators of regional air pollution point sources, operators of global point sources, and contributors to non-point source air pollution	Various parties including LDWG members and other potential responsible parties for LDW sediments, parties associated with point and non-point sources for LDW water quality, and parties associated with sediments located in Elliott Bay
Time Period of Relevant Information	Relevant site investigations and cleanup activity (1983-2007). Sediments include historically-deposited materials.	Year 1 and Year 2 Monitoring Events (2006-2007)	Spill history last 5 years (2003-2007)	Current permitted discharges (2006-2007)	Recent CSO program and monitoring information (1997-2007)	Recent stormwater system and sampling data (1998-2007)	Relevant site cleanup and sampling information (1985-2007)	Recent regional studies (2004-2007)	Relevant transport studies and supporting information (1970s-2007)
Information Regarding Quantity, Frequency, or Solids Loadings	Evaluations of sedimentation patterns	Measurements of thicknesses of accumulated sediments within monitoring area	Documented release history for evaluation period including estimated quantities reported	No confirmed discharges identified	CSO flow monitoring performed by City and County. Whole-water TSS measurements as part of sampling between 1997 and 2004. SPU estimates average CSO solids loadings as 122 mg/L.	Drainage basin mapping land use information and rainfall data are available (can be used to estimate stormwater quantities). Literature reviews identify typical stormwater TSS loadings as 82 to 85 mg/L.	Eleven cleanup sites identified in EW nearshore area. Detailed groundwater studies performed as part of Harbor Island and Terminal 30 sites.	Monitoring of airborne particulate matter concentrations and measurements of pollutant flux during regional studies	Previous studies are available regarding hydrodynamic and sediment transport behavior within the LDW, EW, and Elliott Bay
Available Information Regarding Contaminants	Frequently detected contaminants include PCBs, BEHP, BBP, 1,4-dichlorobenzene, mercury, indeno(123-cd)pyrene, and acenaphthene	Contaminants frequently detected in excess of SQS in cover materials include PCBs and 1,4-dichlorobenzene. Other exceedances detected include mercury, BEHP, BBP, and phenol.	Most (57 of 64) releases associated with petroleum products. Additional releases reported for sewage/human waste, sodium hydroxide and silver, paint thinner, xylene and cresols, and unidentified drum contents.	No data (no identified ongoing discharges)	Whole-water sampling data are available for County CSOs from 1997-2004 sampling period. Frequently detected contaminants included phthalates, 1,4-dichlorobenzene, metals, select PAH, acetone, and methylphenols. Catch basin sampling data are available for areas within the Hanford/Lander CSO drainage basin. Contaminants detected in excess of SQS in catch basin solids included phthalates and metals, with sporadic exceedances of SQS for PCBs and 1,4-dichlorobenzene.	Catch basin and in-line sampling data are available for the Lander and nearshore drainage basins. Contaminants detected in catch basin solids in excess of SQS include BEHP, BBP, copper, and zinc, with sporadic exceedances of SQS for PCBs, mercury, and lead.	Contaminants of concern vary with site. Most common contaminant of concern at nearshore sites is petroleum, though no exceedances of cleanup levels were identified in shoreline areas. Other groundwater contaminants (copper, zinc, cyanide) identified in one nearshore area at Harbor Island.	Deposition sampling data available for phthalates, PCBs, and PAH compounds. Airborne pollutant information available for heavy metals and selected other toxic pollutants.	Sediment contaminant data available from LDW, EW, and Elliott Bay studies. Sediment trap and deposition measurements available from EW studies.

1. Preliminary summary – additional detail to be provided in the EISR.

BBP – butylbenzyl phthalate
BEHP – bis(2-ethylhexyl)phthalate
PCBs – polychlorinated biphenyls
SPU – Seattle Public Utilities
SQS – Sediment Quality Standards
TSS – total suspended solids

3.3 Focus of Source Control Evaluation

The focus of the Source Control Evaluation is to establish the status of potential, ongoing sediment contamination sources for the EW. Timely completion of this evaluation will ensure that information is available to inform cleanup decisions for the EW and future source control efforts.

