DEPARTMENT OF ECOLOGY
State of Washington

# Lower Duwamish Waterway

## Source Control Strategy

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# Lower Duwamish Waterway

## Source Control Strategy

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# Acronyms and Abbreviations

| | |
|---|---|
| 2LAET | Second Lowest Apparent Effects Threshold |
| AET | Apparent Effects Threshold |
| AOP | Air Operating Permit |
| BMP | best management practice |
| CAA | Clean Air Act |
| CAP | Chemical Action Plan |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| COC | contaminant of concern |
| CSL | Cleanup Screening Level |
| CSO | combined sewer overflow |
| CSS | combined sewer system |
| CWA | Clean Water Act |
| EAA | Early Action Area |
| Ecology | Washington State Department of Ecology |
| ENR | enhanced natural recovery |
| EPA | U.S. Environmental Protection Agency |
| ERTS | Environmental Response Tracking System |
| FS | feasibility study |
| HWTR | hazardous waste and toxics reduction |
| ISGP | Industrial Stormwater General Permit |
| KCIW | King County Industrial Waste |
| LAET | Lowest Apparent Effects Threshold |
| LDW | Lower Duwamish Waterway |
| LDWG | Lower Duwamish Waterway Group |
| LTCP | Long-Term Control Plan |
| MHHW | mean higher high water |
| MLLW | mean lower low water |
| MNR | monitored natural recovery |
| MOA | Memorandum of Agreement |
| MOU | Memorandum of Understanding |
| MS4 | municipal separate storm sewer system |
| MSGP | Multi-Sector General Permit |
| MTCA | Model Toxics Control Act |
| NFA | no further action |
| NMC | nine minimum controls |
| NPDES | National Pollutant Discharge Elimination System |
| NPL | National Priorities List |

| | |
|---|---|
| PAH | polycyclic aromatic hydrocarbon |
| PCB | polychlorinated biphenyl |
| PPP | Public Participation Plan |
| PRP | Potentially Responsible Party |
| PSCAA | Puget Sound Clean Air Agency |
| RAL | remedial action level |
| RCRA | Resource Conservation and Recovery Act |
| RCW | Revised Code of Washington |
| RI | remedial investigation |
| ROD | Record of Decision |
| SCAP | Source Control Action Plan |
| SCO | Sediment Cleanup Objective |
| SCWG | Source Control Work Group |
| SMS | Sediment Management Standards |
| SPPR | Spill Prevention, Preparedness, and Response Program |
| SPU | Seattle Public Utilities |
| Strategy | Lower Duwamish Waterway Source Control Strategy |
| SWMP | Stormwater Management Program |
| SWPPP | Stormwater Pollution Prevention Plan |
| TCP | Toxics Cleanup Program |
| TOC | total organic carbon |
| TSCA | Toxic Substances Control Act |
| USACE | U.S. Army Corps of Engineers |
| USC | United States Code |
| VCP | Voluntary Cleanup Program |
| VGP | Vessel General Permit |
| WAC | Washington Administrative Code |
| WPCA | Water Pollution Control Act |
| WSDOT | Washington State Department of Transportation |
| WWTP | wastewater treatment plant |

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- City of Seattle
- King County

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# Executive Summary

The Lower Duwamish Waterway (LDW) Superfund site is located in Seattle and Tukwila, Washington. The U.S. Environmental Protection Agency (EPA) added the LDW to the National Priorities List under its Superfund cleanup program on September 13, 2001. Contaminants found in waterway sediments include polychlorinated biphenyls, polycyclic aromatic hydrocarbons, dioxins/furans, phthalates, arsenic, mercury, and other metals. These pose a threat to people, fish, and wildlife. The LDW Superfund cleanup effort focuses on reducing risks to human health and the environment from these contaminants.

Source control is an integral component of the cleanup effort. It involves removing or reducing contaminants from identifiable sources within a defined area that end up in surface water and sediments of the LDW. The near-term goal of source control is to address existing, ongoing sources of contaminants to the LDW so that in-waterway sediment cleanup can begin without the risk of recontamination above remedial action levels, as defined in EPA's Record of Decision (ROD). The long-term goal is to minimize the risk of recontaminating sediments above the sediment cleanup standards established in the ROD. As source control actions progress, the Washington State Department of Ecology (Ecology) will report the source control status and make recommendations, when possible, to EPA on whether or not to proceed with any planned sediment cleanup actions. This is addressed in source control sufficiency evaluations and recommendations in Chapter 6.0.

This document, the Lower Duwamish Waterway Source Control Strategy (herein referred to as Strategy), updates and replaces the previous Source Control Strategy published in 2004 (Ecology 2004). It represents a coordinated and committed long-term effort for managing source control in the LDW by the agencies that have authorities to regulate sources of contaminants. The Strategy:

- Defines what is a source and pathway to the river.
- Describes the framework, goals, and priorities of the source control effort.
- Describes the main regulatory mechanisms.
- Describes how those mechanisms will be implemented.

The Strategy provides a broad framework for organizing the work of federal, state, and local agencies under various legal authorities. The complex regulatory framework for controlling sources of contaminants within the larger Duwamish River watershed defines much of this Strategy. While the priority of source control work may be influenced by the Superfund remediation schedule, each agency sets its priorities based on their legal obligations as a regulator or regulated entity. Ecology has asked each source control agency to provide an Implementation Plan that describes how that agency conducts its source control work and what

changes are proposed or will be performed specific to the LDW. Each Implementation Plan is unique and includes a:

- Description of how each agency conducts its various programs to address source control for the LDW source area.
- Set of each agency's priorities for source control on a near-term (5-year) and long-term basis.
- Description of both intra-departmental coordination within the agency and interagency coordination through the Source Control Work Group.

In 2012, Ecology published a Revised Draft Strategy for public review and comment at the same time EPA published its Draft Proposed Plan for sediment cleanup of the LDW. Comments on the Strategy were directed to Ecology. Ecology revised this Strategy based on those comments and in response to changing circumstances and new information. This Strategy is a living document, and Ecology will revise it to reflect major changes as the sediment cleanup proceeds.

# 1.0 Introduction

## 1.1 Lower Duwamish Waterway

The Lower Duwamish Waterway (LDW) Superfund site is approximately 5 miles long. It spans the southern tip of Harbor Island, in Seattle, Washington, to just south of the turning basin near S 102nd Street in Tukwila, Washington (Figure 1). Figure 1 shows the potential source area identified as the combined stormwater/sanitary sewer service area and the separated stormwater drainage basins. The total area that discharges to the LDW encompasses 20,400 acres, or approximately 32 square miles.

In 1999, the U.S. Environmental Protection Agency (EPA) completed a study of contaminants in the sediments of the LDW. The study found multiple contaminants that pose threats to people, fish, and wildlife. These include polychlorinated biphenyls (PCBs), carcinogenic and non-carcinogenic polycyclic aromatic hydrocarbons (PAHs), dioxins/furans, phthalates, mercury, arsenic, and other metals.

The study resulted in EPA adding the LDW to the National Priorities List (NPL). The NPL is EPA's list of the nation's contaminated hazardous waste sites that require investigation and cleanup under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The Washington State Department of Ecology (Ecology) added the LDW to the Washington State Hazardous Sites List on February 26, 2002.

In December 2000, EPA and Ecology jointly entered into a legal agreement called an Administrative Order on Consent with the Lower Duwamish Waterway Group (LDWG). The LDWG is composed of the city of Seattle, King County, the Port of Seattle, and The Boeing Company. Under this agreement, the LDWG performed a remedial investigation (RI) and feasibility study (FS) for LDW sediment contamination (Windward 2010; AECOM 2012). The RI/FS listed PCBs, arsenic, carcinogenic PAHs, and dioxins/furans as human health contaminants of concern (COCs) and 41 different hazardous substances as ecological COCs for the site. The FS evaluated several cleanup alternatives that include dredging, dredging and capping, enhanced natural recovery (ENR), and monitored natural recovery (MNR).

After receiving public comment on a Proposed Plan (EPA 2013), EPA published the Record of Decision (ROD) for the LDW Superfund site in November 2014. The ROD describes the overall strategy for addressing contamination and the associated risks in the LDW as including "three components: 1) early identification and cleanup of the most contaminated areas in the waterway, referred to as Early Action Areas (EAAs); 2) controlling sources of contamination to the waterway; and 3) cleanup of the remaining contamination in the waterway…" (EPA 2014). The ROD presents EPA's selected remedy for component 3, the sediments of the LDW. This Source Control Strategy (herein referred to as Strategy) document, updated in 2016, presents Ecology's plan for component 2, source control.


**Figure 1. Lower Duwamish Waterway source area**

## 1.2 Source Control Development

### 1.2.1 Source Control Strategy 2016

Ecology developed the first Source Control Strategy document in 2004[1]. The basis for the original 2004 Strategy and this 2016 Strategy is described in EPA guidance (EPA 2002) and in Washington Administrative Code (WAC) 173-204, Sediment Management Standards (SMS). The first principle is to control sources of contaminants early, starting with identifying ongoing sources of the COCs affecting a cleanup site.

This 2016 Strategy is a framework for organizing the work of federal, state, and local source control agencies in the LDW as the Superfund project moves from the RI/FS phase into remedial design and construction activities for sediment cleanup. It identifies the goals and priorities of the LDW source control effort that will allow EPA to begin active sediment remediation as described in the ROD. Implementation of these goals and priorities is largely influenced by the complex regulatory framework for controlling sources and pathways of contaminants within the 24 source control areas of the LDW watershed (Figure 2). The Strategy clarifies the regulatory framework that Ecology and other source control partner agencies use to ensure regulatory controls are in place to minimize the potential for recontamination.

The Strategy also describes the documentation, tracking, and reporting of the collective source control efforts and the external communication processes among the agencies.

Ecology intends for this Strategy to be the framework for source control for the LDW until the end of the active in-water sediment remediation. Given the complexity of the LDW cleanup and the anticipated project timeline, the Strategy will need to be reviewed every 5 years and updated as necessary.

### 1.2.2 Memoranda of Understanding and Agreement

In April 2002, EPA and Ecology signed an interagency Memorandum of Understanding (MOU), dividing federal and state responsibilities for the LDW (EPA and Ecology 2002). Ecology and EPA revised this MOU in 2004 (EPA and Ecology 2004) to reflect ongoing work in the LDW. Under the MOU, EPA is the lead agency for the sediment investigation work, and Ecology is the lead agency for coordinating and implementing the source control work.

EPA and Ecology expanded and clarified the 2004 MOU through development of a Memorandum of Agreement (MOA), signed by both agencies in 2014 when EPA issued its ROD. The 2014 MOA expands the coordination and cooperation effort to include additional EPA Region 10 and Ecology programs, particularly the water quality programs. The MOA acknowledges that both source control and the in-waterway cleanup are complex, and describes a collaboration framework between agencies to coordinate the in-waterway cleanup and source

1 Additional background information on the LDW and source control is provided in Appendix A.

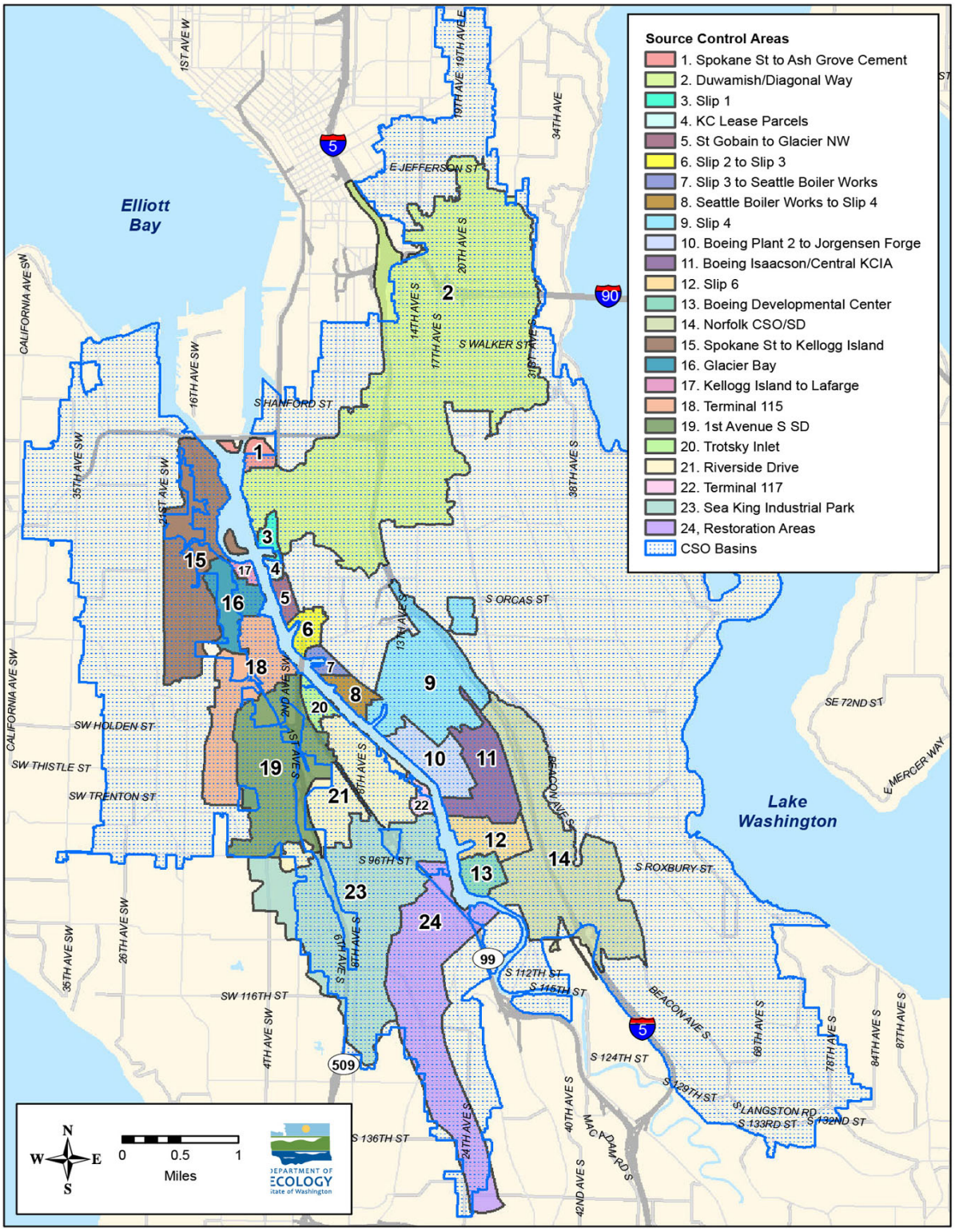


**Figure 2. Source control areas within the Lower Duwamish Waterway source area**

control. The MOA details both state involvement with the EPA-led cleanup of the LDW and EPA's involvement with the state-led source control work, including the potential for EPA's use of federal tools, as appropriate, to assist in source control efforts.

### 1.2.3 Source Control Work Group

Ecology formed the Source Control Work Group (SCWG) in January 2002. The SCWG is currently composed of representatives from Ecology, King County, the city of Seattle, the Port of Seattle, Puget Sound Clean Air Agency (PSCAA), the city of Tukwila, Washington State Department of Transportation (WSDOT), and EPA. The purpose of the SCWG is to share data and information; to actively develop, coordinate, and implement source control measures; and to report progress on source control activities.

Other public entities with relevant source control responsibilities, such as Public Health-Seattle and King County, are invited to participate as appropriate.

### 1.2.4 Summary of Existing Information and Identification of Data Gaps Reports

Summary of Existing Information and Identification of Data Gaps Reports (herein referred to as Data Gaps Reports) served as the basis for the Source Control Action Plans (SCAPs) developed for each source control area. These reports are provided on Ecology's website (see <https://fortress.wa.gov/ecy/gsp/CleanupSiteDocuments.aspx?csid=1643>). The Data Gaps Reports summarize the environmental information for facilities listed in Ecology's Facility/Site database, which are located within the source control area at the time of their publication. Ecology contractors reviewed the files for these facilities and summarized available information for each source control area, including:

- Chemicals of potential concern in sediments near the source control area.
- Potential adjacent and upland sources of contaminants, including current and past facility names, addresses, permit information, and past operations or activities that may be relevant.
- Contaminant migration pathways from potential sources to LDW sediments.
- What, if any, effective source control is planned or already in place.
- Critical data gaps regarding the potential of a property as a source of sediment contamination, with recommendations for filling them.
- Recommended actions necessary to control sediment contamination sources.

The information was compiled primarily from Ecology's databases and files. The Data Gaps Reports often include information from other SCWG agencies and responses to CERCLA inquiries for environmental information.

Preparation of the first report began in February 2003, and the last SCAP was completed in September 2013. During this period, Ecology and its contractors continually refined and improved the content and organization of these reports. In 2013, Ecology developed a SCAP Handbook that summarizes the process used to develop Data Gaps Reports and SCAPs during the 10 years from 2003 to 2013 (Leidos 2013). The LDW SCAP Handbook explains how the Data Gaps Reports and SCAPs were developed and the reasons for some of the differences between earlier and later reports. The Handbook documents the evolution of changes to the format and content that were implemented between the publication of the first SCAP in 2004, and the last one published in 2013.

### 1.2.5 Source Control Action Plans

As part of source control efforts in the LDW, Ecology worked with other members of the SCWG to develop SCAPs for the 24 sub-basins (or source control areas) that drain to the LDW (Figure 2). The SCAP for each source control area identifies potential contaminant sources and transport pathways that may affect sediments, evaluates the significance of these sources and their potential for recontamination of sediments, and identifies actions needed to control them. The SCAPs also describe sampling and monitoring that will be conducted to identify any additional sources.

