King County
Lower Duwamish Waterway Source Control
Implementation Plan

2014–2018

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Revised DRAFT

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Acronyms and Abbreviations

µg	micrograms
BEHP	bis (2-ethylhexyl) phthalate
BBP	butyl benzyl phthalate
BMP	best management practice
CAD	computer-aided design
Cadman	Cadman Aggregate and Ready-Mix
CAP	cleanup action plan
CDL	construction demolition and land clearing debris
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	contaminants of concern
COPC	contaminant of potential concern
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CSGP	Construction Stormwater General Permit
CSL	Cleanup Screening Level
CSO	combined sewer overflow
CSCL	Confirmed and Suspected Contaminated site List
DDT	dichlorodiphenyltrichloroethane
DMMP ML	Dredge Material Management Program maximum level
DMMP SL	Dredge Material Management Program screening level
DNRP	King County Department of Natural Resources and Parks
DOH	Washington State Department of Health
DOT	King County Department of Transportation
DPER	King County Department of Permitting and Environmental Review
DSN	Discharge Serial Number
dw	dry weight
Ecology	Washington State Department of Ecology
ECOSS	Environmental Coalition of South Seattle
EPA	U.S. Environmental Protection Agency
ERTS	Emergency Referral and Tracking System
ESA	Environmental Site Assessment
FAA	Federal Aviation Administration
FMD	King County Facilities Management Division
FS	feasibility study
FOD	Foreign Object Debris
FTE	full-time employee
GIS	Geographic Information System
GSI	green stormwater infrastructure
HPAH	high molecular weight polycyclic aromatic hydrocarbons
HQ	hazard quotient
IC/IDDE	Illicit Connections and Illicit Discharges Detection and Elimination

ISGP	Industrial Stormwater General Permit
KCC	King County Code
KCSWDM	King County Surface Water Design Manual
KCIA	King County International Airport
KCIW	King County Industrial Waste Program
kg	Kilograms
LAET	Low Apparent Effects Threshold
2LAET	Second Lowest Apparent Effects Threshold
L&I	Washington State Department of Labor and Industries
LDW	Lower Duwamish Waterway
LDWG	Lower Duwamish Waterway Group
LHWMP	King County Local Hazardous Waste Management Program
LID	low impact development
LPAH	low molecular weight polycyclic aromatic hydrocarbons
Manson	Manson Construction Company
Metro	Municipality of Metropolitan Seattle
MG	million gallons
mg	milligrams
mg/kg oc	milligrams per kilogram organic carbon
mgd	million gallons per day
MIC	Manufacturing/Industrial Center
ML	maximum level
MLK	Martin Luther King
MNR	monitored natural recovery
MS4	Municipal Separate Storm Sewer System
MS4 Permit	NPDES Phase I Municipal Stormwater Permit
MT/Y	metric tons per year
MTCA	Model Toxics Control Act
N/A	not applicable
NBF	North Boeing Field
NEP	National Estuary Program
NOAA	National Oceanic and Atmospheric Administration
NOAEL	no-observed-adverse-effect level
NPDES	National Pollutant Discharge Elimination System
NWRO	Northwest Regional Office
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PERC	perchloroethylene
PLP	potential liable parties
ppb	parts per billion
ppm	parts per million
PSAMP	Puget Sound Ambient Monitoring Program

PSCAA	Puget Sound Clean Air Agency
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Conditions
RI	remedial investigation
RI/FS	remedial investigation/feasibility study
RM	River Mile
RME	reasonable maximum exposure
ROW	right-of-way
RSD	King County Roads Services Division
SAP	sampling and analysis plan
SCCG	source control coordination group
SCWG	Source Control Work Group
SD	storm drain
SEPA	State Environmental Policy Act
SMC	Seattle Municipal Code
SMP	Sediment Management Plan
SMS	Sediment Management Standards (Washington State)
South Plant	South Treatment Plant
SPS	South Pump Station
SPU	Seattle Public Utilities
SQS/LAET	Sediment Quality Standards
STORM	Stormwater Outreach for Regional Municipalities
SVOC	semi-volatile organic compound
SWD	King County Solid Waste Division
SWMP	Stormwater Management Program
SWPPP	Stormwater Pollution Prevention Plan
SWS	Stormwater Services Section
TBT	Tributyltin
TEQ	toxic equivalent
TMDL	Total Maximum Daily Load
TRV	toxicity reference value
UST	underground storage tank
WAC	Washington Administrative Code
West Point	West Point Treatment Plant
WLRD	King County Water and Land Resources Division
WRF	water recreation facility
WRIA	Water Resources Inventory Area
WTD	King County Wastewater Treatment Division
YSC	Youth Services Center

Executive Summary

King County's Source Control Implementation Plan for 2014–2018 builds on the significant clean water investments the County has made in the Lower Duwamish Waterway (LDW) for over 50 years. The plan includes a continued commitment to regulating and monitoring industrial dischargers to the portions of the regional wastewater system that have releases to the LDW; implementing planned combined sewer overflow (CSO) control projects; managing the implementation of the County's NPDES[1] Phase I Municipal Stormwater Permit; providing technical and educational programs for businesses and residents on ways to prevent pollutants from entering the LDW; conducting scientific assessments, sampling, source tracing, and system mapping; and committing to full compliance with water and air quality permits and regulations at County-owned and operated facilities.

Source Control Planning in the Lower Duwamish Waterway

The Washington State Department of Ecology (Ecology) issued a draft update to its LDW Source Control Strategy in December 2012.[2] The strategy is one of three components to the overall strategy for addressing contamination in the LDW (EPA 2014). The other two components are the cleanup of early action areas and the U.S. Environmental Protection Agency's (EPA) cleanup plan for the LDW Superfund site as documented in the Record of Decision for the site.[3] Two key goals of Ecology's updated strategy are to sufficiently control sources so that sediment cleanup can begin and to minimize recontamination of sediments after the LDW Superfund cleanup has occurred.

Ecology asked King County, the City of Seattle, and EPA to provide agency-specific implementation plans that describe how each agency will conduct LDW source control work through 2018 in the target area (Figure ES-1). The implementation plans will be included as an appendix to Ecology's updated strategy.

The County's five-year (2014−2018) LDW Source Control Implementation Plan consists of (1) ongoing source control actions and programs; (2) additional and accelerated source control actions; and (3) a commitment to continue to coordinate source control efforts among county agencies and with external partners.

Historical Water Quality Investments in the Lower Duwamish Waterway

The formation of the Municipality of Metropolitan Seattle (Metro) in 1958 led to the elimination of untreated sewage and primary-treated effluent discharges into the LDW through the development of the regional wastewater system. Since 1966, untreated sewage and primary-treated effluent that once flowed daily into the LDW are being treated at the West Point Treatment Plant and discharged to Puget Sound. Since 1965, untreated sewage and primary-treated effluent that flowed into the Green/Duwamish River upstream of the LDW are being treated at the South Treatment Plant and discharged as secondary-treated effluent. In 1986, a new

[1] NPDES = National Pollutant Discharge Elimination System.
[2] Ecology's strategy is available at http://www.ecy.wa.gov/programs/tcp/sites_brochure/lower_duwamish/lower_duwamish_hp.html.
[3] Superfund refers to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

effluent discharge pipeline and deep-water outfall in Puget Sound were completed to eliminate the effluent discharges from South Plant to the Green/Duwamish River.

Figure ES-1. Lower Duwamish Waterway Source Control Area

In 1994, King County assumed Metro's authority and its legal obligation for water pollution abatement. Since that time, the County has continued to implement projects and practices to protect water quality in the LDW and across the County. The County manages one of the first programs in the nation to regulate industries to remove toxicants before discharging their wastewater into the sewer system, and it has been partnering since the 1970s with the City of Seattle, the Port of Seattle, other cities, local sewer utilities, and government agencies to support programs that prevent new and ongoing sources of pollution from degrading regional water bodies. These source control efforts have reduced flows of industrial waste and sewage to the Green/Duwamish River by 98 percent, or 27 billion gallons per year.

In 2013, King County entered into a consent decree with the U.S. Department of Justice, EPA and Ecology to ensure its CSO control plan is completed by 2030. King County had already committed to limiting uncontrolled CSO discharges to one per year at each outfall by 2030 through its adopted policies and a 2011 agreement with Ecology.

Ongoing Actions and Programs

King County's ongoing actions have had and will continue to have a positive impact on sediment and water quality in the LDW. Since the 1960s, the County has made significant investments to clean up sediment in the LDW and help improve water quality. The proposed additional and accelerated actions in this LDW source control plan will increase current investments by over $3.5 million (2014 dollars) in 2014–2018 to further protect and restore the LDW prior to implementation of sediment cleanup actions.

The County's previous investments in CSO control have significantly reduced CSO volumes and pollutant loads into Seattle-area waterways. Three CSO control projects in the LDW form the cornerstone of this source control plan. The three projects, estimated to cost $174 million (2010 dollars) to implement, are (1) West Michigan-Terminal 115 storage, pipeline improvements, and green stormwater infrastructure (GSI); (2) Georgetown Wet Weather Treatment Station (Brandon–South Michigan); and (3) Rainier Valley Wet Weather Storage and conveyance improvements (Hanford #1). The three projects will control the remaining uncontrolled county CSOs in the LDW, removing most of the untreated combined stormwater and wastewater flows into the LDW. Planning or design for these projects is under way. They will be in operation by 2030.

In addition to the three CSO control projects, several county divisions and multi-jurisdictional groups, such as the Local Hazardous Waste Management Program (LHWMP), carry out LDW source control activities in accordance with regulatory requirements and county commitments. For example, the County has been monitoring and regulating industrial dischargers to the LDW since 1969 through its Industrial Waste Program (KCIW) and will continue to implement the program to control sources of contamination in the LDW far into the future.

Other examples of the County's ongoing source control actions in the LDW area are as follows:

- Providing technical and educational programs for businesses and residents on ways to prevent pollutants from entering the LDW
- Complying with all permits, including wastewater, industrial, and municipal stormwater NPDES permits, to reduce release of pollutants to the LDW

- Implementing stormwater management and spill prevention programs to reduce pollutants entering storm drains and combined sewer systems
- Conducting water quality studies related to the Green/Duwamish River to better understand where and how pollutants are entering upstream of the LDW
- Cleaning up contaminated sediments in the LDW to reduce pollutants in the LDW
- Performing source identification, tracing, and sampling in the areas directly discharging to the LDW to reduce release of pollutants to the LDW
- Installing equipment and monitoring flows to optimize the wastewater collection system and reduce overflows
- Performing facility and line inspections, maintenance, and cleaning to keep the collection system functioning properly and reduce releases to the LDW.

Additional and Accelerated Actions

The purpose of the proposed additional and accelerated actions in 2014-2018 is to expand and increase the benefits of the County's ongoing and planned source control work to keep pollutants from entering the LDW. In accordance with Ecology's direction in its updated LDW source control strategy, the actions are above and beyond the County's existing LDW source control actions and commitments or are actions that will be completed sooner than required. All necessary authorization and funding will be sought from the King County Council to implement proposed additional activities.

The following are source control actions that complement and expand existing programs and commitments.

Wastewater Treatment Division in the Department of Natural Resources and Parks

King County, the City of Seattle, and several other jurisdictions share responsibility for managing sources of pollution in the LDW drainage area. Seattle has the jurisdictional authority in most of the area that is required to prevent contamination of stormwater. However, more than 85 percent of the stormwater that drains to the combined sewer system, on average, is sent to the West Point Plant for treatment, which significantly reduces the pollutants that otherwise would enter the LDW.

Additional action by many parties beyond ongoing activities is needed to further reduce pollutants entering the LDW. King County's Wastewater Treatment Division (WTD) and the City of Seattle are developing an agreement for coordinating and optimizing the combined sewer system to further improve pollutant capture. WTD will conduct additional activities to improve source control in the LDW area. Highlights of these WTD actions are as follows:

- **Expanded sampling.** WTD will develop a plan each year describing which combined sewer basins will be targeted for sampling in the following year. The plan will include the use of sediment traps and the collection of in-line solids grab samples in the areas of focus. Sampling will be tailored and reevaluated to align with CSO control.
- **Stormwater assessment.** WTD is committing to funding an Ecology inspector position through 2015 to complete an expanded assessment of stormwater in the County's Brandon CSO basin and in selected subareas in its South Michigan CSO basin. After

evaluation of the data, WTD will develop a plan for additional source control actions as needed.

- **Grants Program.** WTD's rate through 2015–2016 includes funding for the WaterWorks Program, which replaces the Green Grants Program that sunset in 2015. The Green Grants program began in 2011 and provides funding for air or water quality improvement projects, environmental education, and community outreach efforts in the Duwamish River Valley. The grants target a community that has disproportionate human health outcomes and environmental burdens and improves equity and social justice by supporting the community's vision for vibrant, healthy neighborhoods around the Duwamish River. The WaterWorks program focuses on water quality and broadens the grants to the entire wastewater service area; the 2016 grants incorporate incentives for Duwamish area projects.

Water and Land Resources Division in the Department of Natural Resources and Parks

The Water and Land Resources Division (WLRD) intends to complete its mapping of the County's Municipal Separate Storm Sewer System (MS4) in the LDW area sooner than required by the County's stormwater NPDES Phase I Municipal Stormwater Permit. WLRD also plans to increase the frequency of source control inspections and to collect source tracing samples in the South 96th Street Corridor, which is home to a number of industrial activities in the LDW drainage basin.

Highlights associated with these actions are as follows:

- **Accelerated mapping.** The County's 2013 NPDES Phase I Municipal Stormwater Permit requires that the County's MS4 and connections to the MS4 in the urban and higher rural sub-basins in unincorporated King County be mapped by December 31, 2017. WLRD is prioritizing the LDW drainage basin and plans to complete conveyance system mapping of this area by June 30, 2015. This effort includes migrating mapping data that exists in varying formats for all available stormwater features to the central county stormwater geodatabase for the LDW.
- **Source control inspections in the South 96th Street Corridor.** The majority of the potential pollutant-generating sites in unincorporated King County that are in the drainage boundary of the LDW Superfund cleanup site are located between State Route 509 and the Duwamish River and north of South 102nd Street to the border with the City of Seattle. This area is commonly referred to as the South 96th Street Corridor. The corridor houses a number of industrial activities and carries significant truck traffic. The current source control inspection rate is approximately one inspection per site every five years. The County intends to increase inspections in the South 96th Street Corridor to one every two to three years, depending on the nature of the business and its potential to pollute. Sites identified as "high pollution-potential sites" will be sampled for potential pollutant runoff by taking a sediment sample at the nearest downstream catch basin.
- **Source Tracing Sampling.** Source tracing samples will be collected in the South 96th Street Corridor.