Completion of the Source Control Evaluation will require coordination of SRI/FS activities (including the SRI/FS sediment transport evaluation) with the source control activities being performed by EWG members and other parties. Figure 4 illustrates the relationship between the Source Control Evaluation, planned SRI/FS activities, and coordinated source control efforts.

The Source Evaluation and Data Gaps Memorandum will use existing information to estimate the potential contribution of each source to sediment recontamination. This evaluation will be conducted using the methods described in Section 4, and will include an estimate of overall solids and chemical loadings to the EW. This process will use existing data and new data collected as part of Source Control Evaluation activities, including those currently underway.

Where existing data are determined to be insufficient to evaluate a source, it may be necessary to develop estimates of chemical concentrations based on surrogate information (i.e., stormwater sampling results from similar land use types), or gather new information through site-specific field investigation and sampling activities. Some of these data may be developed through ongoing or planned sampling activities conducted by EWG members. New sampling activities may be conducted by EWG members or coordinated group action if critical for addressing data gaps or for better understanding potential recontamination mechanisms. Sampling activities will be coordinated to the extent possible so that the types and quality of data generated are adequate to support the Source Control Evaluation and SRI/FS process.

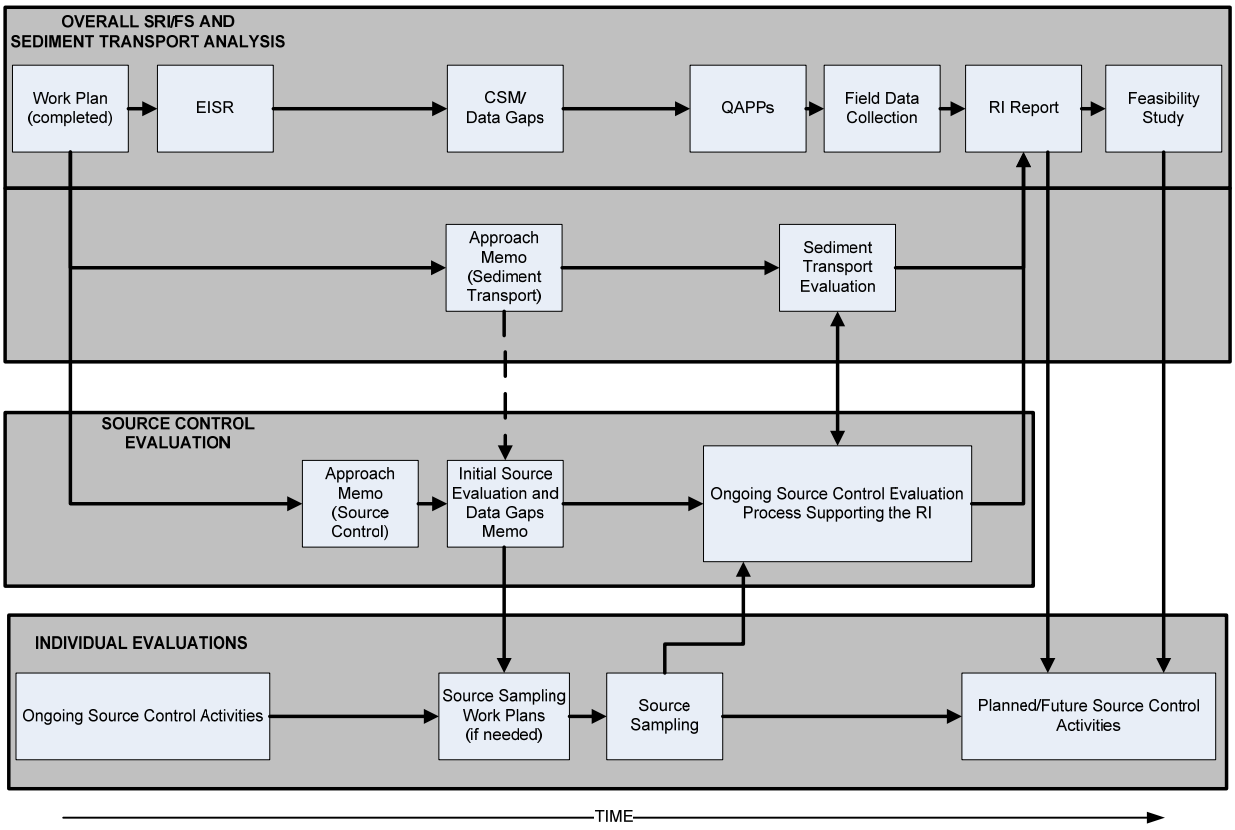

Figure 4 Source Control Evaluation and Relationship to East Waterway SRI/FS Activities

Notes:

EISR: Existing Information Summary Report – A large amount of work has already been conducted to characterize conditions in the EW. This information, together with newly-identified data, will be compiled in the Existing Information Summary Report. The EISR document will contain a section specifically addressing source-related data and information.

CSM: Conceptual Site Model – The SRI will include development of CSMs for physical processes, ecological receptors, and the Human Health Risk Assessment. The description of physical processes will include consideration of potential source-related inputs including groundwater from adjacent uplands, storm drain and CSO discharges, and other inputs.

Work Plans: Work Plans, including appropriate sampling and quality assurance procedures, will be developed for all new sampling efforts identified in the Data Gaps Analysis Report. Each field study and modeling effort that is conducted (if required) will result in draft and final data reports. If Work Plans should be needed for source control-related field work or modeling, these will be developed and implemented by the EW source control team members. Any data collected and associated quality assurance/quality control (QA/QC) information will be incorporated into a shared database.