Since 2004, Ecology and the other source control agencies have identified source control actions that must be completed before the sediment remedy is implemented. Beginning in 2008, the actions identified in the SCAP for each area have been prioritized as high, medium, and low. Actions in SCAPs published before this date were assigned a priority that is reflected in subsequent Source Control Status Reports. The status of these SCAP action items becomes part of the sufficiency evaluation criteria (see Chapter 6.0). The previous Strategy prioritized work using a system that involved four tiers of work (Ecology 2004). Ecology decided to discontinue using the tier system, because it did not meet the needs of the emerging source control program. Instead of the tier system, the following depicts the relationship between the start of active in-waterway sediment cleanup and the status of action items:

- **High-priority actions** need to be completed prior to sediment cleanup actions.
- **Medium-priority actions** can be completed prior to, or concurrent with, sediment cleanup actions.
- **Low-priority actions** are either ongoing at the time the SCAP is prepared or are actions that can be completed as resources become available.

Source control priorities are currently determined according to what is known about a given source and the work outlined in SCAPs and Source Control Status Reports.

Priority rankings for source control actions identified in the SCAPs are based on several criteria:

- **When is source control needed?** Ideally, source control action is needed before sediment cleanup. The sequencing and timing of active in-waterway sediment remedial action is a critical consideration. This knowledge helps various source control agencies determine when and where to focus their efforts and resources in different sub-basins. This was particularly important in the context of the Early Action Area (EAA) cleanup projects. For information about future in-waterway cleanup and source control sequencing and timing, refer to Chapter 6.0. EPA and Ecology will continue to coordinate per the MOA.
- **How contaminated are the media?** Environmental sample results obtained through source tracing, investigations, inspections/sampling, and property characterizations indicate how much contamination is present in a particular medium (soil, groundwater, surface water, etc.) and how much may be reaching the LDW by any particular pathway (stormwater runoff, groundwater, soil or bank erosion, etc.).
- **How much impact could the source have?** The impact is determined by the size and type of release, what the contaminated media are, the distance between the release and the LDW, and the properties of the contaminant itself. These factors are evaluated in relation to a particular sediment cleanup action, such as, dredge, dredge and cap, and ENR. The amount and nature of high-priority actions identified in the appropriate SCAP(s) and the length of time to complete the high- and medium-priority actions is considered. Several years of lead-time may be needed before a source is effectively controlled.
- **Reassessment of source control priorities in the future.** Source control is an iterative process. As new information becomes available concerning a specific facility or geographic area, the source control agency(ies) re-evaluate the new information and what it reveals about contaminant sources and pathways or the effectiveness of previous actions. Occasionally, new regulatory requirements, such as changes to laws and regulations, will require a reassessment of Ecology's source control priorities.

SCAPs provide detail about how data gaps will be filled, what source control actions are needed, and how these actions will be implemented. The SCAPs include the following information:

- Status of contaminated media and pathways.
- Actions necessary to fill data gaps and control sources. This may include collecting additional environmental data, investigation and cleanup, and tracing sources of contamination.
- Target dates for achieving source control actions.

Ecology will continue to periodically review the progress and data associated with source control action items for each SCAP. As new information becomes available, it will be summarized in the LDW Source Control Status Reports described below. Ecology completed SCAPs for all 24 source control areas (Figure 2 and Appendix B) by the end of September 2013. All SCAPs are

available on Ecology's website
(see: <https://fortress.wa.gov/ecy/gsp/CleanupSiteDocuments.aspx?csid=1643>).

### 1.2.6 Source Control Status Reports

Ecology publishes at least one Source Control Status Report per biennium that describes source control activities conducted during a specific period. Ecology published the first Status Report in July 2007. Each report summarizes any changes since the publication of the previous report. The Source Control Status Reports provide updates, including:

- The status of business inspections, source tracing activities, site assessments and cleanups, and other source control activities described in previous Status Reports.
- Public involvement and outreach activities during the subject time period.
- Updated lists of action items, priorities, and expected completion dates.
- New action items identified during the reporting period, either as a follow-on to a previous action item or identification of a new potential contaminant source.

EPA and other SCWG members provide information, review, and comments on the Status Reports. In addition to the types of details listed above, these reports show important accomplishments, emerging issues, and challenges that affect source control throughout the LDW.

Table 1 summarizes the documentation addressed by this Strategy. Final versions of these documents are posted on Ecology's website
(see: <https://fortress.wa.gov/ecy/gsp/CleanupSiteDocuments.aspx?csid=1643>). The web page contains links to EPA's LDW website as well as to appropriate web pages of other SCWG-members. See Appendix B for the list of SCAPs (with dates of publication) for the 24 sub-basins in the LDW.

Other studies and reports are periodically published but are not specifically addressed in the Strategy. Reports and documents associated with these studies may be reviewed by the SCWG as appropriate and issued by Ecology. Review and discussion in the SCWG is meant to ensure that these documents address source control needs and issues in the LDW, and that this practice will continue.

Source control takes time and often occurs over months and years. Ecology will continue to report the progress on source control in the Source Control Status Reports.

**Table 1. Source control reports**

| Document | Description | Frequency | Reviewers |
|---|---|---|---|
| Summary of Existing Information and Identification of Data Gaps Reports | Compiles existing information on sources/pathways in source control areas. Summarizes data gaps and source control needs | Issued once for a given source control area | Ecology, EPA, city of Seattle, King County, Port of Seattle, NOAA, tribes, and stakeholders |
| Source Control Action Plan | Identifies source control actions, implementing parties/agencies, priorities, and schedules | Issued once, with updates provided in the Source Control Status Report | Ecology, EPA, city of Seattle, King County, Port of Seattle, NOAA, tribes, and stakeholders |
| Source Control Status Report | Summarizes source control actions, with updates reflecting new information in each source control area. Tracks and summarizes source control accomplishments and documents issues affecting source control | At least once per biennium | Ecology, EPA, city of Seattle, King County, and Port of Seattle |
| Source Control Sufficiency Evaluation | Provides a recommendation for whether or not active in-water work can begin with a low likelihood that the surface sediments will recontaminate above the RAL due to specific source pathways | Letter or memorandum as needed | Ecology and EPA |
| Other Studies and Reports | Technical and data reports, fact sheets, public notices for permits, etc. | As needed | Ecology, EPA, city of Seattle, King County, tribes, or other stakeholders, as appropriate |

EAA = Early Action Area
EPA = U.S. Environmental Protection Agency
NOAA = National Oceanic and Atmospheric Administration
RAL = remedial action level
Ecology = Washington State Department of Ecology

### 1.2.7 Source Control Implementation Plans

As the lead agency for source control, Ecology has asked the city of Seattle, King County, and EPA to develop and submit agency-specific Implementation Plans. The intent of the Implementation Plans is to set each agency's priorities for source control for a near term (5 years) and to establish long-term expectations for source control activities extending into the period during and following construction of the in-waterway cleanup under the ROD. Ecology also intends that the Implementation Plans emphasize coordination at two levels:

- Intra-agency coordination between departments and divisions within each agency, and
- Interagency coordination.

Each agency's plan will detail their priorities, relevant activities already underway to comply with regulatory obligations (e.g., National Pollutant Discharge Elimination System [NPDES] permits, Administrative Orders, Consent Decrees, and Model Toxics Control Act [MTCA] Cleanup Orders), additional planned or proposed source control actions, and intra-agency

coordination activities. These plans are under development and will be considered part of this Strategy following their completion.

**Agency Implementation Plans and Links**

Agency Implementation Plans are not included with this Strategy. As the agency Implementation Plans are published, Ecology will include links to them on its LDW web page at: <http://www.ecy.wa.gov/programs/tcp/sites_brochure/lower_duwamish/lower_duwamish_hp.html>.

Ecology reserves its authority to require partner agencies to act upon all or part of their Implementation Plans as appropriate and in accordance with relevant rules and regulations.

Each municipality's Implementation Plan should describe how they will prioritize and schedule their source control activities, including capital improvement projects, over the near and long terms and will incorporate mechanisms to conduct this prioritization. Ecology encourages municipalities, where possible, to consolidate projects and/or activities to the extent that requirements under other permits, orders, or decrees overlap or coincide with source control priorities for the LDW.

Some key concepts noted throughout this Strategy are discussed in the text box below.

**Key LDW Source Control Strategy Concepts**

**What is a source to LDW?** Three things must exist to have a source to LDW: A *contaminant* release to one or more *media* (air, soil, surface water, or groundwater), with a viable, potential *pathway* to the LDW. All these conditions (contaminant, media, and pathway) must be present to trigger a need for LDW source control.

**What is source control?** It is the process of finding sources of contaminants, characterizing them, and then taking actions to stop or reduce them before they reach the LDW. Source control includes a variety of actions, such as inspection, sampling, and monitoring; site investigation and cleanup; structural controls and treatment for discharges; education; agency coordination; and others. All of these actions help reduce contamination in the LDW.

**When can the sediment cleanup begin?** Sediment cleanup actions (e.g., dredging and capping) at a particular location can begin when the agencies understand the sources in that area are sufficiently controlled or planned to be controlled so that the cleanup action does not have to be repeated.

**What is recontamination?** It is the reappearance of contamination above a regulatory limit following sediment cleanup. Due to the difficulty in identifying and controlling all possible sources in a highly populated urban environment, some level of recontamination may occur even with most comprehensive source control efforts.

**Will source control and sediment cleanup address all contamination?** It is unlikely that all sources will be completely controlled in this urban watershed. The Strategy is designed to support long-term restoration by putting credible and adaptive control programs in place, and to make realistic progress toward attaining human health and ecological beneficial uses in this urban and industrial waterway. Source control agencies will always have work to control new and existing sources.

# 2.0 Source Control Goals and Priorities

## 2.1 Lower Duwamish Waterway Source Control Goals

LDW source control has two goals:

- A near-term goal to allow the start of active in-waterway cleanup.
- A long-term goal to minimize the risk of recontaminating sediments above the sediment cleanup standards established in the ROD.

### 2.1.1 Near-Term Goal

The near-term goal for LDW source control is to control sources sufficiently to allow active in-waterway remediation to start, minimizing the likelihood that sediments will be recontaminated at levels that trigger additional active in-waterway remediation. This effort is focused on the defined source area depicted in Figures 1 and 2 and relies on the regulatory framework described in Chapter 4.0. Refer to Chapter 6.0 for details.

The near-term source control goal will be met by achieving the following objectives:

- Identify and, to the extent possible, control ongoing sources of contaminants to LDW sediments with the potential to exceed the remedial action levels (RALs) established in the ROD.
- Apply administrative and legal authorities to implement corrective actions in areas contributing to contaminated sediments above the RALs.
- Evaluate whether specified pathway controls are adequate so that sediment cleanup can proceed with limited potential of recontamination above RALs.
- Monitor and evaluate source control efforts and revise plans accordingly.
- Conduct outreach to businesses, residents, and others who handle hazardous materials on ways to reduce pollution from their activities.
- Establish milestones and reporting requirements for source control activities.
- Increase the degree of inter- and intra-agency coordination to address source control issues that cannot be adequately resolved by one agency, department, or program.

Additional information regarding the near-term goal is available in Chapter 6.0.

### 2.1.2 Long-Term Goal

In the long term, after the sediment remedy is in place, the LDW source control goal is to minimize the risk of recontaminating sediments above the sediment cleanup standards established in the ROD. This will result in an ongoing emphasis on in-waterway sediment quality

within the regulatory framework described in Chapter 4.0. Also refer to the discussion of recontamination in later in this chapter.

## 2.2 Complementary Goals

While the Strategy is focused on supporting the Superfund cleanup of the LDW in-waterway sediments, other complementary efforts are underway or planned that are driven by broader environmental protection and restoration mandates. These complementary efforts are briefly described below for context. Details regarding these efforts are not incorporated into the Strategy, as they are beyond the geographic and technical scope of LDW source control.

- **Green/Duwamish River Watershed Pollutant Loading Assessment:** This joint Ecology and EPA effort, initiated in late 2014, will develop a watershed-based model to evaluate the cumulative effects of toxic pollution, assess the relative contribution of toxic pollution from sources and pathways in the watershed, and help prioritize efforts to control the release of pollutants in the watershed. Refer to <http://www.ecy.wa.gov/geographic/GreenDuwamish/pla.html> for project information.
- **Our Green/Duwamish:** King County and the city of Seattle started this regional effort in 2014 to coordinate the work in the watershed that is already being done by local, state, and federal agencies to manage habitat restoration, salmon recovery, flood control, public health, economic development, and more. Ecology's Water Quality Program will participate, as appropriate, in stormwater strategy development. Refer to <http://ourgreenduwamish.com/> for more information.
- **Chemical Action Plans (CAPs):** Ecology's Hazardous Waste and Toxics Reduction (HWTR) Program develops comprehensive CAPs to identify, characterize, and evaluate uses and releases of specific persistent, bioaccumulative toxics. Ecology has developed five CAPs since 2003. The latest is the CAP for PCBs published in 2015. A CAP recommends actions to protect human health and the environment. Some of the recommendations may lead to new legislation or rules, which would go through the normal legislative or rulemaking processes. Other recommendations contained within the CAP are implementable by Ecology and other agencies. Examples of these efforts in the LDW include sampling building materials for PCBs and contributing to a PCB Source Control Guidance Manual, as described in Goal #2 of the PCB CAP. Other agencies working in the LDW are contributing information on products that contain PCBs by testing backfill soils, compost, and mulch. This information is shared as part of the broader effort of identifying PCB-containing products described in Goal #4 of the PCB CAP. Goal #6 addresses the expansion of environmental monitoring to identify new areas requiring cleanup. This is a core element of LDW source control and Ecology's Toxics Cleanup and Water Quality Programs. The programs have sampled and identified several sites requiring cleanup or other environmental control to reduce or eliminate sources of PCBs to the LDW. The programs will continue to identify such sites in

the future. Other Ecology efforts to reduce toxics include testing consumer products for toxic chemicals, protecting children through the Children's Safe Products Act, finding safer alternatives to toxic chemicals, reducing the use of toxic substances in industry, advancing green chemistry, and supporting strong toxics policy. Refer to <http://www.ecy.wa.gov/programs/hwtr/rtt/pbt/> for more information.

## 2.3 Geographic Priorities

The 2004 Strategy provided a four-tier scheme for prioritizing source control actions based on the cleanup schedule for the EAAs and the need to address sources to the entire sediment study area, not just those sources affecting the active in-waterway sediment cleanup actions. The four tiers were helpful during the initial stages of organizing source control but became less useful as source control agencies gained experience with sources throughout the LDW source area and as EPA finalized cleanup plans. Ecology's current approach, as detailed Chapter 6.0, is to perform source control evaluations for geographically specific active in-waterway sediment cleanup actions.

Ecology has determined the best way to ensure sources are controlled sufficiently to allow EPA to begin active cleanup is to adopt an upstream to downstream approach. Ecology based this decision on several factors, including:

- The number of contaminated upland sites in each area needing direct Ecology or EPA oversight.
- The number of proposed active in-waterway remediation locations.
- The concentrations of chemical contamination in the sediments.
- The need to avoid or reduce the impact of residual contamination to a "cleaned" downstream site.
- The potential number of human resources available to oversee source control actions.
- EPA's estimated timeline to begin sediment cleanups.

Ecology has divided the 24 LDW source control areas into 3 larger sub-areas: upper, middle, and lower (Figure 3). Ecology intends to focus on finishing the high-priority action items identified in each of the SCAPs that comprise each sub-area. For example, Ecology plans to complete high-priority action items first in the upper reach, and then continue downstream. Ecology will direct their programs and advise other agencies to prioritize their respective actions, as much as possible, based on these sub-areas.

Prioritizing work from upstream to downstream does not mean Ecology will stop performing or evaluating source control actions in other areas. Several identified actions within the middle and lower sub-areas will continue to be addressed as resources become available. Priorities will continue to be coordinated with EPA's cleanup construction schedule(s).