King County International Airport in the Department of Transportation

There are approximately 15 miles of stormwater drainage pipe in the King County International Airport (KCIA) drainage system. In addition to stormwater monitoring, KCIA intends to continue in-line sediment traps and grab sampling in targeted areas in its drainage system on an annual basis in 2014–2018. This effort will assist in source tracing, identification, and control activities at the airport. KCIA will conduct annual evaluations to help determine the following:

- Effectiveness of source control activities and best management practices
- Changes from airport/tenant industrial activities
- Trends in pollutant contributions

Roads Services Division in the Department of Transportation

The King County Roads Services Division (RSD) has the responsibility for maintaining the County's MS4 system within the road right-of-way (ROW) as part of the County's NPDES Phase I Municipal Stormwater Permit. Responsibilities include street sweeping and vactoring, repairing, and cleaning of stormwater flow control and water quality treatment facilities, catch basins, and conveyance systems.

RSD intends to conduct additional maintenance in support of source control activities in King County's ROW in unincorporated areas of the LDW drainage basin. All catch basins east of State Route 99 in unincorporated King County ROW in the LDW drainage basin will be cleaned annually to help prevent pollutants from entering the LDW.

Facilities Management Division in the Department of Executive Services

The Facilities Management Division (FMD) intends to participate in an expanded program of source control sampling in catch basins upstream of the outfalls on the Harbor Bond properties and will rely on a coordinated effort with the current tenants on these parcels to obtain and analyze the samples.

Internal and External Coordination

Coordination among county divisions and with external agencies involved in LDW source control is a key component in accomplishing effective source control and implementing adaptive management strategies as needed. The County participates in a number of forums and groups that are dedicated to preventing pollutants from entering the LDW and intends to continue to actively participate in these efforts over the long-term. The County is also working with other jurisdictions to better coordinate and resolve jurisdictional authority and clarify responsibilities to improve source control.

A team of representatives from the four county divisions listed above and from the Solid Waste Division (SWD), Public Health – Seattle & King County, Department of Permitting and Environmental Review (DPER), and Local Hazardous Waste Management Program (LHWMP) has been assembled and has been meeting regularly for over a year to coordinate the development of this five-year source control implementation plan. The County intends to continue its internal coordination through a team of representatives from the various divisions in the future to discuss ongoing activities and to develop the County's next 5-year LDW Source Control Implementation Plan.

1.0 Introduction

This document summarizes King County's Lower Duwamish Waterway (LDW) Source Control Implementation Plan for 2014–2018. This chapter provides background on the reasons for the plan and on the County's efforts to keep pollutants out of the LDW, demonstrates how the plan aligns with source control objectives for the LDW, and ends with a description of the content and organization of the plan.[1]

1.1 Background

In December 2012, as part of the U.S. Environmental Protection Agency's (EPA) proposed plan for the LDW Superfund site, the Washington State Department of Ecology (Ecology) updated its 2004 LDW Source Control Strategy (Revised Draft, Ecology 2012).[2,3] In its updated strategy, Ecology asked King County, the City of Seattle, and EPA to provide agency-specific implementation plans that describe how each agency will conduct source control work.

Two key goals of Ecology's updated strategy are to sufficiently control sources so that sediment cleanup can begin and to minimize recontamination of sediments after the LDW Superfund cleanup has occurred. Although the majority of the contaminants of concern (COCs) in the sediments are from historical releases, ongoing releases are still occurring. The COCs that pose unacceptable risk to human health include polychlorinated biphenyls (PCBs), arsenic, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), and dioxins/furans. The COCs that pose unacceptable risk to aquatic organisms include PCBs, metals, and other organic compounds such as phthalates. Appendix A lists the COCs that are being looked at as part of the LDW Superfund cleanup and that are the target for source control.

The LDW source control area is defined as drainage areas that discharge to the LDW Superfund site; the area includes both King County and Seattle Public Utilities (SPU) combined sewer overflow (CSO) basins and separated stormwater basins that are the responsibility of King County and the cities of Seattle, Tukwila, Burien, and SeaTac (Figure 1-1). This source control plan covers combined sewer basins associated with King County combined sewer overflow (CSO) outfalls, King County separated storm-sewer basins, and King County properties within the LDW source area.

King County has been working to keep pollutants from entering the LDW since the 1960s. The formation of Metro in 1958 led to the elimination of untreated sewage and primary-treated effluent discharges into the LDW through the development of the regional wastewater treatment system. In 1994, King County assumed Metro's authority and its legal obligation for water pollution abatement.

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[1] This plan was revised and re-issued in early 2016 to address comments received from Ecology in 2015. Because the plan covers 2014–2018, some activities have already been completed by the time the plan was revised. These activities are documented in Ecology's annual LDW source control status reports and will also be included in King County's summary report of this five-year plan.

[2] Superfund refers to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

[3] The strategy is one of three components to the overall strategy for addressing contamination in the LDW (EPA 2014). The other two components are the cleanup of Early Action areas and the EPA cleanup plan for the LDW Superfund site, as documented in the Record of Decision for the site. Ecology's strategy document is available at http://www.ecy.wa.gov/programs/tcp/sites_brochure/lower_duwamish/lower_duwamish_hp.html.

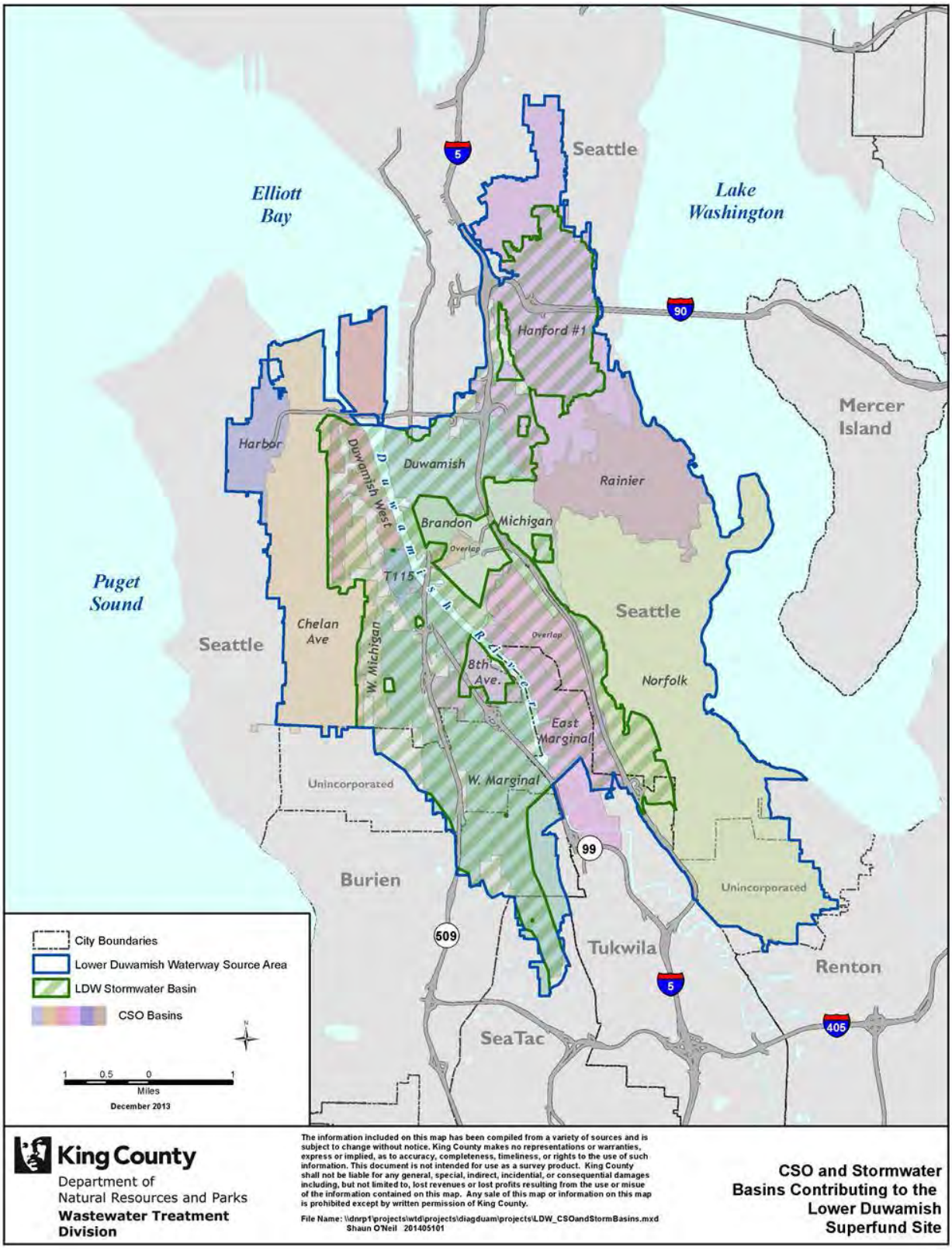

Figure 1-1. Stormwater and Combined Sewer Basins in the Lower Duwamish Waterway Source Control Area

Since the opening of the West Point Treatment Plant in 1966, untreated sewage that once flowed daily into the LDW has been conveyed to the West Point Plant for treatment and discharge into Puget Sound. In 1968, Metro established one of the first programs in the nation to regulate industries to remove toxicants before discharging their wastewater into the sewer system. Since the opening of South Plant in 1965, untreated sewage and primary-treated effluent that flowed into the Green/Duwamish River has been treated and discharged as secondary treated effluent. In 1986, a new effluent discharge pipeline and deep-water outfall in Puget Sound were completed to eliminate the secondary treated effluent discharges from South Plant to the Green/Duwamish River. These source control efforts have reduced flows of industrial wastewater and raw sewage into the LDW by 98 percent, or 27 billion gallons per year, and have significantly reduced contaminant concentrations in the remaining releases.

Preventing industrial wastewater and untreated sewage discharges from entering the LDW is just one of a number of actions Metro, and now King County, have carried out to improve water quality in the LDW. The County has also invested in restoration of more than 25 acres of habitat, numerous water quality studies, programs to improve water quality, CSO control, and sediment cleanup. These investments have successfully removed decades of contamination from some of the waterway's most contaminated areas.

Highlights of these efforts are listed below:

- **Multiple water quality studies and data collection efforts**. Metro began conducting water quality studies in the Green/Duwamish River in 1958 and, in 1964, began the first year of continuous data collection to characterize local water bodies and identify water quality needs.
- **Puget Sound Estuary Program Elliott Bay Action Plan.** This multi-agency program (EPA, Ecology, City of Seattle, Metro, King County, Port of Seattle, and others) and multi-year comprehensive plan were carried out in the 1980s and resulted in the identification and elimination of many industrial process discharges into the LDW.
- **Efforts to characterize and control pollution from stormwater.** King County became a leader in the movement to characterize and control pollution from stormwater. The County continues these efforts through its work to control the small remaining percentage of untreated stormwater being discharged from its CSO outfalls, implementing stormwater management and spill prevention programs in separated basins under its jurisdiction, and remediating historical upland and aquatic contamination.
- **Elliott Bay/Duwamish Restoration Program.** As a partner in this program, the County implemented some of the first sediment remediation efforts and habitat improvements in the LDW at the Norfolk and Duwamish/Diagonal CSO/Storm Drain sediment cleanup sites and the Herring's House Park, Hamm Creek, Turning Basin, and Cecil B. Moses restoration sites. The program was the result of a 1991 legal settlement reached by the City of Seattle and King County (then Metro) with the National Oceanic and Atmospheric Administration (NOAA). The U.S. Fish and Wildlife Service, Ecology, Suquamish Tribe, Muckleshoot Indian Tribe, NOAA, City of Seattle, and King County administered the program.
- **Lower Duwamish Waterway Group.** The Lower Duwamish Waterway Group (LDWG) is made up of King County, the City of Seattle, the Port of Seattle, and The Boeing

Company. LDWG has been working with EPA and Ecology since 2001 to study the contamination and determine the best and most effective alternatives to clean up the waterway. The LDW Remedial Investigation/Feasibility Study (RI/FS resulted from these efforts.[4] LDWG's investment of over $135 million to conduct studies and early action sediment cleanups is expected to reduce the average concentration of PCBs in the sediment by 50 percent. The early action cleanups included the Norfolk and Duwamish/Diagonal projects.

- **Source Control Work Group.** Since 2002, King County has been a member of the LDW Source Control Work Group (SCWG), which was formed by Ecology to bring together agencies with the regulatory authority to implement source control measures in the LDW. The purpose of the SCWG is to share information, discuss strategy, and share progress reports on LDW source control activities.

The County's ongoing work to protect and enhance water quality in the LDW also aligns with the goals and principles of the King County Strategic Plan, which is based on the values and priorities of county residents. A core element of the strategic plan is environmental sustainability to safeguard and enhance the County's natural resources. A guiding principle of the strategic plan is to integrate equity and social justice into all of the County's work. The County has been engaging the diverse communities that live, work, and fish in the LDW area to help guide decisions and priorities regarding actions. Community engagement in the LDW has influenced proposed cleanup strategies in the LDW Superfund site, decisions on plans and projects to control county CSOs, and development and implementation of education and outreach programs.

1.2 Alignment of this Plan with Ecology's Source Control Strategy

King County's LDW Source Control Implementation Plan is responsive to Ecology's updated LDW Source Control Strategy.

Ecology's strategy outlines a coordinated and committed long-term effort for managing source control in the LDW. Its primary near-term goal is to control existing sources of contaminants in the LDW sufficient to begin in-waterway cleanup. In the long term after the sediment remedy is in place, the goal is to minimize the risk of recontaminating sediments to levels above the Sediment Cleanup Standards established in EPA's Record of Decision (ROD) for the LDW Superfund site. A secondary goal is to support habitat restoration opportunities. Ecology identified seven objectives for meeting these Source Control Strategy Goals.