3.4 Relationship of Source Control to Future Activities

In many instances, existing regulatory authorities and programs of the EWG members, EPA, and Ecology are already implementing Source Control Evaluation activities (see Tables 1 and 2). These programs do not preclude collection of additional data relevant to source

management if this data is determined necessary by EPA. If necessary, these programs can be modified as appropriate to address new data requirements and to meet the relative importance of each source category as it becomes better understood.

As indicated in Figure 4, the source control evaluation is being coordinated with other SRI/FS activities, including the evaluation of sediment transport. Specifically, information on lateral loads inputs from combined sewer overflows (CSOs) and storm drains or other sources will be developed as part of the Source Control Evaluation for use in the Sediment Transport Evaluation (STE). The STE will incorporate lateral solids inputs in development of the hydrodynamic and sediment transport model. The FS report will integrate the results of the STE and Source Control Evaluation work, along with the results of the risk assessments and other SRI activities to estimate potential areas of sediment recontamination. The FS report will evaluate the potential effects of sediment recontamination on EW sediment cleanup.

It is expected that the results of the EW SRI/FS will inform Source Control Evaluation efforts. The EW cleanup decision will include an assessment of source control. The SRI/FS, including the source control evaluation work, will provide the information necessary for this assessment. If the potential for sediment recontamination from ongoing sources is predicted to be significant, these predictions will provide a basis for identifying and focusing the types of control measures, including potential upland cleanup actions, that may be effective in minimizing the potential for recontamination. This information will be available to help guide source control efforts and source control actions that may continue post-ROD in the EW area, including such efforts as inspections, investigations, or other actions.

4 INITIAL SOURCE EVALUATION AND DATA GAPS MEMORANDUM

4.1 Source Evaluation Process

The Source Evaluation and Data Gaps Memorandum will include an initial evaluation of potential ongoing sources to the EW and a summary of identified data gaps relevant to these potential sources. Figure 5 illustrates the process for the potential source identification analysis and how the overall EW SRI/FS information and data requirements (related to source control) will be fulfilled.