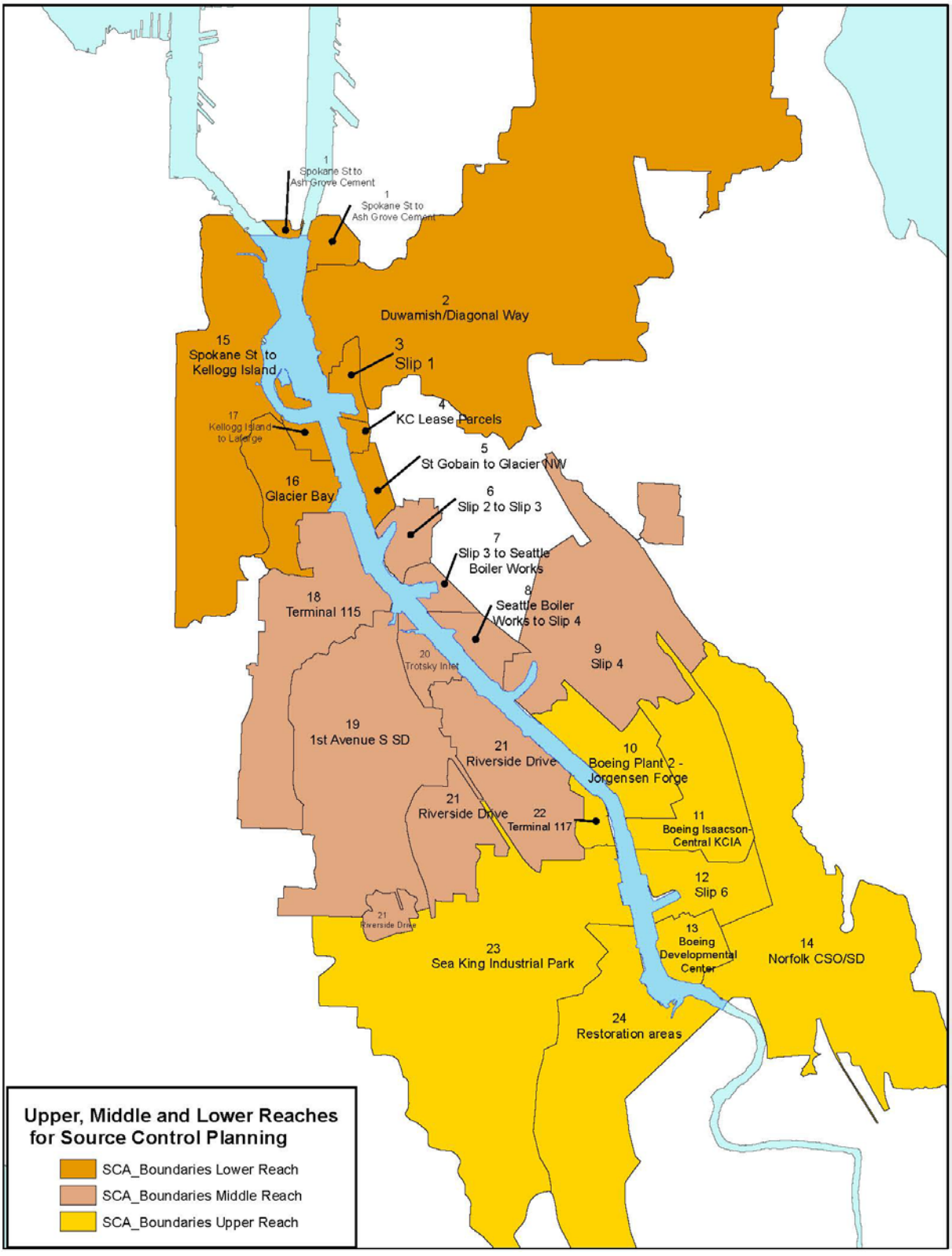


**Figure 3. Three Lower Duwamish Waterway reaches (upper, middle, and lower) and the source control sub-areas contributing to these reaches**

## 2.4 Sediment Recontamination

Recontamination is the reappearance of contaminants above a regulatory limit following sediment cleanup. For the purposes of this Strategy, the contaminant concentrations must also be actionable. In other words, the observed sediment concentrations can be tied to a site-specific, or otherwise known and controllable, source.

Not all LDW sediments will be subject to active remediation, and not all active remediation will occur at the same time. Refer to the pathways discussion in Chapter 3.0 regarding the in-waterway transport of contaminated sediments. The MNR areas may contain up to two times the RALs in some locations. Some level of sediment recontamination is expected as the dredged/capped areas equilibrate to the concentrations in the MNR areas. For the purposes of source control, the concept of recontamination needs to accommodate the remedy's planned sediment quality equilibration.

Source control is an ongoing process, and continued vigilance is necessary to minimize the amount of pollution discharged to the LDW from all potential sources.

It is anticipated, even with a comprehensive source control effort, that localized recontamination may occur. This localized recontamination may have different contaminant signatures and concentrations other than those identified during the LDW RI (Windward 2010). This is due to the difficulty in identifying and controlling all possible sources and pathways in a highly populated urban environment. Long-term monitoring will continue to occur to inform about any particular location or overall decreasing or increasing trends.

Once recontamination occurs, there is no single course of action to follow. EPA and Ecology will determine the appropriate course of action on a case-by-case basis. Many factors will determine what actions may be needed. These include:

- The chemicals causing the recontamination,
- The spatial and temporal extent,
- How much recontamination has occurred (exceedance factors),
- How the recontamination is occurring (such as new sediment deposition),
- The proximity of known sources,
- How well the known sources are controlled,
- Sediment bioassay results, and
- Agency enforcement discretion.

Ideally, monitoring conducted by the potentially responsible party(s) (PRP[s]) for source control and cleanup purposes will supply adequate warning that recontamination is occurring. Given ample warning, additional measures could be taken to reduce or stabilize concentrations appearing to pose a threat of recontaminating an area after a cleanup action. A range of additional source control measures required by the agencies could include additional monitoring of sediment movement and disruption in the waterway, increased frequency of business

inspections, increased source tracing sampling, source removal, or installing engineering controls.

## 2.5 Ubiquitous Chemicals

A variety of chemicals have been generated and released to the soils and sediments of the LDW source area over the last 100 years. Most of the very large and sometimes decades-long releases are historical. Some of these releases are still affecting LDW sediments, along with many industrial, commercial, and residential sources that continue to add to this legacy. The result of these releases is the widespread, or ubiquitous, occurrence of some contaminants at common concentrations in the ambient environment. Examples of these contaminants are phthalates, phenols, PCBs, dioxins, arsenic, benzoic acid, and benzyl alcohol.

Some of these chemicals occur naturally, such as benzoic acid, benzyl alcohol, and some phenols. Others are the result of emissions, atmospheric deposition, or other releases from local, regional, and global sources. While the contaminants may be ubiquitous, their concentrations are not. In other words, the contaminants are not always present at a common concentration.

The average concentrations of many of these ubiquitous chemicals in urban areas are higher than in the surrounding rural or lower-density landscapes and the global background levels found in remote wilderness areas. An example is PCBs. It is widely acknowledged that there is a global background level of PCBs. There is ample evidence that PCB concentrations are higher in urban areas than the surrounding suburbs or the global background level. Part of this urban level of PCBs are releases from discrete sources that have resulted in concentrations well above those found in much of the LDW. Examples of these sources include the Georgetown Steam Plant (3,800 mg/kg in soil) and Terminal 117 (9,200 mg/kg in soil).

The challenge for source control is defining what concentrations of ubiquitous contaminants (e.g., common concentrations) in the urban environment are from non-point and historical sources, and what is attributable to discrete sources that could be controlled. In some areas, the source of the elevated concentrations has been identified. Other sources may be found with continued source control efforts. Until these sources are removed, it is difficult or impossible to tell what concentrations are ubiquitous. Many years of source control and data collection will be required to make such a determination.

The scope of the LDW source control strategy and the associated EPA cleanup efforts alone may not attain all CWA-designated uses.

# 3.0 Sources and Pathways

## 3.1 Sources

It is important to understand what a source is and the pathway a contaminant travels to reach the LDW. For the purpose of controlling an LDW source (historical or ongoing), three elements must be considered:

- **Contaminant release:** This is the release of a chemical by some action, event, or condition (spill, commercial, residential, or industrial practice or product).
- **Medium:** This is the air, surface water, groundwater, or soil affected by one or more contaminants. Contaminated media need to be controlled to either reduce or completely stop the contaminants from reaching the LDW.
- **Pathway:** The route to the river that contaminated media travel. Two examples are dust on hard surfaces that is moved by stormwater to the LDW (stormwater pathway), or chemical spills that contaminate soil, which then contaminates groundwater that seeps into the waterway (groundwater pathway).

To control sources to the LDW, actions may be taken to control the contaminant release, the media, or the pathway. Contaminated media can affect LDW sediments through eight potential pathways described below. Figure 4 shows a conceptual model of these pathways and how contaminants in the source area reach the LDW sediments. The text box gives examples of what is, and what is not, considered a source.

**Examples of What Is and Is Not a Source to the LDW**

In the examples below, both facilities have a contaminant and an affected medium. However, only one facility has an active pathway to the river. A source must include a contaminant, medium, and pathway.

Facility A has groundwater (medium) contamination from years of historical operations (contaminant release). The groundwater *is a source because it leaks* into a storm drain (pathway) that flows into the waterway.

Facility B has groundwater (medium) contamination from years of historical operations (contaminant release). The groundwater *is not a source because it is not leaking* into storm drains or reaching the waterway in a seep or groundwater plume (no pathway exists).

Determining how to control a source uses several lines of evidence. These include site assessments and cleanup actions, historical and current information regarding commercial and industrial activities, agency inspections and documentation, and sampling results. If no data are available, source control evaluations typically include worst-case assumptions about contaminant releases to environmental media and the potential for sediment recontamination.

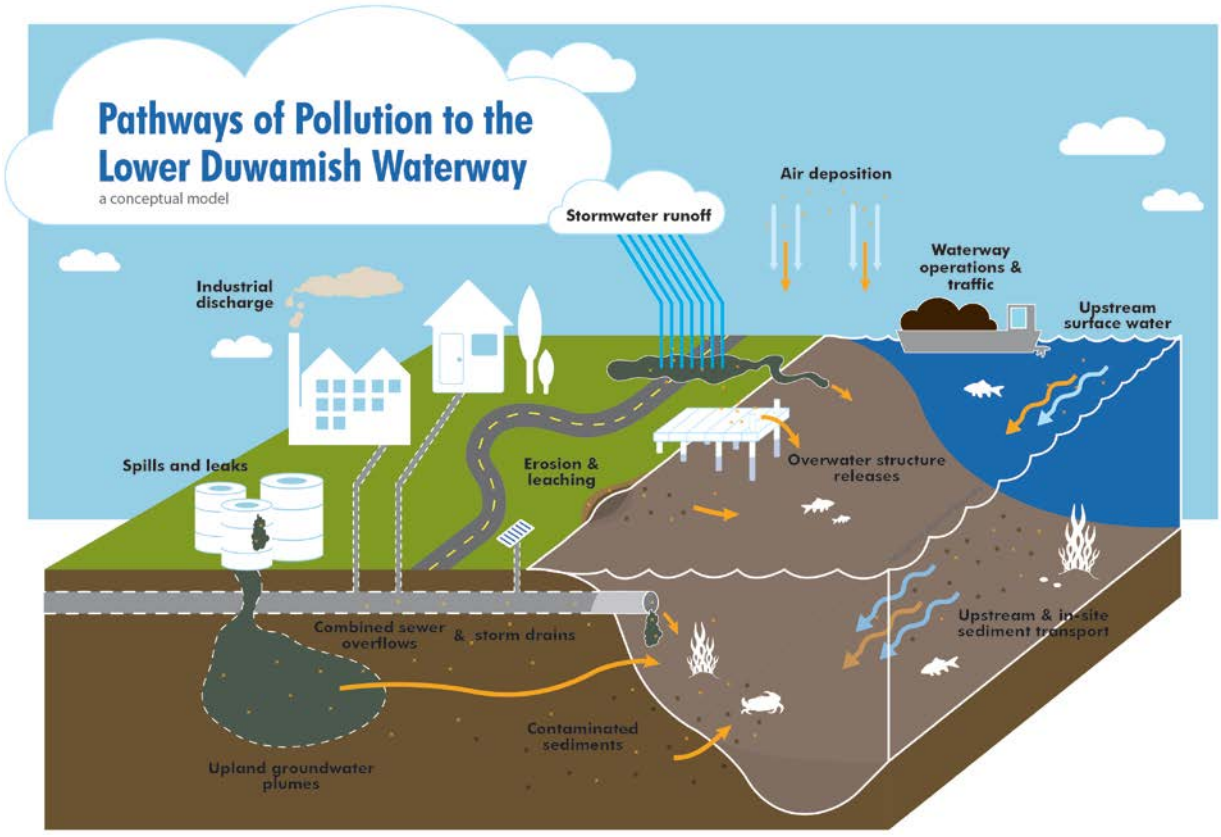


**Figure 4. Pathways from contaminant sources to the Lower Duwamish Waterway**

## 3.2 Pathways

### 3.2.1 Direct discharges

Discharge Pathways to the LDW

In the direct discharge pathway, pollutants enter the waterway through three major types of discharges:

* Stormwater,
* CSOs, and
* Industrial wastewater.

Direct discharges to the LDW can be from the following point sources: public and private storm drain systems, industrial wastewater facilities, and public combined sewer systems that carry municipal and industrial wastewater and stormwater. The direct discharge of pollutants to the waterway from these numerous point sources may affect sediment quality, depending on the origin and character of the effluent. These discharges are regulated under the Clean Water Act (CWA) NPDES permit, the Washington State Water Pollution Control Act (WPCA) (Revised Code of Washington [RCW] 90.48), and associated state waste discharge permit programs. These discharges, whether or not they exceed permit conditions, may contribute to sediment contamination. Each type of direct discharge is described below:

- **Stormwater (industrial and municipal):** Stormwater enters the LDW via a combination of storm drains, pipes, ditches, or creeks, and directly from properties adjacent to the waterway.

Stormwater pollution is generated when rain contacts pollutants that have accumulated in or on exposed soils and surfaces, and those pollutants become entrained in the stormwater runoff. Pollutants present in soil and on paved surfaces come from urban activities such as lawn and garden maintenance, spills/leaks from vehicles and equipment, vehicular and other air emissions, and a variety of industrial activities (e.g., vehicle and equipment refueling, chemical storage, and outdoor manufacturing). Stormwater pollution also comes from illegal discharges or illicit connections to stormwater systems. Contaminated solids that collect in storm drains and ditches may be carried to the waterway by stormwater.

- **Combined sewer overflows (CSOs):** Some areas of the LDW are served by combined sewer systems, which carry both stormwater and municipal wastewater (including industrial process wastewater) in a single pipe. Most of the time, the combined wastewater and stormwater are conveyed to a wastewater treatment facility for treatment prior to discharging to surface waters. However, during large storm events, the total volume of untreated wastewater and stormwater can exceed the conveyance capacity of the combined sewer system. When this occurs, the combined sewer system was designed to overflow through relief points, called CSOs, which discharge the untreated wastewater and stormwater to the LDW. CSOs prevent the combined sewer system from backing up into homes and businesses and creating flooding problems in local streets. CSO discharges carry contaminants that can affect sediments.
- **Industrial wastewater:** Industrial activities located along the LDW may involve processes that generate wastewater that is not permitted to enter the sanitary or combined sewer for treatment at the wastewater treatment plant (WWTP). In these situations, the industrial facility must obtain an NPDES permit and state waste discharge permit that authorize the discharge of process wastewater under specific conditions. There are currently a handful of industrial wastewater discharges to the LDW that are regulated under individual industrial wastewater permits.

### 3.2.2 Surface runoff (sheet flow)

In areas lacking effective stormwater collection systems, contaminants are picked up by stormwater runoff to flow directly from properties adjacent to the LDW or to creeks tributary to the LDW. Current practices at different shoreline properties may contribute to the movement of contaminants to the LDW via runoff. Sheet flow is not considered a point-source discharge.

### 3.2.3 Groundwater discharges

Contaminants in soil and groundwater resulting from spills and releases at upland properties may be transported directly into the LDW via bank seeps or subsurface groundwater mixing, or it may infiltrate into storm drains, pipes, ditches, or creeks that discharge to the waterway.

### 3.2.4 Erosion/leaching

The banks of the LDW shoreline are susceptible to erosion by wind and surface water, particularly in areas with steep slopes. For the purposes of the Strategy, bank areas have soil or other material above the mean higher high water (MHHW) mark. Contaminants in soils along the banks of the LDW could be released directly to sediments via erosion. Waterway bank soil, contaminated fill, waste piles, landfills, and surface impoundments close to the banks may release contaminants directly to the LDW through erosion into the river or into stormwater, or by leaching to groundwater.

### 3.2.5 Spills, dumping, leaks, and inappropriate management practices

Near-water and over-water spills, dumping, and leaks may result in contaminant releases directly to the LDW that may affect both sediments and the water column. Activities on docks, wharves, and piers have the potential to affect sediments from spills of material containing COCs. Accidental spills during loading/unloading operations or from a mechanical failure may result in transport of contaminants to sediments. Poor housekeeping and management practices for waterside construction, hull maintenance, and waste disposal at marinas and small boatyards may affect sediment quality. Dumping material, such as wood waste or debris, directly into the waterway may also adversely affect sediments and the water column.

### 3.2.6 Waterway operations and traffic

Contaminants discharged from operating engines, and gray, bilge, ballast, or other waters may affect sediments. Discharges of gray, bilge, and ballast water without treatment are prohibited in the national Vessel General Permit (VGP). Recreational vessels and commercial vessels under a certain length or tonnage are exempt from sections of the CWA. While waterway operations are currently outside the scope of Ecology's LDW source control program, Ecology's Spill Prevention, Preparedness, and Response Program (SPPR) focuses on preventing oil spills to Washington's waters and land. There is still a potential for spills in the waterway.

### 3.2.7 Atmospheric deposition

Atmospheric deposition refers to contaminants in the air that fall onto surfaces during wet or dry conditions. Atmospheric deposition occurs on the surface of the waterway and everywhere within the source control area. These contaminants can be collected by stormwater conveyance systems and discharged to the LDW as stormwater pollution. Air pollutants may be generated from point or non-point sources. Point sources include industrial facilities; air pollutants generated from painting, sandblasting, loading/unloading of raw materials, and other activities; or through industrial smokestacks. Non-point sources include dispersed sources, such as vehicle emissions, aircraft exhaust, and off-gassing from common materials, such as plastics. Air pollutants may be transported over long distances by wind and can be deposited to land and water surfaces by precipitation or particle deposition.

### 3.2.8 Transport of contaminated sediments

Generally, the issue of sediment transport is outside the scope of Ecology's source control work. Two aspects of sediment transport are important to note:

- **Upstream sediments and sources:** Sediment transport from the upstream portion of the Green-Duwamish River was assessed in the RI and FS. Additionally, Ecology has collected water, sediment, and suspended solids samples from the Green-Duwamish River since 2009 to refine pollutant-loading estimates from the upstream portion of the Green-Duwamish River (Ecology 2009; Ecology and Environment 2009; Conn et al. 2015). King County has also collected water, sediment, and suspended solids samples from the Green-Duwamish River (King County 2013, 2014a, 2014b, 2015a, 2015b). Based on the suspended solids and sediment data collected by Ecology and King County, the Green-Duwamish River upstream of the LDW is not likely to contribute sediment contaminant concentrations that would result in recontamination of LDW sediments above RALs. Therefore, a Green-Duwamish River source control program, similar to what has been done in the LDW since 2003, is not a near-term priority. Refer to complementary goals in Chapter 2.0.
- **In-waterway sediments and cleanups:** Transport of contaminated sediments within the LDW study area was evaluated as part of the LDW RI/FS work and will be further addressed by EPA during geographically specific sediment cleanup construction activities. Transport of sediments from contaminated areas is influenced by a number of variables, including hydrodynamics, vessel traffic, dredging, and other waterway activities. During sediment cleanup construction activities, best management practices (BMPs) are required to minimize transport of contaminated sediments.