In 2010, the County participated in the development of a preliminary needs assessment with its SCWG partners to assess current efforts to control sources in the LDW, identify any existing gaps, and identify supplemental efforts needed to address these gaps in the future. The needs assessment provided the framework for developing the approach to addressing Ecology's Source Control Strategy objectives. The County's LDW Source Control Implementation Plan, identifies actions within the County's authority that are needed to successfully implement source control in the LDW. The goal for this five-year plan is to focus on preventing recontamination above the

[4] The documents associated with the LDW RI/FS are available at http://yosemite.epa.gov/R10/CLEANUP.NSF/LDW/Lower+Duwamish+Waterway+Superfund+Site+Technical+Documents.

remedial action levels (RALs) presented in the ROD. The County's long-term goal is to control sources so that LDW sediments move closer to meeting the cleanup goals in the ROD.

Table 1-1 links each of Ecology's seven objectives to corresponding source control actions that King County will implement over the next five years. This cross-reference demonstrates that the King County LDW Source Control Implementation Plan thoroughly and completely addresses the guiding framework established by Ecology's source control goals and objectives.

1.3 Content and Organization of this Plan

King County's LDW Source Control Implementation Plan consists of the following components:

- **Current LDW source control actions and commitments (Chapter 2).** Three major CSO control projects and other ongoing county source control actions and commitments form the backbone of the County's source control efforts. Chapter 2 describes the history and ongoing work of the county divisions and a multi-jurisdictional program that carry out efforts to control pollutants from entering the LDW. More information is provided in Appendix B.
- **Additional and accelerated source control actions in 2014–2018 (Chapter 3).** Chapter 3 describes actions that will expand and increase the benefits of the County's ongoing and planned source control work in the LDW. The actions were developed in response to Ecology's updated LDW Source Control Strategy. They are designed to improve sediment quality. Per Ecology's direction, these specific actions are those above and beyond the County's existing LDW source control requirements and commitments or are actions that will be completed sooner than required.
- **Internal and external coordination (Chapter 4).** Chapter 4 summarizes the ongoing coordination among county divisions and with external agencies involved in LDW source control; Appendix B includes more detail on this. Coordination is a key component in accomplishing effective source control and implementing adaptive management strategies as needed. Coordination between WTD and SPU regarding management responsibilities and implementation of source control actions is particularly important.

Actions described in Chapters 2 and 3 are presented according to each county division or multi-jurisdictional program that is responsible for implementation. The appendices present supporting information.

Table 1-1. Cross-Reference of the Ecology Source Control Strategy and the King County Five-Year Lower Duwamish Waterway Source Control Implementation Plan

Objective to Meet Ecology Source Control Strategy Goals	King County Strategy	Action (Bolded action = accelerated and additional action)	Outputs by 2018[a] (Bolded output = accelerated and additional output)	Ecological and Human Health Outcomes
Identify and, to the extent possible, control ongoing sources of chemicals to Lower Duwamish Waterway (LDW) sediments with the potential to exceed cleanup levels	Control releases from the combined sewer system	• Implement Protecting Our Waters – combined sewer overflow (CSO) Control Program • Comply with National Pollutant Discharge Elimination System (NPDES) permit for the West Point Treatment Plant (includes LDW) • Regulate wastewater discharges to combined sewer system • Monitor, maintain, and inspect wastewater facilities • **Implement LDW Green Grants Program** • **Determine significance of stormwater inspections in combined sewer system** • **Conduct source identification and tracing** • **Conduct studies to evaluate source pathways of sewer, stormwater, and groundwater in combined systems**	• Begin construction of Rainier Valley Wet Weather Storage project (Hanford #1) by end of 2016; submit facility plan to Ecology for Georgetown Wet Weather Treatment Station by end of 2015; reduce volumes for West Michigan and Terminal 115 by infiltration through 2015, then start design • Meet all West Point permit conditions that apply to the LDW • Review all discharge authorizations in the LDW basin; apply discharge authorizations to any new discharges • Enforce food and water recreation facility wastewater disposal regulations Inspect all county lines on a 7-year cycle; inspect all outfall pipes on a 5-year cycle; maintain West Duwamish rock box annually; maintain facilities as needed • **Award grants for air and water improvements in the Duwamish Valley in 2014 and 2015** • **Complete inspections in Brandon and South Michigan basins and summarize findings for the Source Control Work Group (SCWG) by 2016** • **Collect sediment traps and follow-up in-line grab samples in each sub-basin once every 5 years** • **Complete sampling and develop report for the Brandon and South Michigan combined sewer basins, by 2016**	• Keep sediment concentrations below marine sediment cleanup levels • Reduce fish tissue concentrations • Meet marine water quality criteria
	Control releases from the Municipal Separate Storm Sewer System (MS4) in unincorporated King County	• Comply with county MS4 Municipal Stormwater Permit • Conduct road service programs to reduce pollutant releases from county MS4 system • **Conduct increased inspections** • **Complete mapping in the basin** • **Conduct source tracing** • **Clean lines when necessary[b]**	• Meet all county MS4 municipal stormwater permit conditions that apply to the LDW drainage area, including source control inspections, stormwater facility infrastructure inspections and maintenance activities, stormwater pollution prevention policies and procedures on County–owned or operated lands, water quality complaints, illicit discharge detection and elimination, and spill response • Implement the Regional Roads Maintenance Endangered Species Act Program and the snow and ice response program • **Complete inspections in the South 96th Street Corridor** • **Collect sediment traps and follow-up in-line solids grab samples** • **Complete mapping of the county MS4 in the basins draining to LDW** • **Implement line-cleaning program in the basin in support of the Source Tracing and Elimination Program contingent on other funding sources**	
	Control releases from county-owned property	• Comply with County MS4 Municipal Stormwater Permit on County owned-properties and County Industrial Stormwater General Permit (ISGP) at King County International Airport (KCIA) • **Identify and control releases from properties**	• Complete business inspections of all properties • Meet all conditions of the ISGP for the KCIA • Meet all county MS4 municipal stormwater permit conditions that apply to County properties • Conduct site investigations and hazardous materials abatement during redevelopment • Comply with dangerous waste disposal and reporting and underground storage tank (UST) requirements • **Characterize and evaluate stormwater solids at KCIA in accordance with its source control program** • **Expand source control sampling to include outfalls from Harbor Bond properties.** • **Conduct the remedial investigation for the North Boeing Field/Georgetown Steam Plant state Model Toxics Control Act (MTCA) order by 2017**	
	Control releases from other properties	• Regulate safe handling of solid waste • Implement the Moderate Risk Waste Plan	• Review operation plans and inspect solid waste facilities • Review and assess permit-exempt solid waste facilities • Respond to illegal dumping • Provide collection of household hazardous waste and small quantity generator waste	
	Control releases from septic systems	• Regulate on-site septic systems	• Review all permit applications for new systems and current maintenance reports on home sales • Respond to all complaints of septic failures	
	Identify sources to the Green/Duwamish River	• **Conduct studies to characterize contaminants in the Green/Duwamish basin**	• **Complete air deposition, water, sediment, and suspended solids studies on the Green/Duwamish basin**	

Objective to Meet Ecology Source Control Strategy Goals	King County Strategy	Action (Bolded action = accelerated and additional action)	Outputs by 2018[a] (Bolded output = accelerated and additional output)	Ecological and Human Health Outcomes
Apply administrative and legal authorities to accomplish corrective actions in areas contributing to contaminated sediments	Conduct corrective actions when necessary for inappropriate discharges to the sewer or County MS4	• Follow up on all identified industrial waste problems and referrals • Follow up on all identified stormwater problems and referrals • Work with Puget Sound Clean Air Agency (PSCAA) on control of air emissions • **Conduct review of existing regulatory authorities**	• Resolve all identified industrial waste problems and referrals • Resolve all identified stormwater problems and referrals • Participate on PSCAA board and advisory council • **Identify schedule to address regulatory limitations in next 5-year source control plan**	
Educate businesses, residents, and others who handle hazardous materials on ways to reduce pollution from their activities	Provide educational and outreach information that aids in source control activities	• Conduct education and outreach to businesses that discharge wastewater to sewers and stormwater to county MS4 and on King County properties • Conduct education and outreach for septic systems • Conduct education and outreach to property owners in areas eligible for Green Grants	• Provide de-icing/washing training to KCIA tenants • Conduct spill response training to county tenants • Conduct Dirt Alert program on arsenic and lead exposure and yard cleanup • Provide technical assistance, including on-site visits, to small quantity waste generators • Conduct public education on household hazardous waste • Perform targeted outreach to business and communities on particular hazardous waste issues • Provide technical assistance to businesses on industrial wastewater discharges • Offer certification program for septic pumpers, installers, and maintainers • Conduct education and outreach for septic owners • Conduct outreach on Green Grants Program	
Monitor and evaluate source control efforts and revise plans accordingly	Assess source control program effectiveness and propose revisions	• **Assess source control program effectiveness and incorporate outcomes into long-term plan**	• **Complete next 5-year source control plan** • **Based on source tracing activities and available sediment data, evaluate County's source control program effectiveness over time in summary of 5-year plan actions**	
Establish milestones and reporting requirements for source control activities	Report findings to Ecology and the LDW Source Control Work Group	• **Report all findings to Ecology**	• **Submit yearly updates to the Ecology Source Control Status Report and prepare annual source control reports** • **Report long-term trends in the combined sewer system by end of 2018**	
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	Enhance regional and internal coordination and communication efforts to improve the effectiveness of source control efforts	• Actively collaborate with regional partners and governmental agencies • **Develop a strategy to enhance long-term internal coordination**	• Participate in the SCWG and Duwamish Inspections Group; train investigators to identify sources of contaminants • **Incorporate strategy to enhance long-term internal coordination into the next 5-year source control plans**	
Evaluate whether controls are at the point where a sediment cleanup can proceed with some assurance that recontamination potential has been (or is being) reduced	Provide Ecology with information needed to make timely determinations	• Inform the appropriate authority of any identified problems • Provide all collected information in regular submittals • Participate in SCWG and Duwamish Inspections Group	• Coordinate with Duwamish Inspectors Group • Submit yearly updates to the source control status report • Participate regularly in both groups	

[a] If no data is listed, outcome is completed by end of 5-year plan or is ongoing.
[b] With approval of funds from King County's Water and Land Resources Division and if other funding (e.g., grant) is available.

2.0 King County's Ongoing Source Control Commitments in the Lower Duwamish Waterway

King County is actively involved in many source control efforts in the basins draining to the LDW. The County's track record shows a strong commitment to source control that has yielded substantial results. This chapter describes the ongoing LDW source control work of five county divisions and of one multi-jurisdictional program. This work is described in greater detail in Appendix B.

2.1 Wastewater Treatment Division in the Department of Natural Resources and Parks

The Wastewater Treatment Division (WTD) protects water quality and prevents water pollution by providing regional wastewater treatment to 17 cities and 17 local utilities. WTD serves about 1.5 million people in a 420-square-mile service area, including most urban areas of King County and parts of south Snohomish County and northeast Pierce County. The LDW is included in WTD's service area (Figure 2-1). WTD's treatment plants operate under and comply with National Pollutant Discharge Elimination System (NPDES) permits that outline the conditions in which the plants can discharge treated wastewater. Today, on an annual average, over 85 percent of the stormwater in the system's combined sewer basins is captured and treated at the West Point Treatment Plant. The remaining flow released during CSOs, made up of approximately 90 percent stormwater and 10 percent wastewater, benefits from the source control actions discussed in this five-year plan.

Actions that Protect Water and Sediment Quality

WTD protects water and sediment quality in the LDW through actions listed below. Additional information is available at http://www.kingcounty.gov/environment/wtd.aspx.

- **Implementing the CSO Control Program, known as the Protecting Our Waters Program.** The cornerstones of King County's LDW Source Control Implementation Plan are three CSO control projects that will cost approximately $174 million to implement. Planning or design for these projects is under way. These investments will build on the significant clean water investments the County has made in the LDW for over 50 years. The subsection that follows describes the Protecting Our Waters Program in more detail.
- **Complying with NPDES permits.** The NPDES permit for the West Point Plant includes discharge, loading, reporting, and monitoring requirements for all the facilities and outfalls associated with West Point, including CSO outfalls that discharge to the Duwamish River. Many actions required under the permit contribute to source control, particularly pretreatment of industrial discharges and implementation of the nine minimum controls for CSOs. More information on WTD's NPDES permits is available at http://www.kingcounty.gov/environment/wtd/About/System/NPDES.aspx.