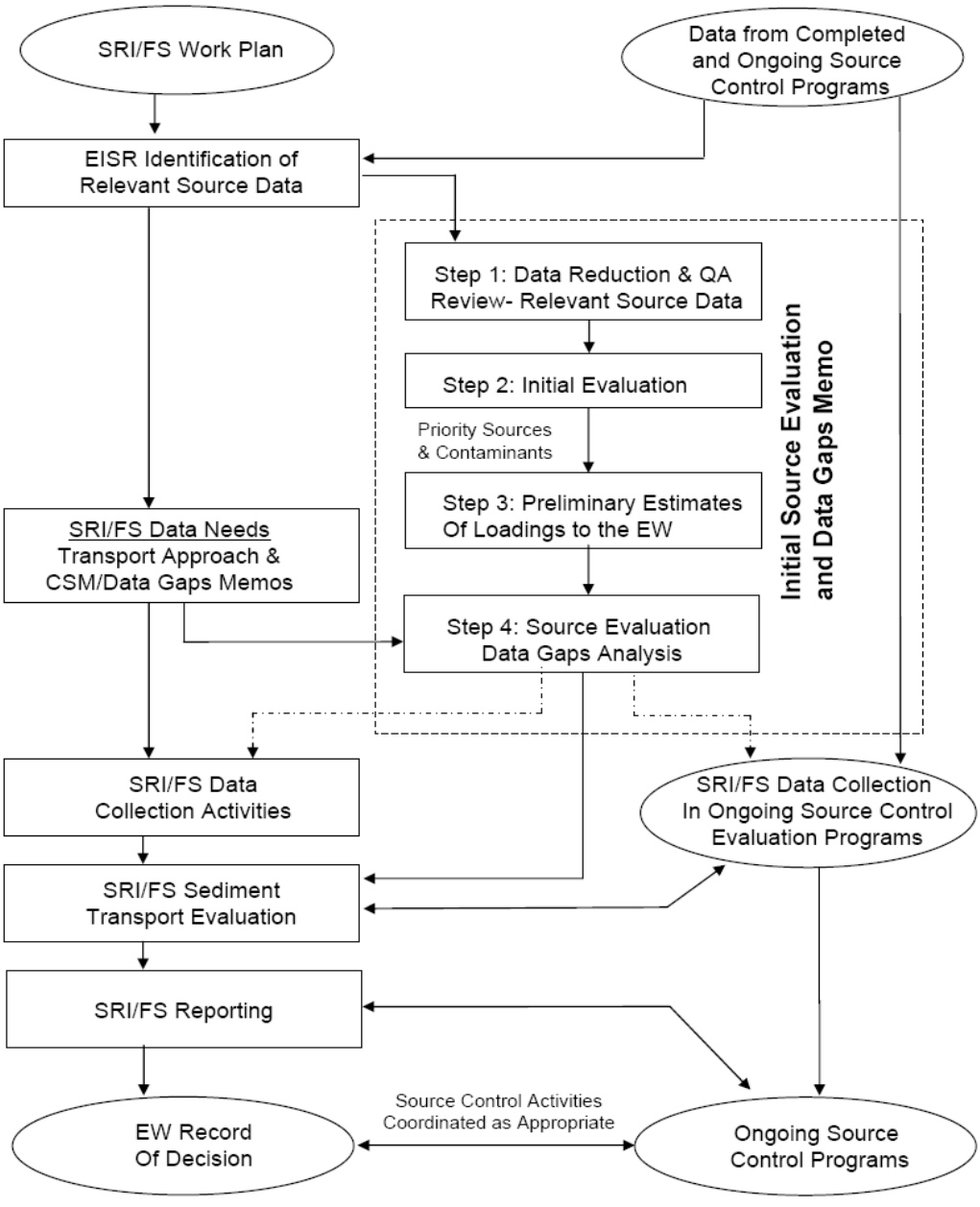

Figure 5 Initial Source Control Evaluation and Data Gaps Analysis Process

4.2 Step 1: Reduction of Source Data

Existing data relevant to the Source Control Evaluation will be presented and examined in the EISR. The existing data will be summarized and evaluated for further use in the Source Control Evaluation process. Generally, the data reduction process will include:

- Obtaining hard copy or electronic copies of the data
- Providing a summary of the existing level of data validation from existing, readily available QA summaries as may be available for each event
- Inputting or importing the data into a Source Control Evaluation data file to facilitate data analysis
- Making the data available for project reporting and data analysis activities

4.3 Step 2: Initial Source Evaluation

The second step of the Source Control Evaluation and Data Gaps process will be to conduct an initial evaluation of each potential source category to assess the priority for further evaluation as a potential source to sediment recontamination in the EW. The initial source evaluation step will be a first step to identification of potential sources. Given that cleanup levels have not been established for the EW and therefore, final screening levels cannot be established, potential sources will not be irreversibly screened out at this stage in the source control assessment process. Further screening may be required if cleanup levels are calculated to be below the levels used for the initial source evaluation described below.