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# 4.0 Regulatory Framework

## 4.1 Introduction

Just as there are multiple pathways for contaminants to reach the LDW sediments, there are also multiple laws and jurisdictions that regulate these contaminants and/or pathways. A coordinated and committed long-term effort will be necessary to achieve the source control goals in this large and complex basin.

Implementation of this Strategy relies on existing administrative and legal authorities to control sources of contamination. The existing regulatory authorities[2] that form the framework used to address LDW source control needs are described below. Table 2 summarizes the major regulatory authorities that apply to the sources (contaminant releases, media, and pathways) that affect the LDW sediments.

Regulatory authorities for source control are implemented by various public agencies. Two examples are the NPDES permitting program that is delegated to the state of Washington by EPA and the industrial wastewater pretreatment program that is delegated to King County from Ecology. Some programs are not delegated, such as the Toxic Substance Control Act (TSCA), which is administered solely by EPA.

Because of the multiple laws and regulations used to control different sources, the local municipalities can find themselves in the role of both regulatory agency through their local codes and an entity regulated by Ecology and/or EPA. All the agencies involved with source control work recognize that, due to the need for source-specific actions and the technical difficulties associated with them, source control is a multi-agency effort. Ecology, EPA, and the other SCWG partners must work together and use regulatory tools effectively to control sources to LDW sediments.

It is critical that the authorities are clearly understood and coordinated to achieve the most-effective source control possible. Since 2002, the members of the SCWG have worked together solving mutual source control problems in a cooperative and voluntary manner. Participation was not required by regulation, order, or decree. The LDW Superfund process has entered a new phase since EPA issued a ROD for sediment cleanup in 2014, moving from the investigation phase toward active remedy design and construction. Ecology has determined it is time to clarify the regulatory framework that will be used to continue source control. The framework has two main regulatory elements, which are administered by water quality and cleanup programs. Ecology and EPA intend to coordinate these separate programs to support this Strategy and LDW source control goals. See Chapter 1.0 for details about Ecology and EPA coordination through MOU and MOA.

[2] This section is not a comprehensive review of all relevant regulatory authority. It is a brief synopsis of the most common regulatory authorities used for source control.

## Table 2. Regulatory authorities applicable to source pathways

| Levels of Government | Regulatory Authority | Applicable Permits/ Regulations | Pathways | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Direct Discharges | Surface Runoff | Contaminated Groundwater | Contaminated Soil Erosion/ Leaching | Waterway Operations | Spills, Leak, and Inappropriate Management | Atmospheric Deposition | In-water Transport of Contaminated Sediments |
| State | Water Pollution Control Act (RCW 90.48) and federally delegated NPDES program under CWA | Municipal stormwater permits | X | X | | | | X | | |
| | | Industrial stormwater permits | X | X | | | | X | | |
| | | Municipal wastewater and CSO permits | X | X | | | | X | | |
| | | Industrial wastewater | X | X | X | | | X | | |
| | MTCA (RCW 70.105D) | Cleanup regulations | X [a] | X [a] | X | X | | X | X [c] | X |
| | Hazardous Waste Management (RCW 70.105) | Control and management of hazardous waste | X [a] | X [a] | X | X | | | X [c] | X |
| | OHSSPR (RCW 90.56) | Surface water spill prevention regulations | X [b] | X [b] | | | X | X | | |
| Federal | CWA 33 USC §§ et seq. | Point source general permits (federal, e.g., Vessel General Permits) | X | X | | | X | X | | |

## Table 2. Regulatory authorities applicable to source pathways (continued)

| Levels of Government | Regulatory Authority | Applicable Permits/ Regulations | Pathways | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Direct Discharges | Surface Runoff | Contaminated Groundwater | Contaminated Soil Erosion/ Leaching | Waterway Operations | Spills, Leak, and Inappropriate Management | Atmospheric Deposition | In-water Transport of Contaminated Sediments |
| | TSCA 15 USC §§ 2601-2692 | Regulates PCBs, asbestos, lead, radon, and other substances and mixtures | X | X | X | X | | X | | |
| | RCRA 42 USC § 6901 et seq. | Sets standards for the treatment, storage, and disposal of hazardous waste in the United States | X [a] | X [a] | X | X | | | | |
| | CWA 33 USC § 404 et seq. | Dredging, filling, and work in navigable waters | | | | | X | X | | |
| | CERCLA 42 USC § 6901 et seq. | Cleanup regulations/ NCP | X [a] | X [a] | X | X | | | X [c] | |

## Table 2. Regulatory authorities applicable to source pathways (continued)

| Levels of Government | Regulatory Authority | Applicable Permits/ Regulations | Pathways | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Direct Discharges | Surface Runoff | Contaminated Groundwater | Contaminated Soil Erosion/ Leaching | Waterway Operations | Spills, Leak, and Inappropriate Management | Atmospheric Deposition | In-water Transport of Contaminated Sediments |
| | OPA, 33 USC §§ 2701 et seq. | Surface water spill prevention regulations/ NCP | X [b] | X [b] | | | X | X | | |
| | CAA, 42 USC §§ 7401 et seq. | Air regulations | | | | | | | X | |
| Regional and Local | Delegated state CAA (RCW 70.94) and federal CAA | PSCAA permits | | | | | | | X | |
| | King County Codes: Title 28, metropolitan services and delegated pretreatment program; Titles 9.04, 9.12, and 16.82 | King County industrial waste permits and discharge authorizations; sets requirements for stormwater detention/ treatment, source control, and maintenance | X | X | | | | X | | |

## Table 2. Regulatory authorities applicable to source pathways (continued)

| Levels of Government | Regulatory Authority | Applicable Permits/ Regulations | Pathways | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Direct Discharges | Surface Runoff | Contaminated Groundwater | Contaminated Soil Erosion/ Leaching | Waterway Operations | Spills, Leak, and Inappropriate Management | Atmospheric Deposition | In-water Transport of Contaminated Sediments |
| | Seattle Municipal Codes: Stormwater Code (22.800-22.808) and Side Sewer Code (21.16) | Sets requirements for stormwater detention/ treatment, source control, and maintenance; side sewer construction and permitting | X | X | | | | X | | |
| | Tukwila Code, Titles 6, 14, 21, and 22 | Permits, licenses, orders, decrees, and notices | X | X | | | | X | | |

[a] The character, nature, and extent of chemical contamination, affected media, and pathways at any given place may determine how these regulations apply. Each source may be uniquely regulated.
[b] Spill response regulations apply to an immediate threat to human health and to the environment for oil and hazardous substances.
[c] Cleanup regulations apply to other media contaminated by air sources.

CAA = Clean Air Act
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CSO = combined sewer overflow
CWA = Clean Water Act
MTCA = Model Toxics Control Act
NCP = National Oil and Hazardous Substances Pollution Contingency Plan
NPDES = National Pollutant Discharge Elimination System
OHSSPR = Oil and Hazardous Substance Spill Prevention and Response
OPA = Oil Pollution Act
PCB = polychlorinated biphenyl
PSCAA = Puget Sound Clean Air Agency
RCRA = Resource Conservation and Recovery Act
RCW = Revised Code of Washington
TSCA = Toxic Substances Control Act
USC = United States Code

Other regulations may apply on a case-by-case basis, such as the Clean Air Act (CAA), TSCA, and the Resource Conservation and Recovery Act (RCRA).

## 4.2 Water Quality Regulations

Water quality regulations focus on the prevention and systematic reduction of the discharge of contaminants through NPDES and state waste discharge permits. Ecology's Water Quality Program regulates the direct discharge pathways discussed in Chapter 3.0. EPA has delegated the CWA Section 402 NPDES permitting responsibilities for Washington State to Ecology. EPA continues to regulate any direct discharge pathways owned or operated by federal facilities in the LDW source control area. Water quality regulations and permits are an important component of source control for the long term. Each relevant permit is briefly described below.

### 4.2.1 Municipal stormwater permits

Under the CWA, certain urban areas are required to have an NPDES permit if they collect stormwater runoff in municipal separate storm sewer systems (MS4s) and discharge it to surface waters. Accordingly, Ecology issues municipal stormwater permits (as joint NPDES and state waste discharge permits) to various municipalities. The Phase I Municipal Stormwater Permit covers the city of Seattle, unincorporated King County, and the Port of Seattle. The Western Washington Phase II Municipal Stormwater General Permit covers the city of Tukwila and numerous other cities located upriver from the LDW. WSDOT has an individual municipal stormwater permit for discharges from WSDOT's MS4s, which are generally located along state highway rights-of-way across the state.

Each municipal stormwater permittee must implement a Stormwater Management Program (SWMP), which includes programs to control stormwater pollution (refer to text box on page 29). The SWMP and the associated minimum performance measures specified in the permits are designed to reduce the discharge of pollutants from the MS4 to the maximum extent practicable; meet state requirements for all known, available, and reasonable methods of prevention, control, and

**Permits**

A permit prohibits certain discharges and allows a facility to discharge a specified amount of a pollutant into a waterbody under certain conditions consistent with water quality regulations. In Washington State, NPDES permits are typically issued as both NPDES and state waste discharge (RCW 90.48) permits. There are two basic types of NPDES permits: individual and general.

**Individual Permit**

An individual permit is tailored to an individual facility. Once a facility submits the appropriate application(s), Ecology develops their permit based on the type of activity, nature of discharge, and receiving water quality. Ecology issues the permit for a specific period (not to exceed 5 years), requiring they reapply 180 days prior to the expiration date.

**General Permit**

General permits are developed for a category of discharger instead of an individual facility. General permits are cost-effective because:

* A large number of facilities can be covered under a single permit.
* Ecology allocates resources in a more-efficient manner to provide timelier permit coverage.

treatment; and protect water quality. However, discharges may occur that cause or contribute to violations of water quality standards. Therefore, in some cases, adaptive management may be necessary. Adaptive management of the SWMPs allows permittees to fine-tune their programs to address specific water quality problems. Ecology will evaluate municipal stormwater permittees discharging to the LDW for potential adaptive management requirements to support LDW source control goals.

Municipal Stormwater Management Program Components

* Coordination;
* Legal authority;
* Source control, illicit discharge detection and elimination, and mapping;
* Structural stormwater controls;
* Municipal operations and maintenance;
* Construction and post-construction runoff controls;
* Public involvement, education, and outreach; and
* Monitoring.

SWMP activities and any appropriate adaptive management provisions will be included in city and county Source Control Implementation Plans. In this way, Ecology may utilize the municipal stormwater permits as a primary regulatory tool to implement controls on municipal stormwater discharges to the LDW. This does not preclude permittees from identifying contributions to municipal stormwater that may need to be addressed separately under other regulations or referred to other source control agencies.

The city of Seattle, the largest municipal stormwater permittee discharging to the LDW, has integrated its Source Control Implementation Plan with an MS4 Adaptive Management Plan. Refer to Section 1.2.7 for further information.

### 4.2.2 Industrial Stormwater General Permits

Ecology grants coverage under the Industrial Stormwater General Permit (ISGP) to facilities generating stormwater associated with industrial activities that is discharged directly to the LDW, creeks tributary to the LDW, or to MS4s. The ISGP requires stormwater monitoring and reporting and the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP). SWPPPs must include operational; structural; and, where necessary, treatment BMPs that identify, reduce, eliminate, and/or prevent the discharge of stormwater pollutants. Any federal facilities discharging stormwater associated with industrial activities in the LDW are subject to requirements of EPA's Multi-Sector General Permit (MSGP). The relevance of the MSGP in LDW source control is minimal and, thus, it is not discussed further.

Stormwater may become contaminated by industrial activities as a result of contact with materials stored outside; spills and leaks from equipment or materials used onsite; contact with materials during loading, unloading, or transfer from one location to another; and from airborne contaminants.

Facilities covered under the ISGP must manage stormwater in accordance with specific terms and conditions, including the development and implementation of a SWPPP, monitoring, reporting, and ongoing adaptive management based on sampling and inspections. The facility

must implement specific mandatory BMPs consistent with Ecology's Stormwater Management Manual for Western Washington (Ecology 2012). These source control BMPs must be designed and implemented to meet ISGP benchmark values for copper, zinc, turbidity, pH, and oil sheen. Exceedances of benchmark values result in escalating corrective actions. As a result, numerous ISGP permittees have installed stormwater treatment technologies. Additional ISGP requirements apply to most of the permitted LDW dischargers that will provide on-site sampling results for additional LDW COCs and reduce total suspended solids in stormwater discharges (Ecology 2014).

There are an estimated 2,500 commercial and industrial properties that discharge stormwater to the LDW either directly or indirectly via the MS4. Approximately 100 of these, including the King County International Airport, generate stormwater associated with industrial activity, as defined by EPA rules, and thus are subject to the ISGP. The remaining properties are not required to obtain coverage under the ISGP based solely on their industrial practices. However, where these properties discharge to an MS4, discharges from these properties are regulated by the local government.

**Why Do Not all Commercial and Industrial Properties Need NPDES Permits?**

The vast majority of businesses in the LDW source area are not required to obtain coverage under an NPDES permit, because they do not fall into the defined "industrial stormwater" categories. Nonetheless, the state's WPCA (RCW 90.48), MTCA (RCW 70.105D), and Hazardous Waste Management Act (RCW 70.105), along with municipal codes governing the release or discharges of hazardous substances, may apply. Ecology can require a traditionally non-regulated business to obtain coverage under an NPDES permit if the business is determined to be a "significant contributor" based on available data. If a facility is found discharging pollutants into waters of the state, it may face monetary penalties and could be required to take additional steps to come into compliance. In extreme cases, criminal charges may be brought against a business, business owners, or employee(s).

In the near term, Ecology addresses the industrial stormwater discharges to the LDW in the following manner, on a site-specific basis:

- Ecology conducts regular visits and inspections, and takes formal enforcement action where necessary, to ensure that facilities are complying with their ISGP. Where appropriate, ISGP permittees are asked or required to monitor for additional contaminants that may be present in their discharge. In addition, these permittees may be asked or required to apply for coverage under an individual NPDES permit to allow for fine-tuning of permit conditions to meet facility- and LDW-specific needs.
- Ecology has conducted a review of the SWPPPs for all industrial stormwater permit holders discharging to the LDW. The project mapped all stormwater discharge monitoring locations and reviewed the adequacy of the SWPPPs. Ecology used the results to identify the outfall(s) each of the permit holders discharge to, as well as facility-specific SWPPP deficiencies.
- Ecology sampled stormwater and storm solids at selected facilities (Leidos 2015a, 2015b) to provide information that can be used to help prioritize facilities for additional regulatory oversight.

### 4.2.3 Municipal wastewater and CSO permits

Ecology issues individual NPDES permits to municipal wastewater dischargers under the authority of the CWA and the State WPCA (RCW 90.48). Permits relevant to the LDW include a permit for King County's West Point WWTP and associated CSO system, and a permit for Seattle's CSO discharges. Each permit includes provisions from the federal CSO Control Policy (59 Federal Register 18688) that require owners of combined sewer systems (CSS) to implement nine minimum controls (NMC). The NMC are largely programmatic policies and practices designed to minimize the impacts untreated CSOs have on human health and the environment. Ecology considers the NMC as technology-based standards for untreated CSO discharges. As part of NMC #7, the King County and Seattle permits explicitly require a pollution prevention program that uses BMPs consistent with strategies identified in Ecology's Stormwater Management Manual for Western Washington (Ecology 2012) to reduce the impacts of CSOs on receiving waters.

The State WPCA requires communities with CSOs to implement plans designed to "achieve the greatest reasonable reduction in combined sewer overflows at the earliest possible date" (RCW 90.48.480). Chapter 172-245-020 defines "greatest reasonable reduction" as an average of no more than one untreated discharge from each CSO outfall. Each NPDES permit for communities with CSOs includes compliance schedules to ensure communities implement CSO control strategies in a timely manner. The permits also require the communities to ensure their CSO outfalls do not exceed the one-discharge-per-year standard once they are controlled. In addition to meeting the performance standard for a controlled outfall, the permits require the communities to validate that their one authorized untreated discharge from each outfall does not violate narrative water quality and sediment standards.

King County's West Point WWTP permit (#WA0029181) authorizes discharges of secondary treated wastewater into central Puget Sound. The permit also authorizes intermittent discharges of primary treated wastewater from 4 existing CSO treatment facilities and untreated wastewater from 38 CSO outfalls. King County owns and operates the large-scale interceptor pipelines and pump stations that convey municipal wastewater from local purveyors to the West Point WWTP. King County provides regional collection and treatment of wastewater from 33 cities and local sewer utilities and 1 tribe in the greater Seattle area. Approximately 75 percent of the service area within the city of Seattle, which flows exclusively to the West Point WWTP, includes CSSs. King County is responsible for controlling untreated CSOs from their CSO outfalls connected to their interceptor system and must comply with discharge limits for each CSO treatment facility. In the LDW, King County's combined sewer conveyance system includes four controlled CSO outfalls, five uncontrolled CSO outfalls, and one CSO treatment facility outfall (the Henderson/Martin Luther King treatment facility that discharges to the LDW at the Norfolk outfall).