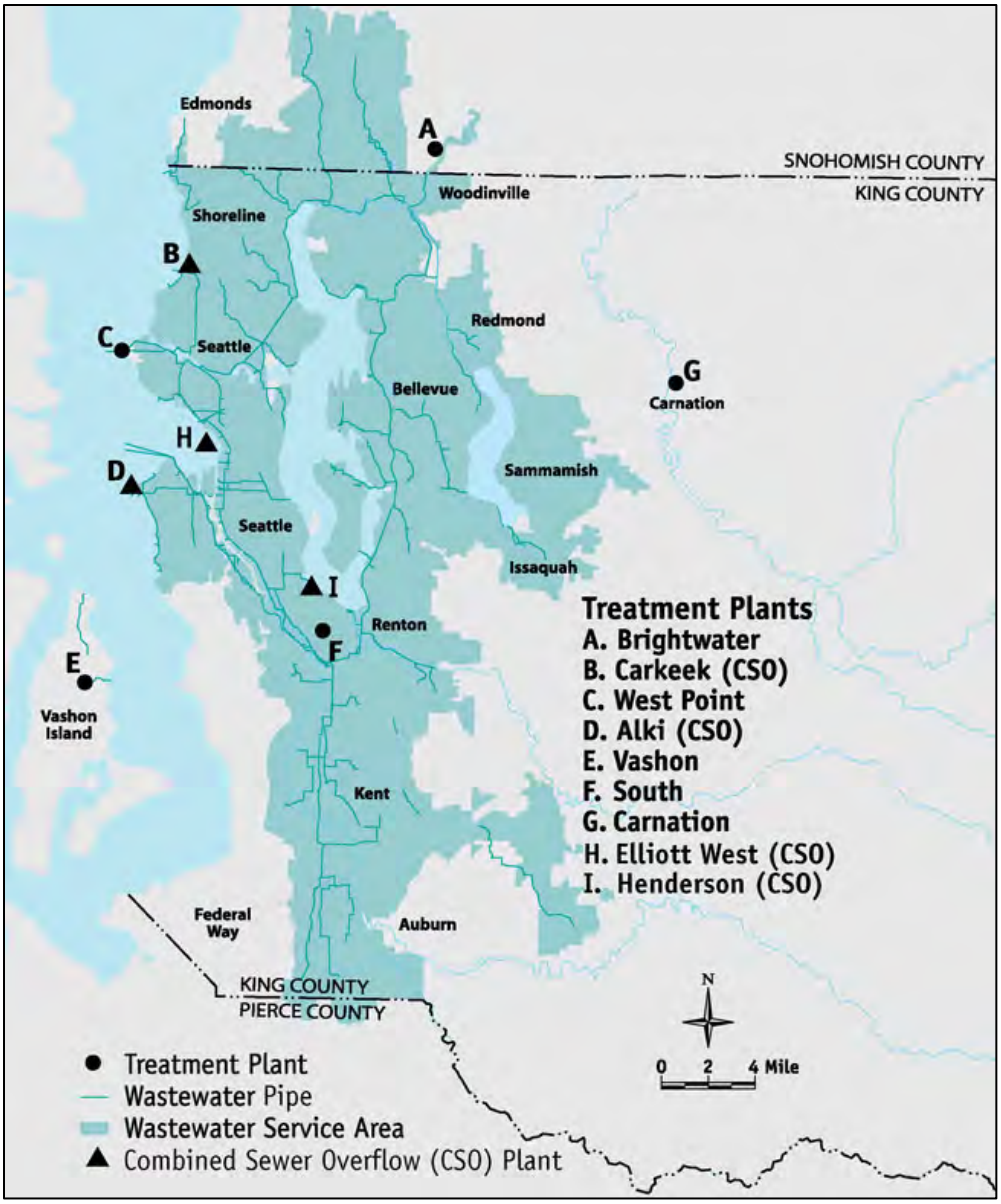

Figure 2-1. King County's Wastewater Service Area

- **Managing the King County Industrial Waste Program (KCIW).** KCIW regulates industrial wastewater discharged into the King County wastewater system from industrial facilities. The program ensures that facilities either treat wastewater to reduce harmful substances or use best management practices (BMPs) before discharging wastewater to sanitary sewers. KCIW regulates approximately 180 facilities in basins draining to the LDW, representing approximately 25 percent of facilities regulated by the program.
- **Implementing the Sediment Management Program.** WTD carries out a Sediment Management Plan (SMP) to remediate contaminated sediments near CSO outfalls identified on the state's Contaminated Site List. Sites in the LDW either have been addressed under the Elliott Bay Duwamish Restoration Program or are being addressed under the LDW Superfund cleanup. The County's efforts include past and ongoing work to identify and control the sources of pollution that may pose health or environmental

problems if they accumulate in sediments and to prevent recontamination of cleanup areas in the LDW. To address gaps in knowledge of sources entering the system and the LDW, the County started several studies that will aid in future source control efforts (for example, gaining a better understanding of contaminants in the air deposition pathway).

- **Monitoring, inspecting, and maintaining WTD facilities.** WTD monitors flow at approximately 30 locations in LDW combined sewer basins and inspects sewer lines using video equipment and other means on a seven-year cycle so that each sewer line is inspected at least once every seven years. CSO outfall pipes are inspected about every five years. More information is available at http://www.kingcounty.gov/environment/wtd/Construction/Assets.aspx and http://www.kingcounty.gov/environment/wastewater/CSI/FlowMonitoring.aspx.
- **Offering educational and public outreach activities.** WTD offers educational information as part of its source control activities in the LDW. It maintains a website, performs community outreach, provides wastewater education and tour programs, and provides industrial waste educational programs, materials, and workshops. WTD partners with other groups on education, such as participating in the annual Duwamish River Festival and in Local Hazardous Waste Management Program activities. More information is available at http://www.kingcounty.gov/environment/wtd/Education.aspx.
- **Participating in the RainWise Program.** WTD is working with SPU to offer the RainWise Program in selected portions of the WTD wastewater service area, including the LDW. Property owners who live in a targeted CSO basin in the LDW area may be eligible for rebates for installing rain gardens or cisterns to help control stormwater runoff and CSOs. The County plans to offer this program through 2016. Information on the program is available at http://www.kingcounty.gov/environment/wastewater/CSO/BeRainwise.aspx.
- **Funding the Green Grants Program.** From 2011 through 2015, WTD is funding community projects, environmental education, and community outreach efforts in the Duwamish River Valley through the Green Grants Program. The purpose of the program is to help improve air and water quality in the Duwamish watershed, support the successful implementation of CSO control projects in this area, and meet regulatory obligations for clean air. Grants are also offered to promote partnerships in the LDW area with the goals of advancing source control for the LDW Superfund cleanup, developing local expertise in water and air quality protection, and enhancing small-scale environmental and economic opportunities in the community. A new program will continue awarding grants starting in 2016 (see Chapter 3).

Protecting Our Waters Program—WTD's Combined Sewer Overflow Control Program

The regional wastewater system includes CSO "relief points" in the combined sewer area of Seattle to prevent backups in homes and streets from extreme variations in stormwater volumes. These include 38 locations in the county system and about 90 in the SPU system. WTD has been implementing the County's CSO Control Program, Protecting Our Waters, since the late 1970s. King County has spent $390 million on CSO control to date. Projects have been completed to control half of the County's 38 CSOs to the Washington State standard of no more than one untreated CSO discharge per year on a 20-year average.

In 2012, the King County Council approved an amendment to WTD's long-term CSO control plan that includes nine projects to control the remaining 14 uncontrolled CSOs by the end of 2030 at a total cost of $710 million (2010 dollars; predicted to be over $1 billion of future funds spent by completion). This long-term CSO control plan prioritizes the control of LDW CSOs ahead of the others to support the Superfund cleanup efforts (Figure 2-2). The cost of LDW CSO control projects (all underway) is $174 million (2010 dollars). LDW CSO control will decrease untreated CSO volume by an average of 104 million gallons per year and is estimated to reduce CSO pollutant loadings, including PCBs, in the LDW by approximately 60 percent (Figure 2-3).[1]

In 2013, King County entered into a consent decree with the U.S. Department of Justice, EPA and Ecology to ensure its CSO control plan is completed by 2030. Appendix C shows the schedule for meeting critical milestones in the consent decree.

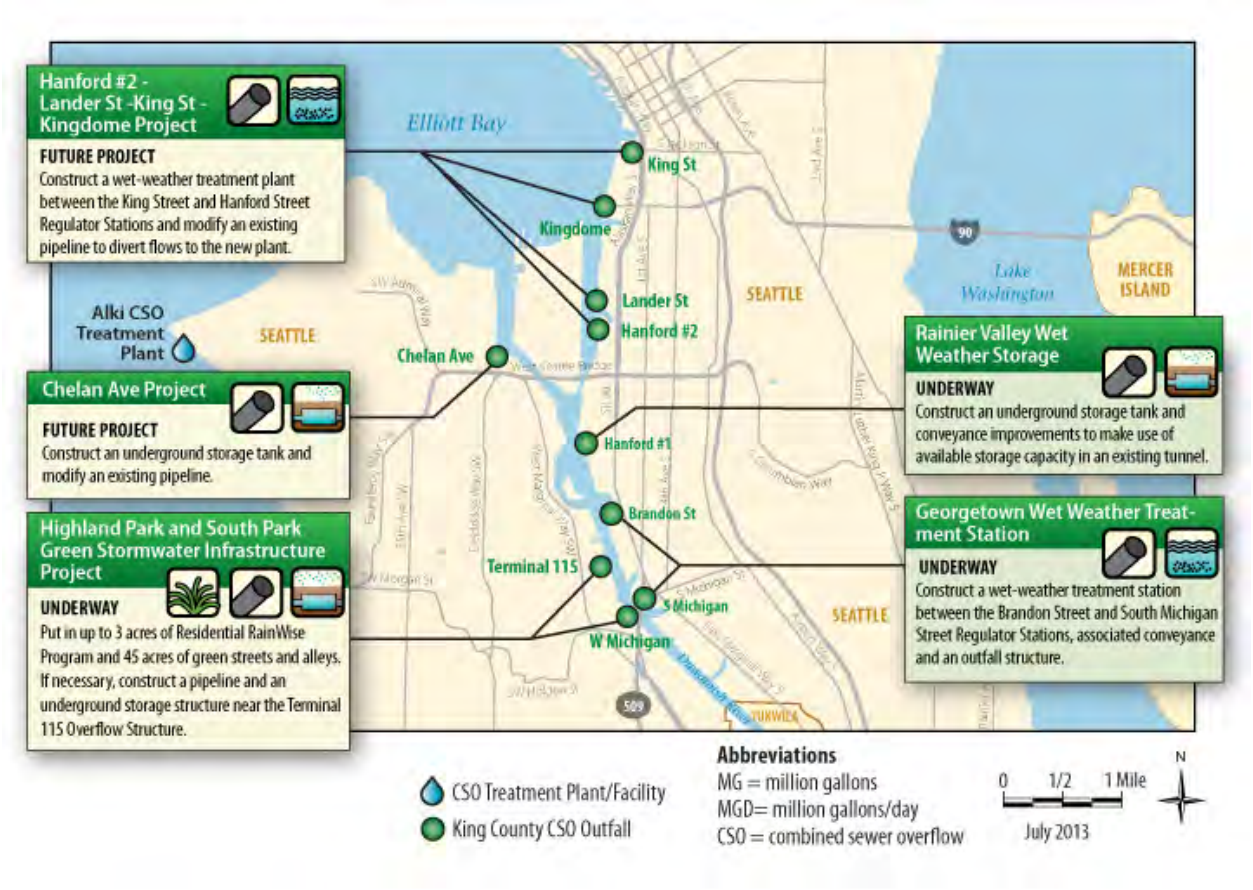

Figure 2-2. Projects in the Lower Duwamish Waterway/Elliott Bay Included in the King County Long-Term CSO Control Plan

[1] See Appendix B for details on how PCB loads shown in Figure 2-3 were calculated.

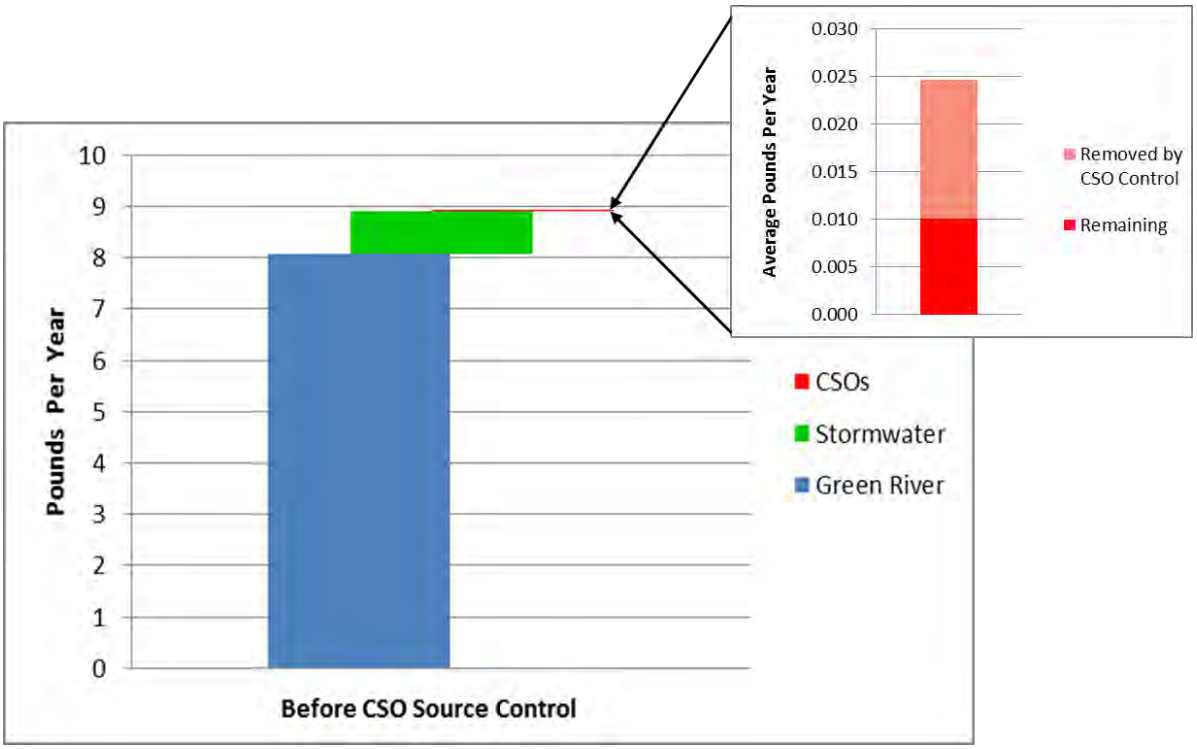

Figure 2-3. Estimated Relative PCB Inputs to the Lower Duwamish Waterway Before and After Combined Sewer Overflow Control

The following activities and their costs (in 2010 dollars) are associated with the County's long-term CSO control plan in the 2014–2018 timeframe and designed to significantly reduce pollutant loadings in the LDW:

- Rainier Valley Wet Weather Storage (Hanford #1) CSO control project ($19 million [M]) to remove 100,000 gallons per year of untreated overflows
- Georgetown Wet Weather Treatment Station (Brandon/South Michigan) CSO control project ($140 M) to remove 102 million gallons per year of untreated overflows
- West Michigan and Terminal 115 CSO control project ($15 M) to remove 1.5 million gallons per year
- CSO treatment of Seattle's Henderson area CSOs (no net cost after reimbursement from the City of Seattle)
- Water Quality Assessment and Monitoring Study ($2 M for the Duwamish Green components of the study)
- Green stormwater infrastructure evaluations for CSO reduction in South Park and Highland Park neighborhoods ($0.2 M) to reduce CSO storage by 0.2 million gallons
- CSO Control Program review($1 M for reconsideration of LDW controls)
- Coordination with City of Seattle on CSOs, integrated control plans, and stormwater in combined basins ($0.6 M for the LDW basins)

Once a CSO control project is constructed, the County conducts post-construction monitoring (King County 2010). The purpose of the monitoring is to verify the effectiveness of CSO controls and demonstrate compliance with water and sediment quality standards and protection of designated uses and sensitive areas.