The purpose of the initial evaluation is to help focus the data gaps identification and prioritization process in subsequent steps on those potential sources and related chemicals that have a source concentration or ongoing load to the EW that could be of potential significance to EW sediment recontamination. The initial evaluation is preliminary in nature and will involve comparison of chemical concentration data against applicable reference values relevant to EW sediments. At a minimum, this comparison will include the following reference values:

- Washington State Sediment Management Standards (SMS): SMS numeric criteria for chemical constituents, including the Sediment Quality Standards (SQS) and the Cleanup Screening Levels (CSL), will be used as a basis for initial evaluation of solid-phase sampling data (e.g., in-line or catch basin sediments from storm drain or CSO systems, and solid spill residues). While these criteria may not apply

directly to these media, the criteria provide a basis for evaluating the potential for sediment impacts and prioritizing further evaluation.

- Washington State Lowest Apparent Effects Threshold (LAET) values: Concentrations of organic compounds in sediments or suspended solids will also be compared against SMS LAET values in those cases where sediment total organic carbon (TOC) concentrations are unavailable or where these values are substantially different than the range of TOC concentrations noted in EW sediments. As with the SQS and CSL values, the LAET do not apply directly to storm drain solids, CSO solids, or solid spill residues. However, their use in the initial evaluation step provides a basis for evaluating the potential for sediment impacts and prioritizing further evaluation.
- Groundwater Cleanup Levels: Initial evaluation of groundwater quality data will be performed by comparing the most recent monitoring results to the cleanup levels or remedial action objectives established by the oversight agencies for the individual upland sites where groundwater monitoring is required. Established groundwater cleanup levels may not consider tidal mixing and other attenuation processes that occur as groundwater enters the waterway and, therefore, these criteria are appropriate for initial evaluation of sediment recontamination potential. For Harbor Island, these were established in the ROD to be the "Water Quality Standards for Surface Waters of the State of Washington (Washington Administrative Code [WAC] 173-201)" and the human health criteria for consumption of marine organisms in the federal "Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants; States' Compliance Final Rule" as defined and in effect at the time of the ROD. Additional detail regarding the Harbor Island groundwater remedial action objectives and cleanup goals are described in the Feasibility Study for the site prepared for EPA (Weston 1993). The groundwater evaluation for each nearshore cleanup site will include a review of the basis of the site-specific remedial action objectives relative to use in the evaluation of potential sediment recontamination sources, and may include discussion of alternate reference values (e.g., references values developed using equilibrium partitioning approaches) where appropriate.

In cases where solid-phase or dissolved-phase concentration data cannot be reliably calculated (e.g., atmospheric deposition data sets contain chemical concentration data but not total solids data; some spill characterization data may not included solids data), but total loadings can be calculated, these data will not be used in the initial source evaluation, but rather will be carried forward for loading estimates (Step 3, below).

Sources that are characterized as insignificant, or where historical information indicates certain chemicals are not expected to be present, will not be carried forward for loading estimates. The data are still retained for data gaps analyses, and for potential future additional evaluations as part of the SRI/FS. Such further evaluation could be appropriate in some cases to address the outputs of the risk assessment process for contaminants with risk-based cleanup levels lower than those used for the initial source evaluation in the Data Gaps Memorandum.