The King County Industrial Waste (KCIW) Program regulates the discharge of pollutants into the separate sanitary and combined sewer systems from various commercial and industrial

businesses. Ecology delegated pretreatment authority for permitting, monitoring, and enforcement over industrial users discharging to their treatment system to provide more direct and effective control of pollutants. This program is consistent with the federal pretreatment regulations in 40 Code of Federal Regulations (CFR) Part 403 and related federal Effluent Guidelines and Limitations (40 CFR Parts 405-471). These federal regulations, along with Chapter 173-216 WAC and Title 28 of the King County Code, give KCIW authority to set limits on pollutants discharged and require BMPs and/or wastewater treatment at industrial facilities. NMC #3 requires permittees with CSO outfalls to routinely review and modify, as appropriate, its pretreatment program to minimize the impact non-domestic discharges have on the quality of water discharged during storm events.

In 2013, EPA, Ecology, and King County signed onto a federal Consent Decree (2:13-cv-677) that was developed to enforce federal and state requirements for King County to control all CSO outfalls in its system. The Consent Decree establishes a compliance schedule designed to bring the County's remaining uncontrolled CSOs into compliance with the performance standard of no more than one untreated discharge by 2030. The County's 2012 CSO Control Plan Amendment, which provided the basis for the compliance schedule in the Consent Decree, proposes completion of multiple storage and treatment projects to control discharges into the LDW by 2030. The approved plan includes storage projects to control three LDW CSO outfalls: Hanford #1, scheduled for completion in 2019, and W. Michigan Street and Terminal 115, scheduled for completion in 2025. The plan also proposes a CSO treatment facility project to control two LDW CSO outfalls: the Georgetown Wet Weather Treatment Facility to control the Brandon Street and Michigan Street outfalls, scheduled for completion in 2022. Two other major CSO control projects will control CSO outfalls into the West and East Waterways: the Chelan Avenue storage project scheduled for completion in 2023; and a currently unnamed treatment facility to control the Hanford #2, Lander Street, Kingdome, and King Street CSO outfalls, scheduled for completion in 2030.

The city of Seattle operates and maintains sewage collection system infrastructure within the Seattle city limits that serve areas of up to 1,000 acres. Seattle does not own or operate domestic wastewater or CSO treatment facilities. All sewage collected by Seattle's sewer system transfers to King County facilities for conveyance and treatment at either the West Point WWTP or at one of King County's CSO treatment facilities. The NPDES permit for Seattle's CSS (#WA0031682) provides limited authority to Seattle to discharge untreated wastewater from its 86 CSO outfalls city-wide. The permit requires Seattle to assist KCIW in administering King County's pretreatment program as part of its NMC #3 requirement.

Seattle operates one CSO outfall that discharges into the LDW at S. Oregon Street. Seattle also has a CSO outfall at Terminal 5 in the West Waterway, and one along E. Marginal Way discharging to the East Waterway. Similar to King County, Seattle signed onto a federal Consent Decree with Ecology and EPA in 2013 to enforce the state and federal requirements to control all of its remaining uncontrolled CSOs. The Seattle Consent Decree required Seattle Public Utilities

(SPU) to submit a Long-Term Control Plan (LTCP) to Ecology and EPA for approval by May 30, 2015. It also requires SPU to complete all of the control projects identified in the plan by the end of 2025.

The Consent Decree gave SPU the option to also develop an Integrated Plan that would allow them to defer some lower-priority CSO control projects in exchange for completing stormwater management projects that would provide a greater environmental benefit than the CSO projects. Seattle developed an Integrated Plan along with the LTCP, which Ecology and EPA approved in 2015. The approved Integrated Plan defers, until 2030, construction of CSO storage facilities that may be needed to control relatively small CSOs (including the three CSO outfalls discharging into the Duwamish waterways) if planned sewer system improvement projects to reduce the frequency and volume of CSO discharges (to be completed by 2020) are insufficient to control the CSO. In exchange for the deferral of these CSO control projects, Seattle will implement three stormwater management projects: the South Park Water Quality Facility (to be completed by 2025); increased arterial street sweeping throughout the City, including areas that drain to the LDW; and natural drainage systems in creek basins, including Longfellow Creek. The South Park Water Quality Facility will treat stormwater runoff from approximately 238 acres in the 7$^{th}$ Avenue drainage basin (part of the river mile 2.2-3.4 West Riverside Drive source control action area).

### 4.2.4 Clean Water Act Section 401 water quality certification

Under CWA Section 401, when a project proponent applies for a federal permit or license that results in any discharge to the waters of the United States, the applicant is required to obtain a 401 Water Quality Certification (401 certification) from the state in which the discharge originates. Generally, the 401 certification certifies that the federal action will comply with state water quality laws and regulations. In the state of Washington, Ecology is authorized to issue the 401 certification as an RCW 90.48 Administrative Order. Issuance of a 401 certification means that Ecology has reasonable assurance that the applicant's project, as permitted by the federal action, will comply with state water quality standards and other aquatic resources protection requirements under Ecology's authority.

Typical cases where Ecology issues a 401 certification include, but are not limited to, applicants receiving a Section 404 permit from the U.S. Army Corps of Engineers (USACE), a U.S. Coast Guard permit, or license from the Federal Energy Regulatory Commission. The 401 certification can cover both the construction and operation of the proposed project. Conditions of the 401 certification become conditions of the federal permit or license.

A state 401 certification is not required for in-waterway cleanup activities under CERCLA authority, because the CERCLA action is exempt from procedural or administrative requirements of CWA. It is EPA's responsibility to ensure that CERCLA actions comply with the substantive requirements of the CWA.

## 4.3 Surface Water Spill Response and Prevention Regulations

Spills of oil and/or hazardous substances are addressed by two regulatory acts.

### 4.3.1 Oil Pollution Act of 1990

The Oil Pollution Act of 1990 (33 United States Code [USC] §§ 2701 et seq.) provides for prevention, liability, removal, and compensation for the discharge of oil into or upon the navigable waters of the United States, adjoining shorelines, or the Exclusive Economic Zone.

EPA is the designated Federal On-Scene Coordinator if an oil spill were to occur in the LDW. EPA may ask the U.S. Coast Guard to assume the role of Federal On-Scene Coordinator. Parties responsible for oil spills may be asked to reimburse the federal government for cleanup costs. Spills may also result in penalties and other enforcement actions by the federal government.

### 4.3.2 Oil and Hazardous Substance Spill Prevention and Response

Under the state Oil and Hazardous Substance Spill Prevention and Response (RCW 90.56), Ecology is designated as Washington's lead agency to oversee prevention, abatement, response, containment, and cleanup efforts with regard to oil or hazardous substance spill to waters of the state. Ecology's SPPR focuses on preventing oil spills to Washington's waters and land. SPPR works with the regulated community and others to minimize the environmental threat of oil spills from vessels and oil-handling facilities. This work is done by:

- Inspecting facilities' vessels and monitoring oil-handling facility transfers.
- Boarding vessels for educational and compliance purposes.
- Overseeing oil transfer operations.
- Requiring and reviewing operations manuals and prevention plans.

Ecology would be the designated State On-Scene Coordinator if an oil spill were to occur in the LDW. Parties responsible for oil spills may be asked to reimburse the state for cleanup costs. Additionally, parties responsible for oil spills may also be asked to pay for damages to any state beaches, wildlife, or other natural resources. Spills may also result in penalties and other enforcement actions by the state.

## 4.4 Cleanup Regulations

Cleanup regulations focus primarily on removing contamination from the environment after a release. Three cleanup regulations are used to clean up the LDW and the surrounding source area.

### 4.4.1 Comprehensive Environmental Response, Compensation, and Liability Act

CERCLA (42 USC §§ 9601 et seq.), also known as Superfund, provides the basic legal framework for the cleanup and restoration of LDW sediments and is managed by EPA. The Superfund Amendments and Reauthorization Act of 1986 amended CERCLA. It requires Superfund actions to consider the standards and requirements found in other state and federal environmental laws and regulations; requires increased state involvement in every phase of the Superfund program; requires increased focus on human health problems posed by hazardous waste sites; and encourages greater citizen participation in making decisions on how sites should be cleaned up. The LDW Superfund cleanup effort is focused on reducing risks to human health and wildlife. Slip 4 (EAA-3), Earl M Jorgensen (EMJ), and Terminal 117 (EAA-5) cleanups are being addressed under CERCLA authority.

### 4.4.2 Resource Conservation and Recovery Act

RCRA (42 USC §6901 et seq.) gives EPA the authority to control hazardous waste from "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also sets forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances.

The 1984 Federal Hazardous and Solid Waste Amendments to RCRA focused on waste minimization and phasing out land disposal of hazardous waste and included provisions for corrective action for releases. Some of the other mandates of this law include increased enforcement authority for EPA, more stringent hazardous waste management standards, and a comprehensive underground storage tank program.

EPA manages two facilities under federal RCRA authority in the LDW source control area. The first is Boeing Plant 2, also known as EAA-4, where sediment cleanup under RCRA is being coordinated with adjacent bank and sediment cleanups at Jorgensen Forge and Terminal 117 (EAA-5). The second is Rhône-Poulenc, where interim corrective measures for the soils and groundwater are complete, and corrective measures for intertidal sediments will be coordinated with the Superfund sediment cleanup.

Ecology implements a federally authorized RCRA program with EPA oversight. Ecology administers RCRA through their HWTR Program. A Washington State MTCA order (described below) is considered part of the federally authorized RCRA program when it is incorporated in a RCRA permit or when Ecology determines the MTCA order can serve as an enforceable document in lieu of a post-closure permit. Ecology is managing formal RCRA corrective actions at five sites: Stericycle (Philip Services Corporation/Burlington Environmental Georgetown); Art Brass Plating, Blaser Die Casting, and Capital Industries (collectively referred to as West of 4$^{th}$); and Former General Electric Aviation Division.

### 4.4.3 Toxic Substances Control Act

TSCA (15 USC §2601 et seq.) provides EPA with authority to require reporting, record keeping and testing requirements, and restrictions relating to chemical substances and/or mixtures. Certain substances are generally excluded from TSCA, including, among others, food, drugs, cosmetics, and pesticides. TSCA addresses the production, importation, use, and disposal of specific chemicals, including PCBs, asbestos, radon, and lead-based paint.

With respect to sources in the LDW, there have been a number of TSCA-based cleanups for PCBs over the years. Since LDW source control efforts began, TSCA work has been coordinated with either Ecology's MTCA cleanup program or with EPA's CERCLA cleanup program. The most recent and notable examples include the PCB cleanups at Rainier Commons, Boeing Military Flight Center, and North Boeing Field.

### 4.4.4 Model Toxics Control Act

MTCA **(**RCW 70.105D [1989]) is Washington's site cleanup law. The states' cleanup law is comparable to the federal Superfund program and is managed by Ecology. The statewide regulations (WAC 173-340 [1992]) establish cleanup standards and requirements for managing contaminated sites. MTCA requires any owner or operator who has information that a hazardous substance has been released to the environment at the owner or operator's facility, and may be a threat to human health or the environment, must report this information to Ecology. Ecology's Toxics Cleanup Program (TCP) oversees the cleanup of hazardous substances that have been released into soil, groundwater, surface water, drinking water, and sediments under this act. Cleanup can be accomplished either with formal oversight under an Agreed Order with the liable party or independently.

An Agreed Order is a legally binding Administrative Order issued by Ecology and agreed to by the potentially liable person. MTCA Agreed Orders can be used for RIs, FSs, and final cleanups. It describes the site activities that must occur for Ecology to agree not to take enforcement action for that phase of work. Agreed Orders are subject to public review and offer the advantage of facilitating contribution claims against other persons and exempting cleanup work from obtaining certain state and local permits. Cleanups planned under Ecology Agreed Orders may be eligible for a settlement agreement called a Consent Decree.

Cleanup at sites under an Agreed Order may include interim actions. An interim action is a remedial action that is necessary to reduce a threat to human health or the environment by eliminating or substantially reducing one or more pathways for exposure to a hazardous substance at a facility. An interim action only partially addresses the cleanup of a site. It could also be used to correct a problem that may become substantially worse or cost substantially more to address if the remedial action is delayed.

Cleanup at a site may take place with varying degrees of Ecology oversight. Independent cleanup may occur without any Ecology involvement until the cleanup is completed and a report is

submitted to Ecology. Many property owners choose to clean up their sites independently but with technical assistance and options provided by Ecology through the Voluntary Cleanup Program (VCP). If admitted to the VCP, the property owner will conduct the cleanup and ask Ecology if the activity meets the requirements of MTCA. Based on review of data and reports submitted, Ecology may issue a letter stating that the site needs no further action (NFA) or identifies what additional work is needed. Because the cleanup is voluntary, any determination by Ecology is not a settlement of MTCA liability with the state. However, many persons have found an NFA letter to be sufficient for their needs. Cleanup may also take place where the potentially liable person and Ecology have entered into an Agreed Order or where Ecology has issued an order requiring remedial action. This is often referred to as the "formal process" and involves a significant amount of Ecology oversight of the cleanup actions.

Ecology has identified 17 (as of June 2016) upland contaminated sites in the LDW source control area requiring cleanup to protect the water column and sufficiently control or eliminate sources through the soil or groundwater pathways that could adversely affect LDW sediments. Fourteen of these sites are currently managed by the TCP under MTCA Agreed Orders to determine the nature and extent of contamination and propose a course of action to address it. TCP is negotiating Agreed Orders for three other sites.

There are generally multiple sites in the LDW in the VCP at any given time. The list changes frequently, because these sites may be cleaned up relatively quickly or the applicant may withdraw from the program.

Sites under MTCA Agreed Order

730 Myrtle LLC/Whitehead Tyee Property*
8801/Paccar/Kenworth Truck
Boeing Isaacson/Thompson
Crowley/DeNovo
Douglas Management
Duwamish Marine Center
Duwamish Shipyard
Glacier NW/Reichhold
Jorgensen Forge
N Boeing Field/Georgetown Steam Plant
South Park Marina*
T-115 North (MRI Corporation)
T-115 South (Boeing Plant 1)*
Trotsky/Industrial Container
Boeing Field Chevron
Fox Avenue/Great Western Chemical
South Park Landfill

* In negotiations as of June 2016

Ecology will evaluate contaminated sites as they are discovered or referred to Ecology by source control partners. Ecology will perform initial assessments of contaminated sites for possible soil and groundwater contamination and prioritize them for cleanup action when they pose a risk of contaminating LDW sediments or the water column. Once a contaminated site has been identified as posing a risk to the river, Ecology may require a cleanup for all media and contaminants. Ecology source control staff will coordinate with cleanup project managers to ensure that source control for relevant pathways is integrated into their respective sites.

### 4.4.5 Sediment Management Standards

The SMS (WAC 173-204) are Washington's regulations intended to reduce, and ultimately eliminate, adverse effects on biological resources and significant human health threats from sediment contamination. The SMS regulations are authorized by several statutes, including

MTCA and WPCA. Parts I through IV of the SMS are approved by EPA as state water quality standards under the CWA; however, Part V of the SMS regulations is only authorized by MTCA and may not be used for CWA purposes. Some requirements of the SMS (Part IV) may be implemented through an administrative action under either the Washington State WPCA (RCW 90.48) or MTCA (RCW 70.105D). MTCA regulations specifically state that, in addition to complying with the requirements of WAC 173-340, sediment cleanup actions must comply with the SMS in WAC 173-204. EPA and Ecology have worked together to ensure the in-waterway LDW cleanup, as documented in the ROD, will meet SMS substantive requirements.

The SMS regulations provide Ecology with authorization to require a party to conduct activities that could inform Ecology on the source of contamination to the LDW, and Ecology could require changes to discharge permits or require use of a sediment impact zone. Part IV of the SMS regulations specifies a process for managing sources of sediment contamination from point or non-point discharges, including evaluation, analysis, and verification of the discharge's impact on sediment; stipulating permit terms and conditions to ensure a violation of the sediment standards does not occur; or use of a sediment impact zone to control and minimize the impact of the discharge.

## 4.5 Additional Source Control Tools

### 4.5.1 Ecology's Urban Waters Initiative

The LDW was one of three areas chosen by the 2007 Legislature for Washington State's Urban Waters Initiative. This initiative provided funding for Ecology and local government efforts to control sources of pollution to the LDW. Ecology has two inspector positions that continue to be funded via the Urban Waters Initiative. The initiative's goal is to help prepare for cleanup of the contaminated areas and prevent recontamination after cleanup is complete. This is done using the following steps:

1. Identify potential sources of contamination to the LDW water and sediment through comprehensive business inspections.
2. Inspect more permitted facilities to ensure compliance with existing permits. Ensure that all businesses that need environmental permits do have them.
3. Provide technical assistance to businesses to reduce toxics and prevent pollution.
4. Help Ecology decide if more source control measures are needed.
5. Strengthen the partnership between Ecology, city of Seattle, and King County.

### 4.5.2 Waterway operations

Sources of contamination from dockside operations, dredging, and commercial or recreational vessels are regulated with a variety of permits, policies, and procedures. Some of these are under the purview of the federal government, such as USACE CWA 404 permits for dredging and filling, Section 10 of the Rivers and Harbors Act permits for construction and demolition related to preserving navigable function of the waterway, or U.S. Coast Guard regulations governing the operations of commercial vessels and bridges.

With respect to the LDW, EPA Region 10 and USACE Seattle District coordinate CWA 404 and Section 10 permitting according to a Standard Operating Procedure, which applies to any work proposed within the boundaries of a Superfund site within the District. USACE notifies EPA of any work proposals and will not issue a permit until the project is reviewed and either commented upon or approved by the Superfund Remedial Project Manager. LDW examples of this include maintenance dredging at T-115 and pier and piling removal and replacement at various industrial and commercial docks along the LDW.

The Ecology/EPA MOU divides responsibilities for source control and sediment cleanup between the agencies at the MHHW line.[3] When the MOU was negotiated, in-water work and vessel operations were not explicitly addressed. Ecology will rely on EPA to coordinate with the U.S. Coast Guard or other federal agencies as necessary.