More information on the Protecting Our Waters Program is available at http://www.kingcounty.gov/environment/wastewater/CSO.aspx.

2.2 Water and Land Resources Division in the Department of Natural Resources and Parks

The Water and Land Resources Division (WLRD) helps protect the County's water and lands so that its residents can enjoy them safely today and for generations to come. The division provides diverse services, such as water quality studies and analyses, river and floodplain management, watershed basin stewardship, rural and agricultural services, and implementation of and compliance with the County's NPDES Phase I Municipal Stormwater Permit, which regulates the discharges from County-owned Municipal Separate Storm Sewer Systems (MS4s).[2]

WLRD's Stormwater Management Program (SWMP) includes a number of programs that address pollutant prevention and reduction in stormwater discharges to the LDW and other receiving waters in King County. Descriptions of these actions and their associated agencies can be found in the 2013 SWMP document.[3] WLRD also coordinates the actions of other King County agencies that have responsibilities under the NPDES Phase I Municipal Stormwater Permit. These programs are countywide in unincorporated areas.

Programs WLRD implements and that have most relevance to the LDW are as follows:

- The Source Control Program provides technical assistance, education, and code compliance activities to business and property owners. The goal of these activities is to reduce and eliminate existing or potential pollutant discharges to the MS4 and surface waters in unincorporated King County, a small portion (2.8 percent) of which are in the basins that drain to the LDW. Compliance is achieved using a progressive enforcement path, starting with education/technical assistance, corrective action letters, follow-up inspections, and eventually notices of violations and penalties.
- The Facility Inspection Program ensures that stormwater flow control and water quality treatment facilities are properly functioning and appropriately maintained. Thirteen public and 40 private stormwater flow control/treatment facilities are in unincorporated King County areas that drain to LDW.
- The Illicit Connections and Illicit Discharges Detection and Elimination (IC/IDDE) Program addresses potential sources of stormwater pollution by conducting investigations, inspections, and follow-up actions to ensure compliance with King County's Water Quality Code; identifying illicit connections and discharges; and removing them.

[2] Information on the County's NPDES Phase I Municipal Stormwater Permit is available at http://www.ecy.wa.gov/programs/wq/stormwater/municipal/phaseIpermit/phipermit.html.
[3] Information on the SWMP is available at http://your.kingcounty.gov/dnrp/library/water-and-land/stormwater/stormwater-management-program/2013-swmp-and-appendices.pdf.

- WLRD is responsible for mapping and documenting the MS4 in the County's jurisdiction, on the properties it owns or operates, and on properties that are discharging to the County's MS4.

More information on WLRD's programs is available at http://www.kingcounty.gov/environment/wlr.aspx.

2.3 Solid Waste Division in the Department of Natural Resources and Parks

King County's Solid Waste Division (SWD) provides garbage transfer, disposal, and recycling services for residents and businesses in King County, except for the cities of Seattle and Milton.

SWD activities in the LDW drainage basin include the County's Brownfields Program. The Brownfields Program provides technical and financial assistance to qualified private individuals and businesses, nonprofit organizations, and municipalities in King County to assess and clean up contaminated sites, called brownfields. The program is funded with grants from EPA to conduct environmental site assessments (ESAs) on properties with confirmed or suspected contamination. Over the last 15 years, the program has conducted 11 Phase I and 22 Phase II ESAs that have resulted in a number of successful cleanup and redevelopment projects, including one project under way in the LDW drainage basin. Three other projects in the LDW drainage basin have been have been facilitated by the program. Contaminates addressed include petroleum, tetrachloroethene (PCE), PCBs, polycyclic aromatic hydrocarbons (PAHs), and metals. More information on SWD's Brownfields Program is available at http://your.kingcounty.gov/solidwaste/brownfields/index.asp.

2.4 King County International Airport in the Department of Transportation

The King County International Airport (KCIA), also known as Boeing Field, is one of the busiest primary non-hub airports in the nation. Located just five miles south of downtown Seattle, it averages more than 200,000 operations (takeoffs and landings) each year. It serves small commercial passenger airlines, cargo carriers, private aircraft owners, helicopters, corporate jets, and military and other aircraft. It is also home to The Boeing Company's 737 aircraft flight-test program and other Boeing operations.

The airport is located at 7277 Perimeter Road South in Seattle. It is owned and operated by King County and consists of 615 acres. The majority of this area (435 acres) is impervious surface covered by buildings and paved areas; the remaining 180 acres consist of grass and landscape areas.

KCIA's primary pathway to the LDW is stormwater discharged through its drainage basin outfalls. KCIA complies with stormwater regulations related to Ecology's NPDES permits, which include industrial, municipal, and construction stormwater general permits, and with Ecology's regulations under the toxics cleanup, underground storage tank, and dangerous waste programs:

- **Industrial Stormwater General Permit (ISGP).** Ecology issued an ISGP for KCIA that covers industrial activities involving airport transportation. Ecology also has issued ISGPs for seven KCIA tenants. All other tenants are covered under the KCIA ISGP and must comply with its specific requirements.

- **Municipal Stormwater Permit.** As a custodial agency and county property, KCIA adheres to the County's NPDES Phase I Municipal Stormwater Permit (MS4 Permit). The permit regulates the discharges from MS4s owned or operated by King County. WLRD is the lead agency managing permit compliance for the County. Regulatory requirements and associated actions pertaining to the permit include mapping, development standards, structural stormwater controls, source control assessments, IC/IDDE, operation and maintenance, and property maintenance.
- **King County Code.** Development and construction at KCIA are performed in accordance with King County Code (KCC) Chapter 9.04, Surface Water Runoff Policy. Small construction projects, such as minor maintenance projects, must also comply with KCIA's ISGP and MS4 Permit requirements. Airport and tenant projects that trigger county grading permits (excavating > 500 ft^3 of material) and state construction stormwater general permits (> 1 acre of area) are subject to their requirements. Airport lease agreements require tenants to comply with all federal, state, and local laws. Other requirements include airport policies such as KCIA Spill Response Policy. For construction projects greater than 1 acre, KCIA and its tenants are also required to apply for coverage under Ecology's Construction Stormwater General Permit (CSGP) as applicable. The County's Department of Permitting and Environmental Review (DPER) also conducts inspections for building, commercial site development, demolition, and grading permits.
- **North Boeing Field/Georgetown Steam Plant Site Model Toxic Control Act Agreed Order.** In accordance with the Model Toxics Control Act (MTCA), Ecology signed Agreed Order DE 5685 with Boeing, KCIA, and the City of Seattle to facilitate remedial action at the North Boeing Field/Georgetown Steam Plant Site. Boeing, KCIA, and the City are potentially liable parties to the site. Under the Agreed Order, which became effective August 14, 2008, Ecology will conduct an RI/FS and interim actions, as needed.
- **Cleanup of Contaminated Sites.** As part of redevelopment activities, KCIA performs site investigations, feasibility studies, and site cleanups in accordance with Ecology's Toxic Cleanup Program and MTCA requirements. Three independent cleanup projects were completed at KCIA between 2013 and 2015. For these cleanups, KCIA notified Ecology of contaminant release, investigation status, and planned remediation activities. The projects were the former Standard Gas Station, former Standard Oil Station, and former Hangar 5 sites. Ecology has conducted Site Hazard Assessments for these sites and all have been ranked as 4, indicating lower priority.
- **Management of Underground Storage Tanks (USTs).** KCIA requires tenants as a term of their leases to comply with Ecology's UST Program.
- **Dangerous Waste Disposal and Reporting.** KCIA, as a waste generator, complies with Ecology's Dangerous Waste Regulations and Resource Conservation and Recovery Act (RCRA) to ensure hazardous wastes are properly disposed of and recorded.
- **Hazardous Materials Abatement.** For demolition of building structures at KCIA, hazardous material surveys are performed in accordance with federal, state, and local regulations. The surveys identify hazardous materials that require abatement and proper disposal prior to demolition. Asbestos-related activities are coordinated with DPER and with Puget Sound Clean Air Agency (PSCAA).

- **De-icing and Washing Policy and Facilities.** To maximize stormwater protection, KCIA constructed de-icing and washing pads for aircraft. The pads include oil-water separators before discharge to the sanitary sewer system. An aircraft de-icing and washing policy was established to ensure that tenants and operators are knowledgeable of approved de-icing locations and procedural requirements.
- **Capital Improvement Program.** KCIA has updated its infrastructure to support source control and remediation, including rehabilitating runways and taxiways, refurbishing stormwater pump stations, repairing/replacing damaged stormwater pipes, and updating aging ground vehicles. In addition, the program allows for redevelopment activities such environmental investigations, hazardous materials abatement, building demolition, feasibility studies, and environmental cleanups.
- **Tenant Outreach and Education.** KCIA participates in outreach activities to educate tenants and operators on how to control discharges of pollutants into the KCIA stormwater system. Some of these activities include spill response and de-icing policy training and maintenance of the KCIA website that informs readers on environmental accomplishments including green roofs, sound insulation, and stormwater protection. KCIA tenants are also reminded of the airport's ongoing compliance with environmental regulations during annual tenant assessments.

Ongoing source control activities as described in Appendix B, include tenant inspections, assessments, and corrective actions; BMP implementation; and reporting.

More information on KCIA's programs is available at http://www.kingcounty.gov/transportation/kcdot/Airport.aspx.

2.5 Roads Services Division in the Department of Transportation

King County's Roads Services Division (RSD) designs, builds, operates, and maintains roads, bridges, and other features in the right-of-way (ROW) in unincorporated areas of King County, including part of the LDW drainage basin. The RSD service area includes roadways and bridges in about 11 percent of the LDW drainage basin. RSD also has the responsibility for maintenance of the County's MS4 system located in the ROW, including sweeping streets and vactoring, repairing, and cleaning stormwater flow control and water quality treatment facilities, catch basins, and conveyance systems (pipes and ditches). These efforts help prevent sediments and associated contaminants, such as petroleum hydrocarbons, PAHs, and metals from entering local waterways.

Relevant RSD programs are as follows:

- **Regional Road Maintenance Endangered Species Act Program.** King County is part of a consortium of 34 agencies throughout Washington State that implement the Regional Road Maintenance Endangered Species Act Program Guidelines. This program specifically defines routine road maintenance activities and includes 10 Program Elements, including Best Management Practice's designed to minimize the impacts of road maintenance activities on the associated environment. Staff are trained to properly implement erosion and sediment control products and practices along with following regulatory requirements when completing road maintenance work. BMPs can include both physical and managerial practices. Physical BMPs within a highly urbanized

watershed can include, but are not limited to sweeping streets and vactoring drainage systems, which in turn will reduce sediment and other pollutants such as heavy metals from entering the waterway. A Biological Review of the program concluded that the identified routine road maintenance activities conducted throughout Washington State under the Regional Road Maintenance Program will not impair properly functioning habitat, nor appreciable reduce the functioning of already impaired habitat, nor retard the long term progress of impaired habitat toward properly functioning conditions. By issuing a 4(d) approval, NOAA Fisheries concluded that implementation of the Regional Road Maintenance Program guideline will adequately conserve the listed species.[4]

- **Snow and Ice Response Program.** This program applies sand, salt, and anti-icer to roads in unincorporated King County during inclement weather. Improved traction reduces the likelihood and severity of vehicle accidents, which, in turn, limits and minimizes spills of automotive fluids. The sand is recovered through sweeping and catch basin cleaning to reduce the amount of sediment transported downstream to receiving water bodies.
- **Routine Road Maintenance.** The Traffic and Roads Maintenance Section maintains road ROW and associated stormwater conveyance systems throughout unincorporated King County including 50.5 miles of roadway and 50 miles of linear distance of MS4 ditches & pipes in the LDW source area. Activities include cleanup of automotive fluid spills, removal of illegally dumped solid waste, removal of landslide material, snow and ice response, stabilization of eroding soils, street sweeping, removal of litter, shoulder grading, removal of creosote-treated timbers, and removal of sediment from catch basins, pipes, ditches, and stormwater ponds. Problems with contamination and recontamination are referred to WLRD for assistance in identifying and eliminating the source.

More information on RSD activities is available at http://www.kingcounty.gov/transportation/kcdot/Roads.aspx.

2.6 Facilities Management Division in the Department of Executive Services

King County's Facilities Management Division (FMD) operates and manages the County's capital assets by developing and maintaining cost-conscious, sustainable, high-quality facilities and environments. FMD ensures that developed and vacant sites with stormwater facilities are inspected annually for stormwater and water quality compliance.

FMD is the custodial agent for seven parcels located along the LDW, referred to as the Harbor Bond properties, and for five developed parcels and 145 vacant parcels in the basins that drain to the LDW (Figure 2-4). These parcels (as of October 2015) are listed in Appendix D. For each parcel, the appendix includes the following information: parcel identification number, description, acreage, address (approximate if undeveloped), current tenant, Stormwater Pollution Prevention Plan (SWPPP) requirement, sewer service, inclusion on the Confirmed & Suspected Contaminated Sites (CSCS) list, and King County inspection dates. The Harbor Bond properties have been leased to a variety of tenants for almost a century for industrial and commercial

[4] More information is available at http://www.kingcounty.gov/depts/transportation/roads/endangered-species-act-reports.aspx and http://www.wsdot.wa.gov/Maintenance/Roadside/esa.

purposes that benefit from both rail and water access. A number of programs, permits, and activities serve to reduce the possibility of recontamination from these parcels.