Sources where chemical concentrations directly measured in solids loadings are above initial reference criteria (SMS criteria, LAET values, and/or groundwater cleanup levels as described above) or where estimated partitioning from water to sediments indicates a potential to cause EW sediments to exceed defined sediment quality criteria will be evaluated further, including development of loading estimates in Step 3. In addition, in order to provide information relevant to analysis of cumulative source impacts, some sources with contaminants present below the initial reference values will also be evaluated further, including development of loading estimates in Step 3. Regional estimates of chemical concentrations for certain categories of sources (e.g., CSOs or stormwater) or estimates based on land use may be used in the initial source evaluation. However, an absence of reliable data or reference values will likely be examined further as a potential data gap (see Section 4.6).

4.4 Step 3: Preliminary Loading Estimates

For Step 3, source characterization data from Step 2 will be used to develop preliminary lateral loading estimates for sources with potentially relevant discharges to the EW. The EWG will work with EPA to determine what loading analyses should be conducted. Where appropriate, LDW lateral load estimation protocols (or minor variations thereof) will be used to perform the initial evaluation. For example, the process used as part of the LDW

work to estimate stormwater and CSO discharge volumes and associated solids loadings for particular storm drainages/outfalls will be applied (SPU 2007). That process estimated stormwater loadings based on storm drainage basin areas, land uses within the basins, modeled stormwater production rates for different land uses, and actual rainfall records measured using regional rain gauge data. Solids loadings for stormwater were estimated using SPU estimates of stormwater solids loadings based on a review of regional stormwater data, and solids loadings and flows from CSOs were based on actual CSO data, where available.

The purpose of the preliminary loading estimates is to quantify the relative solids and chemical loadings associated with each potential source. Dissolved phase loadings will also be considered where appropriate for the type of source and chemical. Loadings contributed by each source will be preliminarily estimated on an average annual basis (e.g., average annual stormwater solids loadings, or average historical spill loadings). Available information will also be used to express how these average loadings might be expected to vary from year-to-year, where applicable (e.g., CSO loadings vary with CSO discharge patterns; storm drain loadings tend to vary with annual rainfall).

Preliminary loading estimates will also include identification of the location(s) at which solids or chemicals from a particular source enter the EW. For example, stormwater solids loading estimates would be defined by the location of particular outfalls within the EW and chemical loadings will be estimated using available data for particular outfalls or groups of outfalls. Atmospheric deposition loadings would be allocated to direct (i.e., the surface of the EW) and indirect (i.e., storm drain outfalls and CSO outfalls) loading locations; the latter being addressed as part of the evaluation of discharges to the EW. Estimated maximum atmospheric loadings to the EW sediments will be estimated based on measured deposition rates and the size of the EW (direct deposition) and associated storm drainage basins (indirect atmospheric deposition). Relevant locations for groundwater loadings would be identified using existing, site-specific hydrogeologic investigations.

The preliminary loading estimates will include a qualitative or semi-quantitative evaluation of potential uncertainties associated with each potential source or group of sources. The purpose of the uncertainty analysis is to evaluate whether the data are representative, assess

the suitability of the data based on the uncertainty, and to assist in determining whether additional data are needed. At a minimum, the uncertainty analysis will take into account the following:

- The age and quality of the source characterization data
- The quantity and variability of the existing data
- Assumptions and factors used to calculate chemical partitioning
- Availability of regional or literature datasets that provide relevant data or comparison points (e.g., typical solids loadings for stormwater in industrial areas) for source-specific data

Final evaluation of the potential significance of the source information will be performed considering the results of the SRI/FS sediment transport evaluations. Specifically, the RI report will summarize source control evaluation work and the results of sediment transport evaluations, along with the results of the risk assessments and other RI activities. The preliminary loading estimates will not be used for final evaluation without consideration of the transport results or the findings of the risk assessments and other RI activities. However, the preliminary loading estimates performed as part of Step 3 will assist in the evaluation of data uncertainties and potential data gaps.

4.5 Step 4: Data Gaps Analysis

The evaluation of data gaps relevant to the Source Control Evaluation will be performed in coordination with the evaluation of the overall EW SRI/FS data needs. The data needs for the SRI/FS will be defined in two key memoranda (see Figure 4):

- Sediment Transport Evaluation Approach Memorandum: Potential source evaluation data may be useful in the analysis of sediment transport, such as the analysis of lateral solids loadings and associated chemical loadings.
- SRI CSM and Data Gaps Memorandum: The information in this memorandum will help to define portions of the site with elevated chemical concentrations suggestive of ongoing sources. These results could trigger additional focus areas for the Source Control Evaluation.