Washington State also has regulatory authority over activities that occur in the waterway via Water Quality Certifications (refer to water quality regulations above) and through authorities administered by the Washington State Department of Fish and Wildlife. Two such examples are ballast water discharges and hydraulic project approvals. Ballast Water Management (RCW 77.120) applies to all vessels of 300 gross tons or more, United States or foreign flagged, carrying, or capable of carrying, ballast water into the waters of the state after operating outside of the waters of the state. Hydraulic project approvals provide approvals for construction projects that use, divert, obstruct, or change the natural bed or flow of state waters. The hydraulic project approval is authorized through RCW 77.55 and administered through WAC 220-110.

### 4.5.3 Vessel discharge permits

EPA currently regulates vessel discharges with the national VGP. The current 2013 VGP is in effect until 2018. The VGP applies to discharges incidental to the normal operation of all non-recreational, non-military vessels of 79 feet or greater in length that discharge in waters of the United States. In addition, the ballast water discharge provisions also apply to any non-recreational vessel of less than 79 feet or commercial fishing vessel of any size discharging ballast water. The VGP requires that vessel owners and operators meet certain requirements, including seeking coverage for most vessels; assuring their discharges meet effluent limits and

[3] Section III.B of the MOU also states that both agencies recognize there may be site-specific exceptions to the MHHW agreement.

related requirements; a corrective action process for fixing permit violations; and requirements for inspections, monitoring, recordkeeping, and reporting. This national NPDES permit is enforced by the U.S. Coast Guard.

### 4.5.4 Air regulations

Air pollution control in Washington is based on federal, state, and local laws and regulations. EPA, Ecology, and local clean air agencies all regulate air quality. Ecology implements and enforces air quality regulations in counties without an air pollution control agency. Ecology also has jurisdiction over primary aluminum plants, pulp mills, vehicles, and vehicle-related sources.

Title V of the federal CAA requires states to develop and implement an operating permit program in accordance with 40 CFR Part 70 for facilities that are the largest sources of air pollution. These operating permits are often referred to as Air Operating Permits (AOPs), Title V Permits, or Part 70 Permits. They combine, into one document, all operational and procedural requirements; applicable regulations; emission standards; and monitoring, recordkeeping, and reporting requirements. The purpose of the AOP is to make it easier to comply with and enforce air pollution laws. Ecology, the Energy Facility Site Evaluation Council, and any of seven local air quality agencies have received EPA approval to administer Washington's AOP program.

Washington's AOP regulation is in WAC 173-401. It requires a facility to have an AOP if it has the potential to emit any of the following:

- More than 100 tons per year of any pollutant, such as nitrogen oxides, volatile organic compounds, carbon monoxide, sulfur dioxide, and particulate matter. Lower thresholds may apply in non-attainment areas.
- More than 10 tons per year of any hazardous air pollutant, as listed in subsection 112(b) of the CAA.
- More than 25 tons per year of a combination of any hazardous air pollutants.

A facility may also be required to have an AOP if it is subject to certain federal air quality requirements, including:

- Title IV Acid Rain Program,
- New Source Performance Standards, or
- National Emission Standard for Hazardous Air Pollutants.

PSCAA is responsible for regulating air quality of different businesses in the LDW source area. PSCAA's programs, policies, and regulations are designed to maintain air quality standards and protect human health. Refer to PSCAA

**Examples of Using MTCA to Control an Air Source**

Establishing safe levels for a chemical vapor entering a home or business, because of soil or groundwater contamination.

Establishing soil cleanup levels if the surrounding area has been contaminated by air emissions from a smokestack.

Regulation III, which references acceptable source impact levels, as identified in WAC 173-460-150. These acceptable source impact levels are mainly based on human respiratory health risk, which may not be protective of sediments in terms of atmospheric deposition.

Ecology will establish air cleanup standards when the concentration of hazardous substances in the air originates from other contaminated media or a remedial action at the site and under the following circumstances:

- Using a site-specific risk assessment to establish non-potable groundwater cleanup levels for volatile organic compounds.
- Soil cleanup levels addressing dust or vapors.
- When necessary to establish air emission limits for a remedial action.

Under MTCA regulations, Ecology cannot establish air cleanup standards where concentrations of hazardous substances in the air originate from an industrial or commercial process or operation, or where hazardous substances in the air originate from an off-site source.

Dust emissions at NPDES-permitted facilities that contribute pollutants to stormwater, that then discharges to waters of the state, may be addressed by provisions of NPDES and state waste discharge permits.

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# 5.0 Interagency Coordination and Communication

Coordination and communication are critical to the success of the Strategy to address source control issues that cannot be adequately resolved by one agency or program. The following sections describe the existing framework for inter- and intra-agency coordination currently used by LDW source control partners. Ecology expects that coordination mechanisms and tools will be refined over time in response to changing conditions, lessons learned, and Implementation Plan development and revision.

## 5.1 U.S. Environmental Protection Agency and Washington State Department of Ecology Coordination

The 2004 MOU and 2014 MOA between Ecology and EPA (see Chapter 1.0) provide a framework for coordination and cooperation in the ongoing management of the LDW and to optimize and prioritize available federal and state resources for addressing hazardous waste cleanup and water quality issues.

The coordination occurs at both the staff and management levels. At the staff level, lines of communication need to continue to allow frequent discussions on a wide range of issues. An Interagency Task Force, consisting of EPA and Ecology representatives, meets monthly to coordinate action items; discuss and, where possible, resolve regulatory conflicts; and prepare briefings for agency management. Other EPA and Ecology staff working in the LDW coordinate informally as needed. A management-level Executive Committee, with representatives from EPA Region 10's Offices of Environmental Cleanup and Water and Watersheds and Ecology's Northwest Regional Office Toxics Cleanup and Water Quality Programs, provides a routine forum to discuss LDW cleanup and source control efforts in the context of federal and state site cleanup and water quality authorities. The current agreements can be viewed at <https://fortress.wa.gov/ecy/gsp/CleanupSiteDocuments.aspx?csid=1643>.

## 5.2 Source Control Work Group

The SCWG agencies have invested significant effort and resources toward regulating sources and pathways to the LDW. The SCWG meets monthly. The problems discussed in those meetings tend to be technically complex, with multiple levels or types of source control actions needed to address releases, media, or pathways.

### 5.2.1 Annual Source Control Work Group work plan

The SCWG conducts annual comprehensive work planning at the beginning of each calendar year. Future work plan meetings will include the project coordinators from each agency (to be identified in specific Implementation Plans). The main goal of the annual work plan meeting will be to discuss the resources and staffing needed for the ongoing source control work, such as inspections, sampling, and plans for upcoming documents.

## 5.3 Duwamish Inspectors Group

The Duwamish Inspectors Group is an informal group of inspectors from King County's Industrial Waste, Local Hazardous Waste, and Stormwater Programs; SPU's Stormwater Program; Ecology's Urban Waters (Hazardous Waste and Water Quality) Programs and TCP; PSCAA; and EPA's Office of Enforcement. The group meets to discuss compliance issues on specific facilities, coordinate inspections, and refer issues noted to the agency with the authority and jurisdiction to address a compliance problem. This Strategy does not propose any changes to the structure of this group as it currently exists (2016).

## 5.4 Interagency Referrals

Not all discovered sources will fall within the authority of a single agency to control. Source control is often a joint responsibility, and interagency referrals are an important aspect of the Strategy.

Source control problems observed in the field are handled in two ways. As described above, specific facility concerns may be addressed informally during an SCWG or Duwamish Inspectors Group meeting. Routine referrals and incident reporting occur through Ecology's Environmental Response Tracking System (ERTS). (Refer to <http://www.ecy.wa.gov/reportaproblem.html> for additional information.) When a report comes into ERTS, the Ecology ERTS Coordinator notifies and/or refers the incident to other relevant agencies, including the State Department of Health, Seattle-King County Public Health District, EPA, Washington Department of Fish and Wildlife, and municipal stormwater or wastewater managers. ERTS is the primary means used by both the public and source control partner agencies to notify Ecology of spills and other environmental releases, including reporting of the discovery of site contamination under MTCA and notification of discharges that may constitute a threat to human health or the environment under applicable NPDES permits. Source control partners also use ERTS to refer businesses to Ecology for potential coverage under the ISGP NPDES permit.

Ecology may need to formally refer a contaminated site to EPA for federal cleanup oversight. These referrals will be conducted in accordance with the February 2000 EPA and Ecology Superfund Management Agreement (EPA and Ecology 2000a).

# 6.0 Source Control Sufficiency Evaluations and Recommendations

## 6.1 Introduction

This chapter describes the process and information needed to support source control sufficiency evaluations and associated recommendations based on potential and known sources on upland properties. The basic premise of "source control sufficiency" is that it meets the Strategy's near-term goal where sources have been identified and controlled to a level that active in-water sediment remediation activities for the LDW CERCLA cleanup can begin, as defined in EPA's ROD. Ecology is responsible for evaluating source control sufficiency and documenting the recommendation.

The concept of sufficiency is described in the ROD in Section 4.2, which states that the "focus of this work is to control sources sufficiently such that recontamination above the benthic SCO criteria and human health remedial action levels (RALs) … is unlikely. ... This will prevent or minimize the likelihood that sediments will be recontaminated at levels that trigger additional active in-waterway sediment remediation…"

Setting up a clear process of evaluating the sufficiency of source control actions and providing a recommendation supported by documentation will aid EPA in making appropriate and timely decisions for the LDW CERCLA sediment cleanup. Coordination between the agencies is set forth in the 2004 MOU and 2014 MOA between EPA and Ecology (see Chapter 1.0). For the procedures for sequencing the CERCLA in-waterway cleanups with state-lead source control activities, the 2014 MOA states:

"i. The sequencing of active in-waterway sediment remediation and associated source control is likely to begin at the upper portion of the in-waterway portion of the LDW Site and work downstream;

ii. EPA intends to provide Ecology with the baseline monitoring data and remedial design data required by the ROD for the area targeted for active in-waterway sediment remediation activities at least six months prior to the anticipated date that a source control sufficiency evaluation and recommendation is needed;

iii. Ecology will coordinate with EPA in preparing Source Control sufficiency evaluations for areas targeted for active in-waterway sediment cleanup activities and will submit associated recommendations to EPA for its concurrence;

iv. After EPA concurs that an area is ready to begin active in-waterway sediment cleanup activities, EPA intends to direct PRPs to remediate the area in accordance with the LDW ROD and consistent with any enforceable agreement."

While the MOA calls for at least 6 months between Ecology's receipt of baseline and/or remedial design data and completing a sufficiency evaluation, Ecology recognizes that there may

be situations where 6 months is not enough time, especially for complex evaluations involving multiple source control areas and pathways. Both agencies will strive to coordinate and exchange information as soon as possible to stay on schedule for the in-waterway remedial actions.

Both agencies recognize that remediation itself, when designed, constructed, and maintained properly, reduces the risk of recontamination and, therefore, there is a bias for action.

It is important to note that a source control sufficiency recommendation does not provide exemptions from actions required under the federal CWA, the state WPCA, the state MTCA, CERCLA, or other authorities. For example, a site or area that has been evaluated for source control sufficiency for the in-waterway remedial action may still be required to take additional measures to meet water quality permit or site cleanup requirements.

## 6.2 Geographic Scope of Sufficiency Evaluations

The geographic scope of any given sufficiency evaluation will be driven by the scale of planned in-waterway remediation. This includes whatever source control areas affect the planned remediation area. An evaluation can occur for an individual source control area or a portion of a source control area, but is likely to be larger. For example, a sediment dredging area may extend across multiple source control areas.

As EPA and the PRPs proceed with remedial design and planning for in-waterway remedial action, EPA and Ecology will identify the geographic scope of the corresponding sufficiency evaluations as early as practical in the design phase. In-water work activities that necessitate sufficiency evaluations include dredging, capping, and ENR. Because MNR is expected in areas where the sediments already meet the RALs, a source control sufficiency evaluation will not generally be necessary in MNR areas. However, if an MNR area becomes an area slated for an active in-waterway cleanup action, Ecology will assess source control sufficiency for that area.

## 6.3 Process for Sufficiency Evaluations

The process for determining if source control is sufficient to proceed with active sediment remedial actions follows a line of evidence approach, building upon previous source control activities, existing conditions, and new or emerging data. Only some pathways are relevant for source control sufficiency evaluations (see Section 6.3.1). When evaluating sufficiency, Ecology will consider principal criteria (see Section 6.3.2) and an assessment of available environmental data (see Section 6.3.3).

### 6.3.1 Relevant pathways

As identified in this Strategy (Chapter 3.0), contaminants can enter the LDW through many different pathways. For the purposes of sufficiency recommendations, Ecology will evaluate direct discharges, groundwater, and bank erosion pathways. Pathways that are not appropriate for

evaluating sufficiency include river-wide transport of contaminated sediments, waterway operations, regional atmospheric deposition, and inputs upgradient from the LDW (e.g., the Green-Duwamish River).

The river-wide redistribution of contaminated sediments will be reduced by active in-waterway sediment remediation. Evaluating source control sufficiency for sediments already in the waterway is not within the scope of Ecology's source control effort. The sediment remedy already assumes that regional transport of sediments from up-river are not expected to exceed the RALs that will be the basis for MNR.

Typical waterway operations are assumed to have a de-minimis effect on surface sediment.

Regional atmospheric deposition is not within the scope of Ecology's authority or source control program and is being addressed through broader pollution control efforts. Air deposition will only be considered for sufficiency when identified as being from discrete, localized point sources.

**Ecology Will Consider Site-Specific Air Emission**

Ecology will evaluate the air pathway only when a site-specific air emission source is identified as part of an MTCA cleanup site or is from a facility subject to NPDES permit conditions. This will not be a separate evaluation, but rather, a component of the soil and stormwater evaluation process previously discussed. In other words, the evaluation will not address the air emission directly; rather, it will focus on whether a point source of air pollutants has contaminated the soils or the stormwater.

### 6.3.2 Principal criteria

Ecology will use the following sources of information as a basis for source control sufficiency evaluations:

- Status of identified high- and medium-priority actions from the SCAPs.
- Information collected through business inspections and spill investigations/response.
- Relevant information collected through other studies.
- Status of permit compliance, where applicable.
- Status of upland contaminated site cleanups.

**SCAP priority actions**

As part of source control efforts in the LDW, Ecology worked with other members of the SCWG to develop SCAPs for 24 source control areas. Each SCAP describes potential sources of contaminants, evaluates whether these sources may contribute to the recontamination of sediments, and identifies the actions needed to control the sources. Beginning in 2008, the actions identified in the SCAPs for each area have been prioritized as high, medium, and low. Actions in SCAPs published before this date were assigned a priority that is reflected in subsequent Source Control Status Reports. Refer to Chapter 1.0 for additional information on SCAPs and Source Control Status Reports.

The Executive Summary for each SCAP published after 2008 lists the source control actions that have been identified for each source control area in Table ES-1 of the SCAP. The corresponding table in the Source Control Status Reports lists the high-priority action items for all of the source

control areas. For each identified property, the tables include a brief description of the potential contaminant sources, source control activities (i.e., action items) to be conducted, parties involved in source control actions for each property or task, and estimated dates for completion of the action items to the extent possible. 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, fieldwork, laboratory analysis, and activities dependent on weather.

To recommend that source control is sufficient to proceed with the active in-waterway sediment remediation, the high-priority action items listed in Table ES-1 of the relevant SCAP(s) and Source Control Status Reports should be completed before in-waterway work begins. Medium-priority actions should be scheduled for completion within a year or two of the start of in-waterway work. Low-priority items can be completed after the active sediment cleanup and before the end of the 10-year compliance monitoring period. The status of low-priority actions will not influence the sufficiency recommendation. Low-priority actions are associated with long-term protection of the sediment remedy.

**Business inspections**

Ecology, SPU, King County, and others conduct business inspections as part of the comprehensive effort to reduce the amount of LDW COCs discharged to the waterway. As part of the sufficiency recommendation, Ecology will confirm that businesses in the area being evaluated have been inspected to evaluate relevant compliance status and, where necessary, are undergoing corrective action per the appropriate regulatory authority (e.g., hazardous waste, solid waste, industrial waste pretreatment, stormwater management).

**Other relevant studies**

Ecology and other agencies have conducted several studies since 2003 to identify sources of contamination in the LDW sediments or to better understand contamination pathways to LDW sediments. These studies have influenced the understanding of sources and contamination. See Ecology's Source Control Documents webpage (see <https://fortress.wa.gov/ecy/gsp/CleanupSiteDocuments.aspx?csid=1643>) for Ecology published studies. Ecology expects to continue studies of contamination and pathways. The conclusions and recommendations contained in those studies will be considered on a geographic basis when evaluating sufficiency. As an example, Ecology conducted a study of building materials containing PCBs. One of the outcomes is that Ecology is requiring additional sampling of building materials on contaminated sites that have a MTCA Agreed Order if the buildings present were constructed or renovated between 1950 and 1990 when PCBs were used in paint, caulk, and other building materials.

**Status of permit compliance**

A regulated direct discharge pathway provides the basis for determining that it is sufficiently controlled to allow active in-waterway remediation to begin. NPDES and State Waste Discharge Permits are reviewed and reissued every 5 years to respond to changing conditions, such as improved control technologies, changes to applicable standards, and available data. Furthermore, enforcement and compliance activities that result in changes to permittee-specific processes and infrastructure can take years to fully implement. As long as the regulatory agency with authority is providing oversight and assuring compliance, it is possible to conclude that the particular direct discharge is sufficiently controlled for in-waterway remediation to begin.