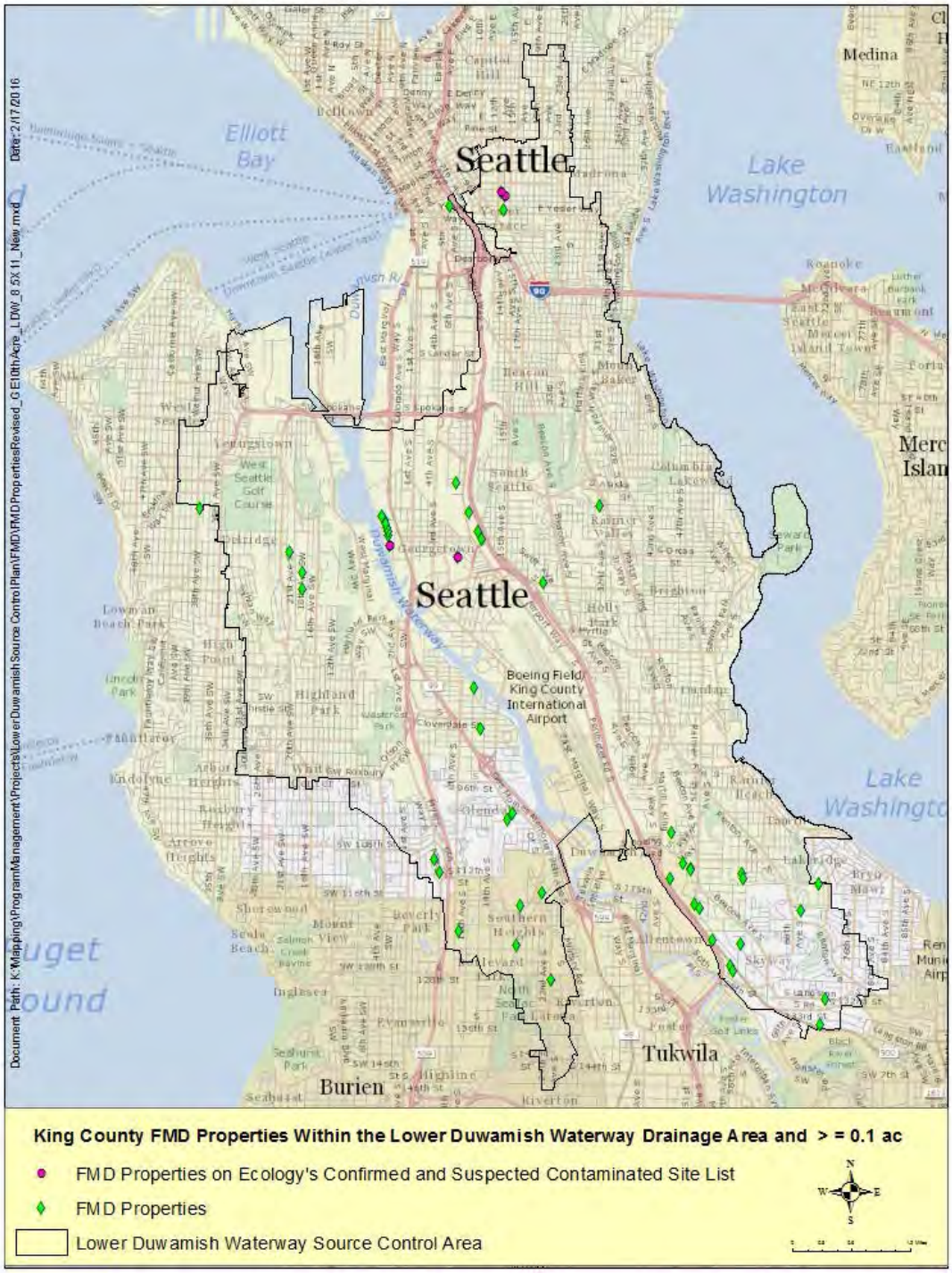

Figure 2-4. King County Facilities Management Division Properties in the Lower Waterway Drainage Area

FMD properties in the LDW area are described below. More information on FMD's programs is available at http://www.kingcounty.gov/operations/FacilitiesManagement.aspx.

Harbor Bond Properties

The Harbor Bond properties occupy the right bank of the LDW from River Mile (RM) 1.0 to 1.4.[5] FMD contracts with WLRD to perform water quality compliance inspections at these properties every five years in accordance with the County's NPDES Phase I Municipal Stormwater Permit. Inspections ensure the stormwater collection systems are maintained and operated according to approved designs and stormwater pollution prevention plans. Inspections also confirm that water quality BMPs are in place.

As custodial agent for King County, FMD administers leases with tenants of these properties and ensures the leases, as they are renewed, contain specific and comprehensive language requiring conformance with the most current applicable environmental regulations, including those for stormwater.

FMD will continue to coordinate and assist where possible to implement elements of Ecology's LDW Source Control Action Plan (RM 1.0 to 1.2 East) (Ecology 2011). Table 2-1 shows how FMD is supporting Ecology action items in this area of the LDW.

Other Properties

The County manages five other developed parcels in the LDW source control area. These developed parcels are inspected annually under contract with WLRD for stormwater facility compliance and every five years for water quality compliance.

The remaining 145 properties are scattered throughout the rest of the area (see Appendix D). Most of the parcels are small vacant properties that have come to the County through failure to pay property taxes (Tax Title Properties) or as the result of open space dedications through formal platting processes. These properties have recently been folded into WLRD's stormwater inspection program:

- If constructed drainage facilties are discovered on a property, the parcel becomes part of the annual inspection and compliance program.
- If no drainage improvements are found, the parcel is inspected for potential sources of water pollution (usually illegal dumping of polluting wastes). The water quality inspection occurs on a five-year rotation. Discovered drainage deficiencies or polluting situations are corrected by Roads Maintenance crews, private contractors, or the Solid Waste Community Litter Program.
- The 105 parcels that are less than a tenth of an acre are managed on a complaint only basis.

[5] River Mile 0.0 is at the southern tip of Harbor Island.

Table 2-1. Facilities Management Division Actions in Support of Ecology's Lower Duwamish Waterway Source Control Action Plan

Property or Facility	Action Item	Responsible Party	King County Actions
Public Outfall Nos. 2007 and 2244	Conduct business inspections at facilities with stormwater drainage to Outfall Nos. 2007 and 2244, including Cadman Concrete-Lehigh NW Cement and J.A. Jack & Sons, Inc., to verify that these facilities are in compliance with applicable regulations/code and have implemented appropriate best management practices (BMPs) to minimize the potential for contamination to enter the storm drain system.	King County, Ecology	King County performed water quality business inspection at Cadman-Lehigh NW on 1/31/13 and issued the compliance letter on 9/30/15. The County also performed a water quality inspection at J.A. Jack on 4/19/13 and issued the compliance letter on 7/10/14. Confirmed from visual inspection that Outfall 2007 has been abandoned and flows are routed to Ohio Ave. S and then to Outfall No. 2010.
Manson Construction Company	If satisfactory cleanup was not achieved during earlier remediation, require that the property owner/operator conduct a site assessment to determine residual concentrations of sediment contaminants of concern (COCs) in soil and groundwater beneath the property and to evaluate the potential for sediment recontamination via groundwater discharge.	Ecology	King County, as property owner, is prepared to work with the operator to conduct the suggested site assessment in areas of concern on the parcel.
	Conduct a visual bank survey. If bank erosion is likely, collect bank soil samples and analyze them for sediment COCs to evaluate the potential for contamination to enter the Lower Duwamish Waterway (LDW) via erosion.	King County, Ecology	Ecology, in its Source Control Status Report, dated June 2014, indicates that it is planning to address this action item. King County is prepared to support this activity.
United Western Supply	Perform a source control inspection of United Western Supply and the buildings on the southern portion of the property to verify compliance with applicable regulations and BMPs and prevent the release of contaminants to the LDW.	King County, Ecology	King County conducted water quality business inspections at United Western on 2/28/2013 and 5/27/2014. A compliance letter was issued on 8/6/2014. Tenancy and use of the southern half of this parcel is currently in transition. Improvements to the existing stormwater system are anticipated.

Source: The Action Item and Responsible Party listed in this table are based on information presented in LDW Source Control Action Plan (RM 1.0 to 1.2 East) King County Lease Parcels (Ecology 2011). The King County Actions listed in this table are based on information presented in LDW Source Control Status Report January through December 2013 (Ecology 2014).

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Properties on Confirmed & Suspected Contaminated Sites List

A comparison of the complete list of current Facilities Management Division properties in the LDW drainage basins was compared to Ecology's list of Confirmed and Suspected Contaminated site List [CSCL]. Only three of the FMD sites in the LDW are on Ecology's CSCL list; all three are developed and occupied:

- One site, located at 5815 Padilla Place South, is occupied by King County Fleet Administration. Vehicles are repaired inside a large warehouse structure. The remainder of the parcel is paved. During preparations in 2012 to repave the south parking area and upgrade the stormwater system, subsurface contamination was discovered below the existing asphalt. Extensive testing done prior to construction disclosed the presence, in limited areas, of lead and mercury in fill soil in concentrations that exceeded MTCA Method A cleanup levels. During construction, the site was carefully managed to contain any contaminants. Any contaminated soils found during construction were excavated to native soils. Approximately 1,300 tons of soil was removed and disposed of at the Roosevelt Regional Landfill in Klickitat County. All excavated areas were repaved.
- The second site is the southernmost parcel in the Triangle or Harbor Bond Properties; however, the listing of this county property on the CSCS list is in error. The site is ranked as a 4 on the Washington Ranking Model (1 through 5, with 5 the lowest risk), and the status of the site is "Cleanup Started." Ardagh Ltd. currently leases the site. Ecology records, filed under a previous lessee (Ball Incon) indicate the discovery in 1989 of a UST that was leaking petroleum products. Further research into historical documents produced by Ball Incon and St Gobain Containers, a lessee of this property after Ball Incon and before Ardagh, indicates that nine USTs were remediated in 1989. Several of them were leaking. Five were removed and four were filled in place. A large quantity of contaminated soils was removed from the site and disposed of appropriately. Importantly, Figure 2 in a 1995 Phase I Environmental Assessment prepared for Ball Incon shows that none of the nine tanks was located on the county parcel. Rather, they were located on the parcel east of Ohio Avenue SE, which is owned and operated by various glass manufacturing companies.
- The third site composed to two parcels is the Youth Services Center [YSC], located on 12th Avenue in Seattle. The YSC occupies four city blocks and includes courtrooms, offices, a major youth detention facility, and paved parking for more than 400 vehicles. The site was reported to Ecology in 2010 as part of a PCE plume discovered near 12th Avenue and East Alder Street. The source has been preliminarily identified as a former dry cleaning facility off-site from the county parcel. The second reporting for this parcel occurred in 2012 and concerned the discovery of a hydraulic fluid leak in an elevator shaft in the central part of the building footprint. Hydraulic fluid may have been released to the soil underneath the building.

  The County has funded a complete replacement of this facility; Phase One will occur in the next five years. In the design-build request for proposals, the County has indicated an intent to conform with Seattle's green stormwater infrastructure techniques. These techniques will manage stormwater runoff from the new facility that discharges to the combined sewer system. Any PCE-contaminated soil or groundwater removed for construction will be disposed of according to current MTCA standards. Similarly, any

soils contaminated with hydraulic fluid removed for construction will be disposed of in compliance with MTCA standards.

If the County becomes aware of additional soil, groundwater, or surface water contamination on County owned property during the course of construction, normal maintenance, or other activities on the property, the County will continue to comply with MTCA reporting requirements. The County will also continue to appropriately manage and dispose of any contamination disturbed during construction or maintenance activities.

2.7 Environmental Health Services Division, Public Health–Seattle & King County

The mission of Public Health–Seattle & King County (Public Health) is to identify and promote the conditions under which all people can live in healthy communities and achieve optimum health. Public Health's Environmental Health Services Division supports efforts to control point sources that can potentially contribute to sediment contamination load in the LDW. This is accomplished through regulatory and oversight activities that do the following:

- Minimize potential human and environmental exposures to sewage and chemicals released from properties that have on-site sewage (septic) systems in the LDW drainage basin. There are 45 properties with known on-site sewage systems in the basin; however, Public Health records for on-site sewage systems are not complete, particularly for areas outside of Seattle.
- Administer and enforce state and local regulations governing the safe handling of solid waste. There are 12 permitted solid waste facilities and 42 solid waste facilities exempt from permits that discharge into the LDW drainage basin.[1] For the 12 permitted solid waste facilities, Public Health prepares inspection reports based on a checklist for each of three types of facilities: Moderate Risk Waste (MRW) facilities; Solid Waste Storage Piles; or Transfer Stations, Material Recovery Facilities (MRFs), and Exempt MRFs.
- Continue other regulatory activities related to the release of wastes from plumbing structures, food facilities, and water recreation facilities into public sanitary sewer systems.
- Help prevent pollutants from entering the LDW through non-regulatory activities such as educational and outreach programs and materials.

More information on Public Health's programs is available at http://www.kingcounty.gov/healthservices/health.aspx.

2.8 Local Hazardous Waste Management Program

King County's Local Hazardous Waste Management Program (LHWMP) is a multi-agency program that covers all incorporated cities and unincorporated county areas. Participating agencies include King County SWD and WLRD, Public Health, SPU, and the Sound Cities Association. The program implements the moderate-risk waste plan required by Chapter 70.105 Revised Code of Washington (RCW), as updated most recently in 2010 and approved by

[1] Information on the number of solid waste facilities is current as of August 2015.

Ecology. It addresses hazardous wastes generated by residents and generated in small quantities by businesses.

LHWMP's services include household hazardous waste collection, public education, small quantity generator technical assistance, small quantity generator waste collection, and targeted outreach to communities and businesses. These efforts help keep pollutants out of surface waters, including the LDW, and the environment.

Of particular importance to the LDW source control efforts are LHWMP's on-site technical assistance visits to small businesses. LHWMP investigators provide consultation services throughout the County; in 2013, they visited more than 500 locations, including many in the LDW drainage area. Table 2-2 below summarizes the number of site visits in the LDW drainage area in 2013–2014.

Table 2-2. Local Hazardous Waste Management Program Visits in the Lower Duwamish Waterway Drainage Area (2013–2014)

Zip Code	2013	2014
98106	6	2
98108	54	100
98134	17	36
98168	64	79
Total	**141**	**217**

In addition to the technical assistance visits to assist with hazardous material and waste management, the LHWMP Business Field Service (BFS) team, through a contract with the Environmental Coalition of South Seattle, provided spill kits, customized drainage maps, spill plans, and spill cleanup training to businesses that lacked these items.

LHWMP also works with selected industries and ethnic groups known to work in each industry. Currently, the program is focusing on dry cleaning companies to explore options for shifting away from perchloroethylene (PERC) and other chlorinated solvent spot cleaners. Other areas of focus are as follows: artists to address the wide variety of hazardous products they use, nail salons to address worker and customer exposures to hazardous solvent vapor, janitorial/custodial services regarding safe use of cleaning products and promotion of safer alternatives, and landscape companies and their workers to promote proper use of pesticides and pesticide-reduction techniques.