Data needs defined in these memoranda will be compared against the quantity and quality of existing data and the findings of the Step 2 and Step 3 data analyses. Where the data

needs are fulfilled by existing data, no further data collection efforts will be implemented. Where the data needs are not fulfilled, the data requirements will be identified and reported to EPA, along with recommendations for fulfilling the data requirements. Note that other data collection for source tracing efforts may be occurring throughout this period.

4.6 Filling of Potential Data Gaps

Where existing data are determined to be insufficient to evaluate a potential source, it may be necessary to develop estimates of chemical concentrations based on other available information (e.g., stormwater sampling results from similar land use types at other sites), or gather new information through field investigation and sampling activities. Some of these data may be developed through sampling activities conducted by EWG members. Sampling activities will be coordinated so that the types and quality of data generated are adequate to support the Source Control Evaluation of the SRI/FS.

Data gaps will be filled either by data collection efforts performed as part of the SRI/FS, or by data collection efforts performed by the individual EWG members. Coordination of the sampling programs for consistent, comparable information will be accomplished by the EW source control team.

Where data collection efforts are to be performed as part of the SRI/FS, these efforts will be integrated with the Sampling and Analysis Plans (SAPs) and QAPPs developed for SRI/FS sampling activities. Where data is to be collected as part of source control programs, the Work Plan(s) under which such data are to be collected will be developed and referenced in the data reporting, as appropriate.

The data gaps analysis may also identify other required evaluations that are separate from field data collection and the SRI/FS transport evaluations. If a need for such additional evaluations is defined, the means for completing these studies will be discussed in the data gaps section of the Source Evaluation and Data Gaps Memorandum.

5 ONGOING SOURCE CONTROL ACTIVITIES

The Port, City, and County are already implementing source control activities in the EW. For example, the City is currently investigating the Lander stormwater drainage basin, as well as other minor stormwater conveyance basins that discharge to the EW. The City program includes installation and sampling of sediment traps in multiple locations for analysis of potential sources upstream in the conveyance system, with subsequent sampling of tributary lines if samples collected indicate concern. Additional sediment trap locations are planned for Harbor Island, in cooperation with the Port, and the Port is planning source-tracing investigations and storm drainage system sampling for their properties on both the east and west sides of the EW. The City is also planning to perform approximately 100 business inspections in the drainage basin by the end of 2009. The inspections include outreach and municipal code enforcement for business activities in the EW drainage area, and will also include sampling of storm drain sediments. The Port will be conducting inspections of Port and tenant properties as part of its Environmental Compliance Assessment Program. Ongoing activities being conducted by the County include source tracing work in the Hanford and Lander CSO basins of the EW, augmenting the inspections performed as part of the delegated pretreatment authority of the King County Industrial Waste Program. The County source tracing activities are to be performed in coordination with the City and include sampling of the Hanford and Lander trunk lines at various locations within the EW basin, potential subsequent sampling in sewer lines that are tributary, and follow-up inspections and site-specific sampling where appropriate.

It is expected that the results of the EW SRI/FS will inform the ongoing source control efforts of the Port, City, and County. The EPA cleanup decision for the EW will include an assessment of source control. The assessment will include EPA's review of the source control evaluation work summarized in the SRI/FS, including the information on source control efforts conducted in other ongoing source control programs. If the potential for post-remedy sediment recontamination in the EW is determined to be significant, then these predictions will provide a basis for evaluating and implementing the types of source control efforts that may be effective in minimizing or avoiding such recontamination. This information will help to guide source control efforts that may continue post-ROD in the EW. Work performed as part of other source control programs will continue to be subject to regulatory reviews appropriate to the individual

programs under which that work is conducted. Such activities will be coordinated with ROD-specified activities as appropriate (see Figure 4).

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