Ecology will evaluate the status of permit compliance as follows:

- **Verify the direct discharge has the appropriate permit type and/or conditions.** Discharge permits can be individual (i.e., written for a specific wastewater discharge), general (i.e., written for discharges typical of a specific industry), or for different types of stormwater discharges. In Washington State, Ecology is responsible for ensuring that NPDES and State Waste Discharge Permits contain requirements for controlling COCs in discharges in accordance with applicable laws and regulations.
- **Confirm compliance with permit conditions.** This involves conducting and documenting compliance inspections as well as a review of available discharge monitoring data and other reported information. This is done to evaluate whether the permittee complies with applicable permit requirements, including the implementation of BMPs and compliance with benchmarks and/or effluent limits for LDW COCs, or their surrogates/indicators, such as total suspended solids and turbidity.

**Status of upland site cleanups**

Contaminated sites can be categorized as follows:

- Listed sites under a formal MTCA Agreed Order.
- Listed sites under EPA RCRA or CERCLA orders:
    - Listed sites that have been ranked via a site hazard assessment and are awaiting cleanup.
    - Listed sites that are in the VCP.
    - Listed sites that have already received a VCP NFA determination.
    - Listed sites that have not been ranked via a site hazard assessment.
    - Listed sites that cannot be ranked due to lack of data or access.

Ecology is currently managing 19 cleanup sites (TCP and HWTR) in the LDW under agreed orders. TCP is negotiating orders on three other sites. These sites are required to define the nature and extent of contamination and, ultimately, conduct a cleanup action that is protective of human health and the environment. As part of this process, Ecology is assessing the need to conduct interim cleanup actions to control ongoing releases of contamination to the LDW. Several interim actions to eliminate the source material or to control the pathway to the river

have already been conducted. Additional interim actions may be conducted in the future as data and plans become available. Ecology will evaluate these sites to determine if the actions taken have reduced, or are projected in the future to reduce, the identified sources of contamination to a level where ongoing releases to the LDW are not expected to result in sediment contamination above the RALs.

EPA is currently managing nine cleanup sites under formal agreements. Ecology will also work with EPA to ensure that control of sources on EPA's sites should not result in sediment contamination above the RALs.

In 2014 and 2015, Ecology identified 243 facilities listed as suspected or confirmed contaminated sites in the LDW source area that had not been ranked. Ecology conducted site hazard assessments for the 180 sites that were actually in the LDW source control area and had enough information to allow ranking. As the site hazard assessments were completed, Ecology prioritized additional sites that may need to be formally remediated to ensure they are sufficiently controlled.

The number and status of contaminated sites in the VCP within the LDW source control area are tracked. Ecology source control and VCP staff work together to ensure that the primary pathways leading to the LDW are evaluated and controlled prior to an NFA determination. Sites that have received an NFA determination are assumed to be sufficiently controlled.

Listed sites that cannot be ranked due to lack of data and/or access have been identified, and additional attempts may be made to gather information or evaluate the potential threat to the LDW. Such sites will be identified in the sufficiency evaluation.

### 6.3.3 Evaluation of available environmental data

**Type of data that will be evaluated**

Ecology will use the following sources of environmental data to inform source control sufficiency evaluations:

- LDW surface sediment data collected during LDW pre-design studies (e.g., baseline sampling), remedial design activities, and post-construction sampling of EAA cleanups. Ecology will consider using older data if there are not adequate recent samples.
- Groundwater, soil, and storm systems solids data generated from investigations of contaminated upland sites.
- Storm system solids data associated with the city of Seattle's source tracing program.
- Other storm system solids data from public and private stormwater systems.

Effluent data from NPDES-permitted facilities are accounted for in Section 6.3.2. Status of permit compliance.

**Relevant screening levels for storm solids and bank soils**

For screening purposes associated with sediment cleanup, Ecology typically compares environmental data from storm system solids and soil eroding into the waterway to criteria published in the state SMS. Data for petroleum hydrocarbons are compared to MTCA Method A soil cleanup levels. Although these criteria do not apply to storm system solids, Ecology and other members of the LDW SCWG use the SMS as screening levels to provide a rough indication of the quality of solids in the stormwater system that could potentially deposit as in-water sediments. A similar approach is used in the CSSs. Ecology also uses the SMS to screen soil contamination for its potential to impact surface sediments via direct erosion into the waterway and via a soil-leaching-to-groundwater pathway (see Chapter 3.0).

The SMS rule, revised in 2013, established two levels:

- **Sediment Cleanup Objective (SCO):** Sediment values at or below the SCO are predicted to have no adverse effects on the benthic community.
- **Cleanup Screening Level (CSL):** Sediment values above the CSL are expected to have minor adverse effects on the benthic community.

For organic compounds with total organic carbon (TOC) normalized SCO and CSL benthic values, it is necessary to use equivalent screening criteria appropriate for non-normalized TOC samples. In these cases, Ecology will use the Lowest Apparent Effects Threshold (LAET[4]) and Second Lowest Apparent Effects Threshold (2LAET[5]), as presented in the LDW RI and FS (Windward 2010; AECOM 2012, respectively) and Sediment Cleanup User's Manual II (Ecology 2015). Using the LAET instead of the TOC normalized values will result in a more conservative evaluation of the data.

Ecology's use of the LAET values is based on the TOC content of over 1,000 storm system solids samples[6] taken throughout the LDW source area. These samples have TOC content ranging from less than 0.1 to over 30 percent. Sediments in the LDW have a TOC range from 1.2 to 2.6 percent. There is no apparent correlation between the TOC within a storm drain system and in sediments deposited in front of the outfall. Likewise, there is no correlation between TOC in one storm drain basin and another.

In addition, the Sediment Cleanup User's Manual II (Ecology 2015) advises to normalize the sample results by dividing the measured chemical concentration by the TOC content, expressed as a percentage, of the sample. This should only be done if the TOC of the sample is between 0.5 and 4.0 percent. If the TOC is outside of this range, then the sample results are not normalized,

[4] LAET is functionally equivalent to the SCO benthic chemical criteria.

[5] 2LAET is functionally equivalent to the CSL benthic chemical criteria.

[6] Sample types include sediment traps, in-line grab samples, and grab samples from catch basins located in rights-of-way and on private property.

and the dry weight values are compared with Apparent Effect Thresholds (AETs) (i.e., LAET or 2LAET).

When there are no established LAET or SMS criteria available, Ecology will use EPA's RALs as screening levels. The ROD establishes RALs, which apply at different locations and depths. The RALs determine where active sediment remediation is required. In these areas, the COC concentrations, erosion potential (according to "recovery category"), and location (intertidal, subtidal, or within the federal navigation channel) determine the remediation technology to be applied (dredging, capping, or ENR).

**Use of LDW surface sediment data**

Ecology's source control sufficiency evaluation will rely on surface sediment data and associated sediment cleanup remedial design information to: (1) identify the COCs for which a sufficiency evaluation will be conducted; and (2) compare COC concentrations in surface sediments with COC concentrations in relevant environmental media, as described in this chapter. The LDW ROD states "Baseline and/or remedial design data will be necessary prior to conducting a sufficiency evaluation." (EPA 2014). Surface sediment data collected during baseline and remedial design activities will reflect updated conditions in the LDW so that source control sufficiency evaluations can focus on contaminant sources that have not already been controlled.

**COC-specific data evaluation**

Data in a given environmental medium (soil, groundwater, and storm drain solids) will be evaluated only for the sediment COCs identified by EPA in a given sediment remediation area. For example, if the selected in-waterway remedy is based on PCB concentrations in sediments, the sufficiency evaluation will focus on PCBs. Generally, sufficiency evaluations will be performed for individual COCs, or classes of COCs, that are driving the active cleanup activities as identified during remedial design.

**Environmental data evaluation pathways**

Where relevant environmental data are available, Ecology will quantitatively evaluate the sufficiency of source control for the following pathways:

- Direct discharges (of industrial and municipal storm water),
- Groundwater discharges, and
- Erosion (including banks).

*Direct discharges*

The direct discharge of pollutants to the waterway from numerous point sources (see Chapter 3.0) may affect sediment quality, depending on the origin and character of the effluent. For the purposes of source control sufficiency evaluations, Ecology will compare contaminant concentrations present in storm system solids with relevant screening levels. This will inform Ecology's assessment of sufficiency and be considered in the overall line of evidence.

LDW source control investigations have generated substantial data on solids located in catch basins, at the bottom of conveyance pipes (i.e., inline), and in sediment traps. As discussed above, Ecology will use the SCO numeric benthic chemical criteria (dry weight and dry weight-equivalent LAET) as screening levels to provide an indication of the quality of solids in the stormwater system that could potentially be deposited as in-water sediments. A similar approach will be used in the combined sanitary storm systems. The use of AETs is for screening purposes only as part of a sufficiency evaluation. These values do not constitute standards that could be incorporated into water quality permits.

**Screening Storm System Solids is Quantitative and Qualitative**

Use of AETs is not a requirement that owners or operators of storm drains must meet. The Source Control Strategy uses LAET criteria as goals for storm solids. Ecology will use its best professional judgment when evaluating sample data collected from storm drains. As an example, if the storm drain solids data are consistently above the LAET but below the EPA RAL and there is no known source that could be affecting the storm drain solids, then this line of evidence would support Ecology's recommendation that active sediment cleanup begin.

For the purposes of determining if the solids within a storm drain system are controlled sufficiently, Ecology will compare storm solids samples to the most recent in-water surface sediment data closest to the outfall, preferably within 100 feet for 24-inch pipes or larger and within 50 feet for pipes smaller than 24 inches. These comparisons will also be based on dry weight or dry weight-equivalent AETs.

Storm drain solids samples will be evaluated in the following hierarchy:

1. Storm drain sediment trap data from the most recent sampling event at the most downgradient location. The most recent data reflect source control work that has already occurred. If catch basin and/or conveyance system solids data also exist for the same discharge, it will not generally be evaluated for sufficiency recommendation purposes.
2. If no sediment trap data exist for an outfall discharge, storm drain catch basin and conveyance data from the most recent sampling event at the most downgradient location will be used.

### *Groundwater discharges*

Contaminants in soil resulting from spills and releases to shoreline and upland properties may be transported to groundwater and subsequently released to the LDW. Contaminated groundwater may enter directly into the LDW or creeks tributary to the LDW via seeps or groundwater discharge, or it may infiltrate into stormwater system infrastructure (i.e., pipes and ditches) that discharges to the LDW. For sufficiency, groundwater will be evaluated where it is known to discharge to the LDW and LDW slips through seeps or pore water when data are available. Groundwater will not be evaluated where it discharges to creeks or infiltrates into stormwater conveyance systems. In many cases, where groundwater COC concentrations are elevated, there is corresponding soil contamination to further inform the line of evidence (see below). This pathway evaluation may involve comparing groundwater chemical concentrations to the sediment concentrations, as described in MTCA (WAC 173-340-747).

*Bank erosion*

As described in the 2004 MOU between EPA and Ecology (see Chapter 1.0), EPA is responsible for sediments below MHHW and Ecology is responsible for source control above this line. In practice, EPA may be able to assess contamination from the top of the bank and the remaining shoreline of the LDW and, in some instances, Ecology may require characterization and cleanup at MTCA sites below mean lower low water (MLLW). The banks of the LDW shoreline (including intertidal sediments) are susceptible to erosion by wind, stormwater, and surface water, particularly in areas with steep slopes. Contaminated solids on the banks of the LDW could be released directly to sediments via erosion. Waterway bank soil, contaminated fill, waste piles, landfills, and surface impoundments close to the banks may release contaminants directly to the LDW through erosion directly to the river or to stormwater or by leaching to groundwater. As part of the remedial design, EPA will evaluate the need for remedial design data above MLLW. Some bank soil data are expected to be collected during pre-design studies. Ecology will consider data available at the time of the source control sufficiency evaluation. Concentrations of COCs in bank soils will be compared to the sediment RALs dry weight equivalent.

**Example Pathway Not Evaluated: In-Water Transport of Contaminated Sediments**

Ecology's source control sufficiency evaluation will not assess in-water transport of contaminated sediments from one location of the waterway to another location in the waterway (see Chapter 3.0). Uncertainty and sensitivity analyses were performed for the LDW Sediment Transport Model and Bed Composition Model, as detailed in the LDW FS (AECOM 2012). The primary sources of uncertainty in these physical and chemical model predictions are:

- COC concentrations of sediments from upstream and lateral sources.
- The rate of net sedimentation/burial from incoming sediment loads.
- The potential for disturbances of subsurface contaminated sediments by mechanisms such as vessel (propeller wash) scour and earthquakes.

## 6.4 Uncertainty of Sufficiency Recommendation

The intent of Ecology's source control efforts is to reduce or eliminate sources to the LDW. However, there will always remain some uncertainty in the status of source control, particularly prior to in-waterway cleanup. Areas of uncertainty in source control sufficiency recommendations include:

- **Pathways and sources not evaluated** for source control sufficiency are discussed in Section 6.3.1.
- **Regional air quality issues** are beyond the scope and reach of LDW-specific source control efforts.
- **Information gaps** resulting from the nature of the source control evaluation process. A reliance on multiple types of information collected at specific moments in response to or associated with regulatory requirements, where applicable.

- **The future** may bring new sources or a new understanding of existing sources.

It is important to note that current source control efforts can only reduce the uncertainty associated with lateral sources but not eliminate it. Also, the uncertainties associated with other variables can mask the source control improvements for lateral sources.

## 6.5 Sufficiency Evaluation and Recommendation Reports

The results of Ecology's source control sufficiency evaluations will be expressed as one of four potential outcomes:

- **Sources are sufficiently controlled:** Ecology recommends the specified area of sediment cleanup proceed based on reasonable confidence that the relevant recontamination potential is as minimal as possible.
- **Sources are conditionally controlled:** Ecology recommends the specified area of sediment cleanup proceed as long as certain additional controls or oversight are implemented in the near future. Additional controls need to be determined on a case-by-case basis. Ecology will identify any relevant controls in the associated sufficiency evaluation report.
- **Sources are controlled with qualifications:** Ecology may qualify a recommendation to proceed with sediment cleanup of a specified area if there are substantial information gaps in the area evaluated.
- **Sources are not sufficiently controlled:** Ecology recommends that sediment cleanup in the specified area not proceed until additional controls have been implemented and assessed for effectiveness.

The sufficiency recommendations would be concise yet provide enough site description, figures, and analytical data to support EPA's source control sufficiency determination. The recommendations should address conditions on all upland sites and relevant pathways that could potentially affect the sediments associated with the area of active remediation for the in-water cleanup. The Source Control Sufficiency Evaluation and Recommendation Report may be developed in memorandum, letter, or report format, as appropriate, based on the amount of information supporting the recommendation. Ecology will submit the reports to EPA for review and concurrence as appropriate and to support the Administrative Record.

EPA will notify Ecology of their concurrence or provide comments, in writing, on the evaluation and associated recommendation. If EPA does not concur with the recommendation, then Ecology will work with EPA to address EPA comments.

To streamline the source control sufficiency review process and to facilitate information sharing, a general framework is outlined in Appendix C.

## 6.6 Sufficiency Recommendation Dispute Resolution

The agencies shall endeavor to reach consensus in a reasonable timeframe; however, EPA reserves its authority to initiate in-waterway cleanup notwithstanding a disagreement between the agencies.

Any dispute regarding the sufficiency recommendation, EPA's concurrence, or EPA determinations, by a party other than EPA or Ecology, shall be resolved by EPA.

# 7.0 Source Control Assessment and Monitoring

A comprehensive environmental monitoring plan for LDW sediment cleanup areas and LDW source control is necessary to assess the overall progress and effectiveness of the sediment cleanup actions and associated LDW source control program. EPA, Ecology, and partner agencies are discussing how to combine, if possible, monitoring requirements of applicable permits, individual cleanup sites, and the waterway-wide Superfund project (i.e., baseline, phased remedial design, and post-cleanup monitoring). This will take some time to fully develop and will be further defined later in the cleanup process.

Other assessment and sampling efforts are used to evaluate the effectiveness of discrete source control activities. Examples of monitoring for this purpose include NPDES-required sampling and associated adaptive management as necessary and post-cleanup monitoring at contaminated sites.

To assess trends of source contributions, Ecology and EPA will use LDW Superfund-generated data (sediment, surface water, and fish tissue) in conjunction with data from other sources (municipal stormwater sediment trap data and site cleanup data). Ecology or EPA may require additional post-cleanup sampling of environmental media or other materials (e.g., paint and caulk) to evaluate these trends. Monitoring or sampling may include, but is not limited to:

- **Monitoring contaminants in sediments.** This direct measurement of contaminant levels in sediments is critical to assessing overall effectiveness of source control and the in-waterway cleanup. Sediment monitoring conducted under the ROD will evaluate sediment concentration trends over time and will provide information on sediment deposition rates and concentrations. Ecology's regulations (MTCA and SMS) and EPA's regulations (CERCLA and RCRA) require post-cleanup monitoring of sediment. One of the goals of this type of monitoring is to assess the accuracy of assumptions and model outputs from the FS and the success of the remedial design. Some assumptions and model outputs are relevant to source control (e.g., assumptions regarding lateral loading of sediment COCs). Therefore, the design of this monitoring program should include considerations for data collection that provide source-related fingerprint data (e.g., PCB congeners, PAHs, and contaminant profiles/forensics) and/or footprint data (e.g., adjacent to outfalls and upland cleanup sites) so that the in-waterway sediment monitoring results can help inform source control effectiveness and needs.

  The results of the monitoring will help shape and redefine specific agency priorities for what additional, if any, source control measures need to be implemented at any given location. If additional source control work is necessary, the existing SCAP for that area may be amended or modified.

- **Monitoring sources and/or pathways.** Monitoring is also necessary to evaluate the effectiveness of source control actions. For example, NPDES permits require routine sampling, the results of which provide information as to the effectiveness of the BMPs that are used onsite. Monitoring and sampling of specific sources or pathways includes:
  - Data from municipal stormwater source tracing work.
  - Information from environmental investigations (surface water, stormwater, soil, groundwater, and air).
  - Data generated by NPDES permittees.
  - Data generated by other regulatory authorities (e.g., air and wastewater data).