More information on LHWMP's services is available at http://www.lhwmp.org/home/.

2.9 Department of Permitting and Environmental Review

DPER is the permitting agency for unincorporated King County and KCIA, with the exception of ROW construction and special use permits administered by the Department of Executive Services. DPER provides two primary services aimed at controlling the release of contaminants from development sites: (1) reviews and issues development and use permits and (2) inspects projects for compliance with plans and conditions of permit approval. The types of projects that could potentially introduce or mobilize hazardous substances include those that involve filling, excavation, construction of new structures, reconstruction or expansion of existing structures,

demolition, and tank installation or removal. Projects can range from construction of a deck for an existing single family residence to construction of a 40,000-square-foot hangar at KCIA.

DPER and KCC policies and requirements are applied uniformly throughout unincorporated King County and KCIA. Compliance with the State Environmental Policy Act (SEPA), the 2009 King County Surface Water Design Manual (KCSWDM), and the County's NPDES Phase I Municipal Stormwater Permit are the primary permitting tools DPER uses to control the release of contaminants from development sites in the LDW drainage area.

Development at KCIA is regulated under the KCSWDM in a manner similar to other areas under King County jurisdiction. Developments that create new or altered impervious surfaces of over 2,000 square feet are subject to the KCSWDM and undergo drainage review and inspection to ensure compliance with the KCSWDM and the NPDES Phase I Municipal Stormwater Permit.

The process recognizes a few KCIA distinctions, including the following:

- KCIA has its own Surface Water Management Plan and Program, NPDES permit, and facilities. KCIA routinely inspects and maintains facilities and monitors their discharges.
- KCIA has a Spill Prevention and Response Plan.

DPER coordinates site development permit reviews with KCIA and individual tenant projects to assure both regulatory and operational compliance with the KCSWDM and with KCIA's source control implementation measures.

Between the early 1980s and 2011, DPER processed permits for approximately 700 projects in the LDW Superfund site drainage area that had the potential to introduce or mobilize hazardous substances. In the past three years, permitting activity in this area has averaged about 15 projects per year. About a third of these projects were located at KCIA and the balance were generally evenly split between small residential and small-to-moderate commercial/industrial projects located in the unincorporated areas in the LDW drainage area. Permitting services in this area are expected to drop significantly over the next five years due to city annexations. Once all unincorporated areas are annexed, DPER permitting activity in the LDW drainage area will be limited to redevelopment projects at KCIA.

Permit Review

DPER receives applications for development permits and reviews all required stormwater site plans for projects that meet the thresholds in the NPDES permit. In addition, implementation of temporary erosion and sediment control BMPs is required for all site development that is below the thresholds for drainage review. The review process includes assessing the site for elements such as erosion hazard critical areas and proximity to steep slopes, creeks, and wetlands and assessing the project for temporary erosion and sediment control elements. Project plans are reviewed for compliance with the relevant provisions of the KCSWDM, the site development and soil retention standards in KCC Title 16, the critical area standards in KCC Title 21A, and other relevant regulations.

For redevelopment of sites that are suspected of containing hazardous materials or other contaminants, DPER requires that a baseline environmental site assessment be prepared to document the presence and levels of potential contamination. In cases where hazardous materials or other contaminants are found, the applicant is required to prepare a remedial action plan to demonstrate how Ecology and MTCA cleanup standards will be achieved and how the

contaminants will be controlled and kept from mobilizing during cleanup. The remedial action plans generally require the following:

- Soils/geotechnical report describing contaminants, groundwater, areas of cleanup, depths, and other relevant information
- Defined work area – temporary erosion and sediment control, isolation, fencing, construction ingress/egress, traffic control, stockpile area, and containment
- Cleanup procedures including excavation, groundwater extraction, disposal sites, soils testing, handling, and safety
- Site restoration – clean soils, compaction reports, surface restoration

This plan is incorporated into the approved permit along with any required mitigation and/or special inspections and the plans and conditions implementing the stormwater management and temporary erosion and sediment control measures required by the KCSWDM and the NPDES Phase I Municipal Stormwater Permit.

Permit Inspection

For larger developments requiring permanent stormwater facilities and/or site remediation because of the presence of hazardous materials or other contaminants, DPER's site inspection program is responsible for ensuring that applicants adhere to approved development plans and conditions of permit approval. Inspection staff conducts three primary source control (erosion and sediment control) inspection activities:

- Discuss erosion control measures and documentation required at a pre-construction meeting with the applicant and contractors
- Inspect the installed erosion control facilities at the start of construction; communicate any noted deficiencies to the applicant; and conduct follow-up inspections if necessary
- Inspect site at end of construction to ensure that site stabilization and permanent drainage facilities are completed and in operation

Inspection staff also conducts erosion control facility checks when doing normal construction inspection site visits and immediately after severe weather events. If at any time the erosion control facilities are determined to be inadequate or in need of repair, the inspector will take appropriate notification and/or permit enforcement actions. For sites with an approved remedial action plan, special provisions in the permit ensure that contaminants are fully contained on site and that all contaminated materials removed from the site are properly disposed of. These provisions are tailored to the site and are an added responsibility of the developer. Provisions typically include water quality monitoring during excavation work, contingency planning, and fulltime supervision by qualified environmental monitors. Depending on the extent of contamination, daily monitoring reports of all on- and off-site activities associated with the cleanup activities may also be required. DPER inspection staff reviews these reports weekly and at project completion to ensure compliance with the remedial action plan. Follow-up inspections are performed as necessary to ensure that any required corrective actions are completed and maintained. Documentation related to the inspections and corrective actions are recorded in DPER's permit tracking system (ACCELA).

For small projects reviewed under the Small Project Manual (Appendix C of the KCSWDM) (limited to single-family residential and agricultural projects), DPER building inspectors inspect the site for compliance with erosion and sediment control measures in conjunction with their other scheduled inspections and input the documentation to ACCELA.

Reporting

For all development proposals in unincorporated King County that are subject to drainage review under the KCSWDM, the NPDES Phase I Municipal Stormwater Permit requires that DPER track certain aspects of its development permitting program and report on this information annually. In 2009, DPER revised its review procedures and processes to accommodate this reporting requirement. The annual report includes the following information:

- Number of stormwater site plans that were reviewed
- Number of development sites that were inspected prior to construction
- Number of development sites that have a high potential for sediment transport
- Number of development sites that were inspected to verify proper installation and maintenance of erosion control facilities
- Number of development sites that were inspected prior to final approval or occupancy to verify proper installation of permanent stormwater facilities
- Number of enforcement actions taken for non-compliance with approved stormwater plans

ACCELA is not able to identify sites with approved remedial action plans.

3.0 Additional and Accelerated Source Control Actions in 2014–2018

This chapter describes additional and accelerated actions that King County intends to implement in 2014–2018 to expand and increase the benefits of its ongoing work to control or reduce pollutants from entering the LDW. These actions together with the ongoing source control efforts discussed in Chapter 2 and Appendix B form the King County portion of Ecology's updated LDW Source Control Strategy.

In accordance with Ecology's direction, the actions listed in this chapter are designed to improve sediment quality and are in addition to the County's existing source control requirements and commitments or will be completed sooner than required. These actions are projected to cost over $3.5 million. Whenever required by the County Charter or other applicable law, the County will seek authorization and appropriation from the King County Council to implement activities not currently authorized and covered by an appropriation.

The additional and accelerated actions include expanded sampling, source identification, source tracing, grant programs, mapping, and stormwater line cleaning and development of the next 5-year LDW source control implementation plan. The results of the actions will provide information that will help ensure that the County's ongoing and planned LDW source control efforts are as effective as possible and meet or exceed permit requirements and other commitments. (See Table 1-1 and Appendix B for context on how these actions fit into the County's overall LDW source control efforts.)

The following section summarizes the actions, followed by more detailed descriptions of the actions that each of five county divisions will implement. Additional sections discuss development of the next 5-year LDW source control implementation plan and how the County will report to Ecology on its progress.

3.1 Summary of Additional and Accelerated Actions

The following additional and accelerated actions will be carried out in 2014-2018:

- **Wastewater Treatment Division in the Department of Natural Resources and Parks.** WTD intends to implement the CSO control plan, which will reduce the volume of current overflows of untreated stormwater and wastewater by an average of 104 million gallons per year and CSO pollutant loadings from combined sewer basins by approximately 60 percent. To supplement CSO control, particularly in basins not yet controlled, WTD intends to do additional tracing and identification of sources of COCs in the combined sewer basins that could impair current and future treatment plant performance or overflow into the LDW; continue the grants program, which provides funding for air or water quality improvement projects; and implement other efforts to support the successful implementation of future CSO control projects in the LDW.
- **Water and Land Resources Division in the Department of Natural Resources and Parks.** WLRD intends to complete its mapping of the County's MS4 conveyance system in the basins draining to the LDW by June 30, 2015. This action is being completed sooner than required by the County's NPDES Phase I Municipal Stormwater Permit. WLRD also intends to increase the frequency of source control inspections and collect source tracing samples in the South 96th Street Corridor, which is home to a number of industrial activities in the LDW drainage basin.

- **King County International Airport in the Department of Transportation.** KCIA intends to conduct annual sampling and source tracing in its drainage system.
- **Roads Services Division in the Department of Transportation.** RSD intends to conduct additional maintenance in support of source tracing activities conducted by WLRD. RSD also intends to implement a line cleaning program in the South 96th Street Corridor in support of the Source Tracing and Elimination Program if grant funding is available and can be obtained to fully fund the activity.
- **Facilities Management Division in the Department of Executive Services.** FMD intends to participate in an expanded program of source control sampling in catch basins upstream of the outfalls on the Harbor Bond properties and will rely on a coordinated effort with the current tenants on those parcels to obtain and analyze the samples.

3.2 Wastewater Treatment Division in the Department of Natural Resources and Parks

WTD intends to supplement its ongoing LDW source control efforts and commitments by (1) identifying and tracing sources, (2) continuing to award grants that benefit water quality in the LDW, and (3) reviewing source control regulations to identify issues that need resolution. These actions are described below followed by a summary in Table 3-2.

Source Tracing and Identification

WTD identifies possible sources of COCs through sampling and will trace sources through ongoing business and industrial waste inspections and additional targeted sampling. Additional tracing of COCs that enter the County's combined sewers will help protect treatment efficiency at the West Point Treatment Plant, ensure proper performance of future CSO treatment facilities in the LDW, and minimize pollutants in the remaining flow from the combined sewer system released to the LDW. Controlling sources will protect river sediments near CSO discharge points following cleanup actions and reduce the potential for sediment recontamination. Once likely sources are identified, appropriate authorities are informed to mitigate the release.

Background

Since 2008, WTD has conducted sampling in combined sewer basins discharging to the Duwamish Estuary[1] to identify and control sources of COCs. The data helped characterize the chemistry of CSO basins (Table 3-1) and identified elevated levels of a few contaminants that were traced back to their sources. The information on sources was provided to the appropriate regulatory agencies. Depending on the type of source, agencies that could have the regulatory authority to address the problem include KCIW, City of Seattle, City of Tukwila, Ecology, and EPA.

[1] The Duwamish Estuary includes the LDW and the East and West Waterways.

Table 3-1. Summary of source tracing samples collected from 2010-2013 in County CSO Basins that drain to the Lower Duwamish Waterway

Sample Type and Year	Uncontrolled CSO Basin and Number of Samples				
	South Michigan	Brandon	West Michigan	T117	Hanford #1
In-line Solids Grab					
2010	2	3	--		
2011	3	--	1	N/AV	N/AV
2012	1	2	--		
Sediment Traps					
2012	2	5	--		
2013	2	4	--		

N/AV – not available; see table notes

Table Notes:

-T117 is not controlled by a regulator station but an overflow weir. No access could be obtained prior to this weir. Seattle Public Utilities collects and analyzes solids from a sediment trap near the outfall that includes both separated stormwater and combined sewer overflows for this basin.

-Reconnaissance in South Michigan, Brandon, West Michigan and Hanford #1 often found no solids in pipes to collect or limited access to look for solids in the pipe to collect.

If a source is found to come from a business or industry that operates under a KCIW discharge permit, KCIW works with that business or agency to control the source or takes appropriate enforcement action. For example, using information from a special study in 2010 that focused on metal recyclers discharging to the combined sewer system in conjunction with in-line sediments in the combined sewers was used to assess the impacts of a specific discharger in the 8th Avenue CSO basin. KCIW staff worked with the discharger to implement source control measures to better control PCB releases. In two situations where upstream in-line sampling did not identify any likely sources, outfall wet wells were cleaned of accumulated sediments at the Brandon and South Michigan CSOs to determine if the existing levels of in-line sediment contamination were historical or from an ongoing source.

Source tracing in-line solids grabs and sediment trap samples have been collected from the LDW combined sewer system since 2010. Uncontrolled basins have been targeted to date (see Table 3-1) and a summary of these results are presented below. Source tracing screening levels for combined sewer system are two times (2x) the second lowest Low Apparent Effects Threshold (2LAET)[2] and source tracing focuses on metals, PCBs, PAHs and certain other semi-volatile organic compounds (see Appendix E for details).

- **West Michigan CSO basin** No exceedances of combined sewer system screening levels (2x the 2LAET) occurred for PCBs, metals or PAHs; although exceedances of the 2LAET were observed for bis(2-ethylhexyl) phthalate (BEHP) and 1,4-dichlorobenzene. However, no exceedances of these compounds or other compounds have been observed in sediments near this CSO outfall (AECOM 2012).
- **Michigan CSO basin** Solids exceeded combined sewer system screening levels for BEHP and butyl benzyl phthalate (BBP), mercury and for total PCBs. Total PCBs exceeded either the screening level or the 2LAET in in-line solids grabs at the outfall

[2] As noted in Appendix E, the 2LAET is the dry weight equivalent of the Cleanup Screening Level from the Washington State Sediment Management Standards (WAC-173-204-562).

structure or regulator station but did not exceed either in sediment traps from the regulator station. This suggests the exceedances for PCBs are more likely associated with historic material deposits in the system. Mercury exceeded the screening level in one in-line solids grab at the outfall structure and on average exceeded the 2LAET in the sediment trap samples at regulator station. There have been some instances of individual PAHs exceeding the of 2LAET in these same sediment trap samples but total low molecular weight PAHs (LPAHs) and high molecular weight PAHs (HPAHs) have not exceeded. Sediments near CSO outfall only have SQS exceedances for PCBs (AECOM 2012).