  These site-specific or action-specific data are used to evaluate the effectiveness of actions and provide the basis for making future changes to improve performance.

# 8.0 Public Involvement

Ecology recognizes the disproportionate impacts of LDW pollution and cleanup activities on local communities. Ecology is committed to promoting environmental equity, keeping stakeholders informed about activities that may affect the LDW, and providing opportunities to be involved.

EPA, the city of Seattle, King County, and the Port of Seattle also conduct activities that require public notice and an opportunity to comment. The timing of the required public involvement differs among agencies and programs. Each agency and program will use a different mechanism or combination of mechanisms, as may be required by law, regulations, or policy.

Ecology will coordinate as appropriate and communicate about outreach materials and public involvement events to other agencies, communities, stakeholder groups, and tribes.

This chapter outlines how Ecology plans to provide information and opportunities for public involvement to LDW stakeholders and communities about MTCA orders and consent decrees for site cleanups, water quality permits, 401 water quality certifications, RCRA corrective actions, and LDW source control.

Ecology maintains a number of email lists, which people can join to be notified of proposed changes to regulations, issuance of permits, and other Ecology activities. Refer to <http://www.ecy.wa.gov/maillist.html> to sign up to the lists.

Ecology's Public Involvement Calendar is designed to engage the public in the decision-making process. The calendar lists upcoming public hearings, meetings, workshops, and open houses. Activities that are educational only or are co-sponsored by Ecology may be found under the *More Ecology Events* link in the left column of the page (refer to <https://fortress.wa.gov/ecy/publiccalendar/>).

## 8.1 Toxics Cleanup Program

Most of Ecology's TCP public involvement opportunities are for specific contaminated site cleanups in the LDW. A site-specific Public Participation Plan (PPP) is developed for each site. The PPP details the goals of public involvement, audience, stakeholders, activities, and more as it relates to contaminated site cleanup.

TCP also provides information about source control activities through a variety of methods.

Updates to the site-specific PPPs and this section of the Strategy may occur as source control and site work evolve and change.

The timing of public involvement activities are "as needed" unless otherwise noted. The main components of TCP's public involvement are:

- Public comment periods – MTCA sites cleanups (also applies to Ecology-led RCRA corrective actions):
    - When possible, Ecology will combine remedial action and State Environmental Policy Act public comment periods.
    - Ecology will announce upcoming public comment and notice schedules to LDW stakeholders online and by mail.
- Key stakeholder briefings, including:
    - Meetings, workshops, or updates.
    - Conference calls.
- Ecology and EPA collaboration:
    - Coordinate planning for and participation in public meetings, events, stakeholder meetings, and general public involvement.
- Partner agencies and stakeholders collaboration:
    - Promote summary information about partner agencies LDW source control work.
    - Coordinate participation in events and activities.
    - Attend and present at source control partner meetings.
    - Other activities, when possible.
- List Serve.
- Fact Sheets[7] and other educational materials:
    - Fact Sheets/Focus Sheets will be developed and mailed as necessary.
    - Other communications materials will be developed as needed, including postcards, brochures, site update mailers, and posters.
- Website updates:
    - Ecology maintains an LDW webpage with source control information (see <http://www.ecy.wa.gov/programs/tcp/sites_brochure/lower_duwamish/lower_duwamish_hp.html>).
    - New source control information (documents, presentations, and reports) are posted on Ecology's website.
    - Ecology and EPA will share links related to source control on their respective websites.

[7] A Fact Sheet is a short document (commonly 1 to 4 pages) that provides information about a site, major document, and/or upcoming public involvement opportunity. This should not be confused with an NPDES Permit Fact Sheet, which is a companion document that explains permit term and conditions.

- Social Media:
  - Ecology will produce blog posts, tweets, and other social media as needed.
- Media:
  - Ecology will do News Releases and media briefings as needed.
- Source control document distribution and review:
  - Ecology will continue to share source control reports with interested stakeholders, including the Muckleshoot and Suquamish Tribes, Duwamish River Cleanup Coalition, SCWG, and LDWG, for review and comment as appropriate.
  - Ecology will consider all stakeholder comments when finalizing documents and will incorporate them when appropriate.
  - Ecology makes all final decisions on source control documents (such as Source Control Status Reports and sufficiency evaluations), with review and comment by EPA.

## 8.2 Water Quality Program

Ecology's Water Quality Program provides public involvement opportunities whenever it proposes to issue or modify NPDES permits. The Water Quality Program also provides opportunities to comment on changes to water quality standards and regulations.

### 8.2.1 Individual National Pollutant Discharge Elimination System permits

Anyone interested in all individual NPDES permits or a specific individual permit in the LDW can become a "party of record" for individual permits. The Water Quality Permit Coordinator in the Northwest Regional Office maintains a "party of record" list, which receives email announcement of the important milestones in the individual permit development and issuance process. The Permit Coordinator for the Northwest Regional Office can be reached at 425-649-7201, or by mail at 3190 160$^{th}$ Avenue SE, Bellevue, Washington 98008-5452.

### 8.2.2 General National Pollutant Discharge Elimination System permits (statewide)

The general permit regulation (Chapter 173-226.130[1c] WAC) specifies that interested parties can be added to a general permit-specific mailing list. Ecology accomplishes this through permit-specific List Servs:

- ISGP,
- Construction General Stormwater Permit,
- Boatyard General Permit,
- Sand and Gravel General Permit, and
- MS4s.

Note that the application for coverage under a general permit does not get announced through this venue. The permit applicants are required to place a public notice in the newspaper that announces they are newly applying for a general permit.

Interested individuals can keep track of general permits by joining the List Serv appropriate for the permit(s) (see <http://www.ecy.wa.gov/maillist.html>).

## 8.3 Hazardous Waste and Toxics Reduction Program

There are several sites that are overseen by Ecology's HWTR Program. These sites are required to follow federal and state regulations governing the management of hazardous wastes including RCRA, an amendment to the Solid Waste Disposal Act, to ensure safe management and disposal of municipal and industrial waste generated nationwide. RCRA has been amended several times, including in 1984 with the Hazardous and Solids Waste amendments that expanded the scope and requirements of RCRA.

Subtitle C of RCRA established a program to handle wastes from "cradle to grave." Owners and operators of waste treatment, storage, and/or disposal facilities are required to submit a permit application covering all aspects of design, operation, maintenance, and closure of the facility. RCRA requires owners and operators of these facilities to clean up contamination resulting from *past* and *present* practices, which includes practices of previous owners. These cleanup activities are known as corrective actions.

Corrective actions (or cleanup) must follow the regulations outlined in MTCA. Ecology's HWTR program also holds public comment periods when permits are submitted, renewed, or modified for permitted treatment, storage, and/or disposal facilities. The comment periods vary depending on the actions at the sites.

For more information about public involvement opportunities for the HWTR Program, contact Bridgette Valdez-Kogle at brva461@ecy.wa.gov or 360-407-7616.

## 8.4 U.S. Environmental Protection Agency

EPA selected a cleanup plan for the LDW in 2014. As the cleanup moves forward, EPA is committed to keeping stakeholders informed about cleanup activities, minimizing the impacts of these activities on the communities where possible, and providing opportunities to be involved. In keeping with that commitment, EPA is in the process of updating its 2002 Community Involvement Plan. The Community Involvement Plan provides an overview of how EPA intends to work collaboratively with the community and stakeholders to share information and to involve the public during the cleanup process. As part of this effort, Ecology and EPA will continue to coordinate planning for, and participation in, public meetings, events, stakeholder meetings, and general public involvement.

EPA's 2002 Community Involvement Plan can be found on their *Lower Duwamish Waterway Superfund Site Community Resources* web page (<https://yosemite.epa.gov/R10/CLEANUP.NSF/ldw/1A933F4BB813FF9D882577BD006EF780?OpenDocument>).

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# Appendices

## Appendix A. Lower Duwamish Waterway Source Control Background Information

The Lower Duwamish Waterway (LDW) is located in Seattle, Washington, and is approximately 5 miles long. Parts of the waterway also flow through the city of Tukwila and unincorporated King County. The U.S. Environmental Protection Agency (EPA) added the LDW to the Superfund list on September 13, 2001. The Washington State Department of Ecology (Ecology) added the site to the Washington State Hazardous Sites List on February 26, 2002. Contaminants found in waterway sediments include polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), dioxins/furans, phthalates, mercury, arsenic, and other metals. These contaminants pose threats to people, fish, and wildlife.

In December 2000, EPA and Ecology jointly entered into an order with King County, the Port of Seattle, the city of Seattle, and The Boeing Company. The purpose of the order is to assess risks to human health and the environment and evaluate cleanup alternatives by performing a remedial investigation (RI) and feasibility study (FS) for the waterway. EPA is the lead agency for the RI/FS. Ecology is the lead agency for coordinating and implementing source control at the site, in cooperation with the city of Seattle, King County, the Port of Seattle, the city of Tukwila, and EPA.

The basis for the original 2004 Source Control Strategy (herein referred to as the Strategy) (Ecology 2004) and this 2016 Strategy is described in EPA's guidance document, Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites (EPA 2002), and in Washington's Sediment Management Standards (Washington Administrative Code 173-204). The first principle is to control sources of contaminants early, starting with identifying ongoing sources of the contaminants of concern (COCs) affecting a cleanup site. EPA's LDW Record of Decision (ROD), which outlines and describes the cleanup action, requires that sources of sediment contamination be investigated and controlled as necessary.

Ecology and local partner source control agencies have been implementing an aggressive, comprehensive effort since 2003. This effort has successfully identified and reduced many sources of contamination.

The first Strategy was developed in 2004. This 2016 Strategy updates and replaces the previous version; the main revisions are listed below:

- Removed the Persistent, Bioaccumulative Toxics section.
- Clarified roles between Ecology and EPA.
- Replaced "effectiveness and completeness" with "evaluation."

- Modified the reporting section to reflect current practices.
- Changed language stating "contamination may pose a threat" to "contamination does pose a threat."
- Removed the concept of estimating the number of pounds of pollution removed from the environment, because source control agencies and studies have never collected these data.
- Removed the Draft Action Plan Table of Contents for Duwamish/Diagonal Way appendix.
- Removed prioritization of areas by a tier structure.
- Added a section addressing source control sufficiency.

## Remedial Investigation

The RI work was divided into two phases. Phase 1 was completed in 2003 and used existing data to:

- Identify high-priority areas for cleanup, known as early action candidate sites.
- Identify initial human health and ecological risks posed by the site.
- Identify gaps in the existing data.
- Produce a work plan to fill those gaps.

Based on Phase 1 work, seven Early Action Area candidate sites were designated by EPA and Ecology (Windward 2003).

Phase 2 work began in 2004. Phase 2 of the RI consisted of sampling to fill the data gaps; analyzing information about the nature and extent of contamination; evaluating sediment transport processes; and assessing current conditions within the LDW, including risks to people and animals that use the LDW. The RI identified 19 COCs in the baseline human health risk assessment (HHRA) based on a Tulalip tribal seafood consumption rate for Puget Sound. PCBs, arsenic, carcinogenic PAHs, and dioxins/furans are considered the four main risk drivers for human health exposure. The other 15 COCs not selected as risk drivers in the HHRA were evaluated in the FS for risk reduction based on the remedial alternatives. These chemicals will be considered in the remedial design phase and included in the post-remedial monitoring program that is part of the 5-year review by EPA.

In addition to the 4 human health risk drivers, 44 chemicals were identified as COCs for the benthic community and 7 COCs for fish or wildlife. Of these, 41 were identified as risk drivers for the benthic community and 1 for wildlife. The Final RI Report was published in 2010.

## Feasibility Study

The LDW Draft FS was initiated in 2007 to evaluate sediment remediation alternatives for the site in accordance with the federal Comprehensive Environmental Response, Compensation, and Liability Act and Model Toxics Control Act regulations. These regulations establish standards

for evaluating remedial alternatives, selecting a remedy, and performing the cleanup. EPA sought public comment on the Draft FS in 2010 and 2011 and finalized the FS in 2012.

All of the alternatives described in the FS require source control to help prevent recontamination of the sediments following remediation. There were no target endpoints or goals for source control in the FS, but merely estimates of future conditions for the purpose of developing and comparing the alternatives.

In support of the FS, Ecology conducted an upriver study to understand the distribution of the COCs in surface sediments upstream (south) from river mile 4.9 to river mile 7.0. The data from this study were used to help determine the contaminant loading entering the LDW site from upriver and whether there were any identifiable contaminant sources in the upriver area. Results of this study, along with a King County study of the Green River and U.S. Army Corps of Engineers Dredged Material Management Program core dredge data in the upper turning basin, were used to approximate upstream river input values (including lower and upper bounds) for the Bed Composition Model in the FS.

## Proposed Plan and Record of Decision

After completing the FS, EPA developed a Draft Proposed Plan and conducted a public comment period on the draft plan from February 28 to June 13, 2013. EPA published its response to comments in November 2014. EPA released the final cleanup plan for the LDW, referred to as a ROD, which presents EPA's final decision after considering the more than 2,000 public comments on the Proposed Plan.

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# Appendix B. Source Control Action Plans

| Source Control Action Plans | Publication Date |
|---|---|
| RM 0.1-0.9 East (EAA-1 Duwamish/Diagonal Way) | December 2004 |
| RM 3.4-3.8 West (EAA-5 Terminal 117) | July 2005 |
| RM 2.8 East (EAA-3 Slip 4) | July 2006 |
| RM 2.1-2.2 West (EAA-2 Trotsky Inlet) | June 2007 |
| RM 4.9 East (EAA-7 Norfolk CSO/SD) | September 2007 |
| RM 1.3-1.6 West (Glacier Bay) | November 2007 |
| RM 2.8-3.7 East (EAA-4 Boeing Plant 2/Jorgensen Forge) | December 2007 |
| RM 3.9-4.3 East (Slip 6) | September 2008 |
| RM 2.8-3.7 East (EAA-6 Boeing Isaacson/Central King County International Airport) | March 2009 |
| RM 2.0-2.3 East (Slip 3 to Seattle Boiler Works) | April 2009 |
| RM 0.9-1.0 East (Slip 1) | May 2009 |
| RM 2.3-2.8 East (Seattle Boiler Works to Slip 4) | June 2009 |
| RM 0-0.1 East (Spokane Street to Ash Grove Cement) | June 2009 |
| RM 1.2-1.7 East (St. Gobain to Glacier Northwest) | June 2009 |
| RM 1.7-2.0 East (Slip 2 to Slip 3) | June 2009 |
| RM 4.3-4.9 East (Boeing Developmental Center) | December 2010 |
| RM 1.0-1.2 East (King County Lease Parcels) | January 2011 |
| RM 1.0-1.3 West (Kellogg Island to Lafarge Cement) | June 2011 |
| RM 1.6-2.1 West (Terminal 115) | October 2011 |
| RM 2.2-3.4 West (Riverside Drive) | August 2012 |
| RM 0-1.0 West (Spokane Street to Kellogg Island) | February 2013 |
| RM 2.1 West (1st Avenue S Storm Drain) | March 2013 |
| RM 3.8-4.2 West (Sea King Industrial Park) | August 2013 |
| RM 4.2-4.8 West (Restoration Areas) | September 2013 |

EAA = Early Action Area
RM = river mile

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# Appendix C. Outline of Sufficiency Recommendation Reports

For a Source Control Sufficiency Evaluation Report, the following format is suggested. The following outline should be modified as appropriate to support the area-specific source control sufficiency recommendation:

1. **Executive Summary:** Summary of the findings, including a statement of the source control recommendation made by the Washington State Department of Ecology (Ecology).
2. **Introduction:** General introduction, definition of sufficiency, goals and objectives, etc.
    a. Area Description: Incorporate, by reference from Chapter 2 of the relevant Source Control Action Plan (SCAP), the relevant information (outfalls, sites, facilities, etc.) based on the specific area under evaluation; include a very brief summary only.
3. **Principal Criteria Evaluation**
    a. Status of identified high- and medium-priority actions from the SCAPs and Status Reports.
        i. Table showing high and medium actions, what was completed, and when (refer to Source Control Status Reports, etc.).
    b. Business inspection status.
        i. Date and outcome of the most recent inspection (citations).
        ii. Status of corrective actions, if necessary, based on the business inspection.
    c. Information compiled or collected for other relevant studies.
        i. Conclusions of those studies that were considered.
    d. Status of permit compliance (tabular).
        i. Confirm relevant permit coverage.
        ii. Status of compliance and any corrective actions.
    e. Status of upland contaminated site cleanups.
        i. Table, schedule, and construct for each relevant site.
4. **Evaluation of environmental data, where available**
    a. In-water sediment data; identify relevant contaminants of concern (COCs).
    b. Direct discharge data evaluation where likely to be significant.
    c. Groundwater data evaluation where likely to be significant.
    d. Soil data evaluation where bank erosion or leaching is likely to be significant.
    e. Site-specific air emission evaluation.

5. **Source control sufficiency outcome**

   a. Ecology's recommendation to the U.S. Environmental Protection Agency.

      i. Sources are sufficiently controlled.

      ii. Sources are conditionally controlled.

         1. Specify additional controls or oversight and implementation schedule.

      iii. Sources are controlled with qualifications.

         1. Explain reason(s) for qualified outcome.

      iv. Sources are not sufficiently controlled.

         1. Identify actions needed and estimated timeline for completion and future assessment.

   b. Site maps or figures should be included as needed to support the decision. Appropriate maps may include, but are not limited to:

      i. Site location map showing the sites within the drainage area being evaluated and their proximity to the Lower Duwamish Waterway.

      ii. Map of current and historic upland contaminant sources, stormwater drainage map, and sample location maps.

      iii. Contaminant distribution maps for selected COCs.