- **Brandon CSO basin** In-line solids exceeded combined sewer system screening levels for BEHP and BBP. One sediment trap sample collected from a lateral line exceeded the screening level of PAHs, two phthalates and three metals. However, these exceedances were not repeated in two later sampling periods. In addition, business inspections by Ecology and their review by King County Industrial Waste did not identify any likely source of these chemicals. Samples from within this basin have only exceeded 2LAET for mercury and on occasion for a couple of metals. Total PCBs have not exceeded the 2LAET in Brandon CSO basin samples. Mercury exceeded the 2LAET in one in-line solids grab at the outfall structure prior to cleaning the structure; no other samples from this structure have exceeded post-cleaning. Sediments near CSO outfall only have exceedance of the CSL for mercury at one station (AECOM 2012).

Localized efforts are continuing in the Brandon and South Michigan CSO basins to determine if potential COC sources are connected to sewer, stormwater, or groundwater inputs. These efforts, along with studies on CSO basin inputs, atmospheric deposition, Green River inputs, and nearfield discharge monitoring, will help target further source tracing efforts and coordination with appropriate enforcement agencies. (See Chapter 2 and Appendix B for more information on the studies.)

After CSO basins are initially characterized and targeted elevated COC levels are traced, to the extent practicable, to their source and controlled, routine screening will be needed over time to provide data for ongoing source tracing and long-term trend analysis to help assess program effectiveness. A variety of factors can lead to new or increased releases to the combined sewer system. A City of Seattle study of properties in the Duwamish/Diagonal drainage basin documented a high rate of property turnover during the five years since the original round of joint City-County inspections. As it is likely there will be changes in staff, businesses, and on-site activities over time, periodic screening will be needed to identify and trace potential new releases that are at levels of concern in the combined system. As CSOs are controlled, WTD will modify source tracing in the newly controlled basins accordingly.

Scope of Work

This section describes WTD's additional or accelerated source tracing and identification efforts in 2014–2018 under the following categories: business inspections and stormwater assessment, source tracing and identification, source control, and program assessment. This work is summarized in Table 3-2.

Business Inspections and Stormwater Assessment

King County and other agencies such as SPU, Ecology, and EPA conduct ongoing business inspections in the LDW. The inspections are an important component in controlling COCs. They

help identify potential sources of contaminants from on-site activities, appropriate BMPs to minimize or prevent stormwater contamination, and pretreatment actions required for any releases to the sewer. The inspections also consider the conveyance system and possible illicit connections. County inspectors share findings with SPU, Ecology, and EPA and work collaboratively in cases that involve multiple jurisdictions. The County will continue participating in joint inspections as needed, fulfill its role in joint efforts to mitigate point sources, and take legal action when necessary where it has jurisdiction and authority.

To enhance business inspection capability and to support the effectiveness of Ecology's Water Quality Program, WTD entered into a three-year memorandum of agreement with Ecology in 2012. The agreement specifies that WTD will fund a full-time Ecology water quality inspector position to conduct surveys in the LDW that focus on stormwater in the combined sewer area. The Brandon and South Michigan CSO basins were selected for the surveys based on the County's plan and schedule for construction of the Georgetown Wet Weather Treatment Station, which will treat flows from the Brandon and South Michigan CSO basins.

The surveys will provide information on compliance with stormwater and hazardous waste generation, storage, and disposal regulations. Identified non-compliance issues will be addressed by WTD alone or in partnership with appropriate authorities. Inspection results can be used to (1) identify problem areas that need more attention and potential source screening and tracing efforts, (2) prioritize future work based on the potential to pollute and the consequences of pollution, and (3) inform ongoing coordination with the City of Seattle in development of a pollution prevention program and implementation of appropriate stormwater BMPs. WTD will then work with the various inspection programs to allocate resources accordingly.

Source Identification and Tracing

WTD collects chemistry samples at key locations in the combined sewer system in the LDW drainage area. Sampling data (1) may identify potential sources, (2) characterizes source concentrations, (3) identifies elevated levels of COCs that can potentially be traced back to their source, and (4) provides the dataset to track long-term trends in overall source concentrations (discussed below under "Program Assessment"). The source tracing samples collected in CSO basins typically consist of in-line solid grab and in-line sediment trap samples. (See Appendix E for details on the types of samples collected for chemistry analysis and the assessment methodology to determine if any follow-up source tracing actions are needed.)

To maximize coverage, the County will expand its source tracing program in strategic locations in the main combined sewer lines. As each basin is targeted, specific sample locations will be identified. Areas identified for source tracing can require additional sampling up the pipe to narrow and identify specific sources of COCs.

In 2014–2018, WTD intends to conduct the following sampling with a focus on one CSO basin per year:

- Collect in-line samples (in-line solids grab samples and sediment traps) in uncontrolled CSO basins in the LDW (Hanford, Brandon, South Michigan, West Michigan, and Terminal-115).
- Do additional screening in controlled basins (Norfolk, Eighth Avenue, and Diagonal siphon) if concerns are identified through ongoing business inspections, spill reports, or other triggers.

- Generally characterize, if needed, combined sewer basins that contribute to relief points farther downpipe of regulator stations (for example, the interceptor line west of the LDW).
- Collect samples following WTD cleaning of facilities in the system once enough solids have accumulated.

Sampling will be basin-specific to identify new sources and, if found, to trace them back to their origin, to the extent practicable, through additional upstream sampling. As CSOs become controlled, sampling efforts in these basins will be reduced to screening in response to any identified concerns.

Source Control

Once a source has been identified, WTD takes action and works with the appropriate regulatory agency and with the property owner to control the release. Control could require implementation of stormwater BMPs, treatment, industrial waste pretreatment, or site cleanup. Extra effort will be required in the basins draining to the LDW because of the lower goals for recontamination than for other receiving bodies. The County will coordinate with various authorities as needed during the process to track the progress of source control actions.

When no specific sources are identified and historical contamination of in-line solids is the likely source, line cleaning may be needed once ongoing sources have been adequately controlled. The County will work with local line owners to ensure their affected line segments are cleaned and will clean its own trunk lines. Additional sampling following cleaning would be conducted to determine if the problem is resolved or ongoing sources keep the solids concentrations elevated and require additional source tracing.

Program Assessment

By collecting and tracking source data over time, WTD will be able to identify long-term trends in concentrations of contaminants in the combined sewer system. The trend analyses can be used to assess changes in source concentrations over time, to track the effectiveness of the overall source control program, and to adaptively manage the source control program including revisiting target levels, tracing priorities, and sampling efforts. The first long-term trend analysis will be completed at the end of the 2014–2018 period.

Lower Duwamish Waterway Grants Program

From 2011 through 2015, WTD has grant funding available through the Green Grants Program for air or water quality improvement projects, environmental education, and community outreach efforts in the Duwamish River Valley. Grants are awarded to help improve air and water quality in the Duwamish watershed, support the successful implementation of future CSO control projects, and meet regulatory obligations for clean air. The grants help promote partnerships in the area by advancing source control for the Superfund cleanup, developing local expertise in water and air quality protection, and enhancing small-scale environmental and economic opportunities in the community Projects can be both structural and non-structural stormwater BMPs. The program targets a community that has disproportionate human health outcomes and environmental burdens. It improves equity and social justice by supporting the community's vision for vibrant, healthy neighborhoods around the Duwamish River.

The Green Grants Program will sunset after the 2015 award round. WTD will modify and expand the grants program in 2016 through funds under the "Our Waters" program budget for the 2015–2016 biennium. The new grants program, titled the WaterWorks Program, will continue to deliver water quality benefits and improve equity and social justice in the areas surrounding the Duwamish River. Although the program covers all of WTD's service area, incentives will be offered in 2016 for projects in the LDW area and those targeting communities that have disproportionate human health outcomes and environmental burdens. Implementation of the projects funded by the program will help support WTD's overall source control efforts in the LDW. WTD will seek funding beyond 2016 to continue the WaterWorks Program.

Regulatory Review

Effective source control relies on the authority to regulate the release of contaminants to receiving waters. This authority is spread over several agencies and jurisdictions. In some cases, the authority is not clarified or does not exist for certain types of releases. WTD is committed to resolving these areas of uncertainty with partner agencies in order to improve the effectiveness of source control.

By the end of 2017, WTD intends to review existing regulations that address source control authority and identify where existing authorities could limit the ability to conduct and enforce source control. Areas needing resolution will be conveyed to the team preparing the County's next 5-year source control implementation plan to help develop proposals to resolve the issues, including revised regulations when necessary. A description of a pollution prevention program, appropriate BMPs, and the legal authority and administrative procedures that will be used to ensure the pollution prevention program is being implemented in combined sewer basins will be submitted to Ecology in the County's 2017 CSO Control Program annual report. Where the legal authority or administrative procedures are not in place, a detailed description of the steps needed to establish such a program and the timeline for getting the program in place will be included.

Table 3-2. Summary of Wastewater Treatment Division Additional and Accelerated Actions in 2014–2018

Additional and Accelerated Action	Completion Date
Source Identification and Tracing	
Expanded Sampling:	
• Develop annual targeted sampling plan for a specific CSO basin based on previous in-line trap data, data and information provided by other agencies, and other factors such as previous line cleaning and follow-up sampling	• Annually
• Deploy 1 to 4 in-line sediment traps in areas of focus	• Rotating uncontrolled basins or identified problems in controlled basins annually
• Target the collection of 4 to 8 in-line solids grab samples in areas of focus	• Rotating uncontrolled basins or identified problems in controlled basins annually
• Sample in each uncontrolled basin and in controlled basins where a problem is identified	• Complete a rotation of basins in 5 years
• Conduct studies and publish on CSO basin inputs, atmospheric deposition, Green River inputs	• By the end of 2016

Additional and Accelerated Action	Completion Date
Business Inspections and Stormwater Assessment:	
• Complete inspections by Ecology inspector, whose position is funded by WTD, and prepare a report to King County	• By the end of 2015
• Evaluate the information and determine potential follow-up actions	• By the end of 2016
Reporting:	
• Summarize previous year's activities for inclusion in Ecology's LDW Source Control Status Report	• Annually
• Provide Ecology with previous year's collected data and activities	• Annually starting in 2016
• Report to Ecology on long-term trends	• By the end of 2018
Grants Program	
• Obtain funding for WaterWorks Program for 2016 and beyond	• Include in 2015–2016 county budget and pursue funding for 2017-2018 budget
• Provide Ecology with a summary from previous year's activities for Ecology's LDW Source Control Status Report	• Annually
Regulatory Review	
• Review existing regulations and identify pollution prevention program, appropriate BMPs, and legal authority and administrative procedures	• By the end of 2017

3.3 Water and Land Resources Division in the Department of Natural Resources and Parks

WLRD intends to supplement its ongoing LDW source control efforts and commitments by (1) completing the County's MS4 conveyance system mapping in the unincorporated area that drains to the LDW sooner than required, (2) conducting more frequent source control inspections in the basin that serves South 96th Street Corridor, and (3) collecting in-line solids source tracing samples and implementing source tracing and identification in unincorporated areas in the LDW drainage basin. These actions are described below, followed by a summary in Table 3-6.

Mapping of Municipal Separate Storm Sewer Systems

In accordance with the NPDES Phase I Municipal Stormwater Permit (S5.C.2 ,Municipal Separate Storm Sewer System Mapping and Documentation*),* King County is required to map and document the MS4 on the properties it owns or operates, including the county ROW, and on properties that discharge to the MS4. Since the issuance of the municipal stormwater NPDES permit in 1995, various county departments and divisions that hold properties that contain MS4 structures and facilities have mapped their systems to meet their requirements in the County's MS4 mapping program.

Background

As technology has changed and permit requirements have evolved, the County has found it necessary to consolidate the various stormwater mapping formats, such as paper, spreadsheets, images, computer-aided design (CAD), and geographic information system (GIS), into a standardized information system that includes GIS. Since 2011, King County has been moving the information to WLRD through the Stormwater Data Migration Project. The project includes development of a central mapping geodatabase, collection of mapping data from the custodial agencies, and standardization of field mapping protocols. This centralized map and supporting information system forms the foundation of various county stormwater management programs. The system will be made available for use by King County staff in mid-2014, allowing them to more knowledgably and effectively supplement, query, and analyze the stormwater systems they manage.

The two field mapping priorities in the LDW are completing the mapping in the basins draining to the LDW and supporting IC/IDDE Program needs.

Scope of Work

King County's 2013 NPDES Phase I Municipal Stormwater Permit requires that the County's MS4 and connections to the MS4 in the urban and higher density rural sub-basins in unincorporated King County be mapped by December 31, 2017. Parts of the County's MS4 are located in the unincorporated portions and in incorporated areas where the County owns or operates properties in the LDW drainage basin (Figure 3-1).

The County has scheduled the MS4 mapping in the LDW drainage basin to be completed ahead of the other urban areas in the County. It plans on fulfilling the permit's conveyance system mapping requirements in the LDW drainage basin by June 30, 2015, well ahead of the required schedule. The remaining mapping requirements will be completed by 2017.Various custodial agencies have already mapped the majority of the LDW drainage area. The focus of this accelerated action is to move the various datasets into a single standardized geodatabase through the County's Stormwater Data Migration Project. The County will conduct gap and connectivity analyses to evaluate the system's functionality and will highlight areas where additional information, including additional field work, is needed to improve data quality and better understand the stormwater system in the LDW and all other areas of the County.

Table 3-6 lists the mapping actions in the LDW drainage basin that will be completed by the end of June 2015.

Source Control Inspections in the South 96th Street Corridor

As part of the NPDES Phase I Municipal Stormwater Permit, the County has an inventory of potential pollutant-generating sites and must inspect 20% of those annually. The majority of the potential pollutant-generating sites in unincorporated King County that are in the LDW Superfund site drainage boundary are located between State Route 509 and the Duwamish River and north of South 100th Street to the City of Seattle border. This area is commonly referred to the South 96th Street Corridor and is zoned for industrial and commercial uses (Figure 3-2). The areas south of South 100th Street and west of State Route 509 are zoned for residential development.

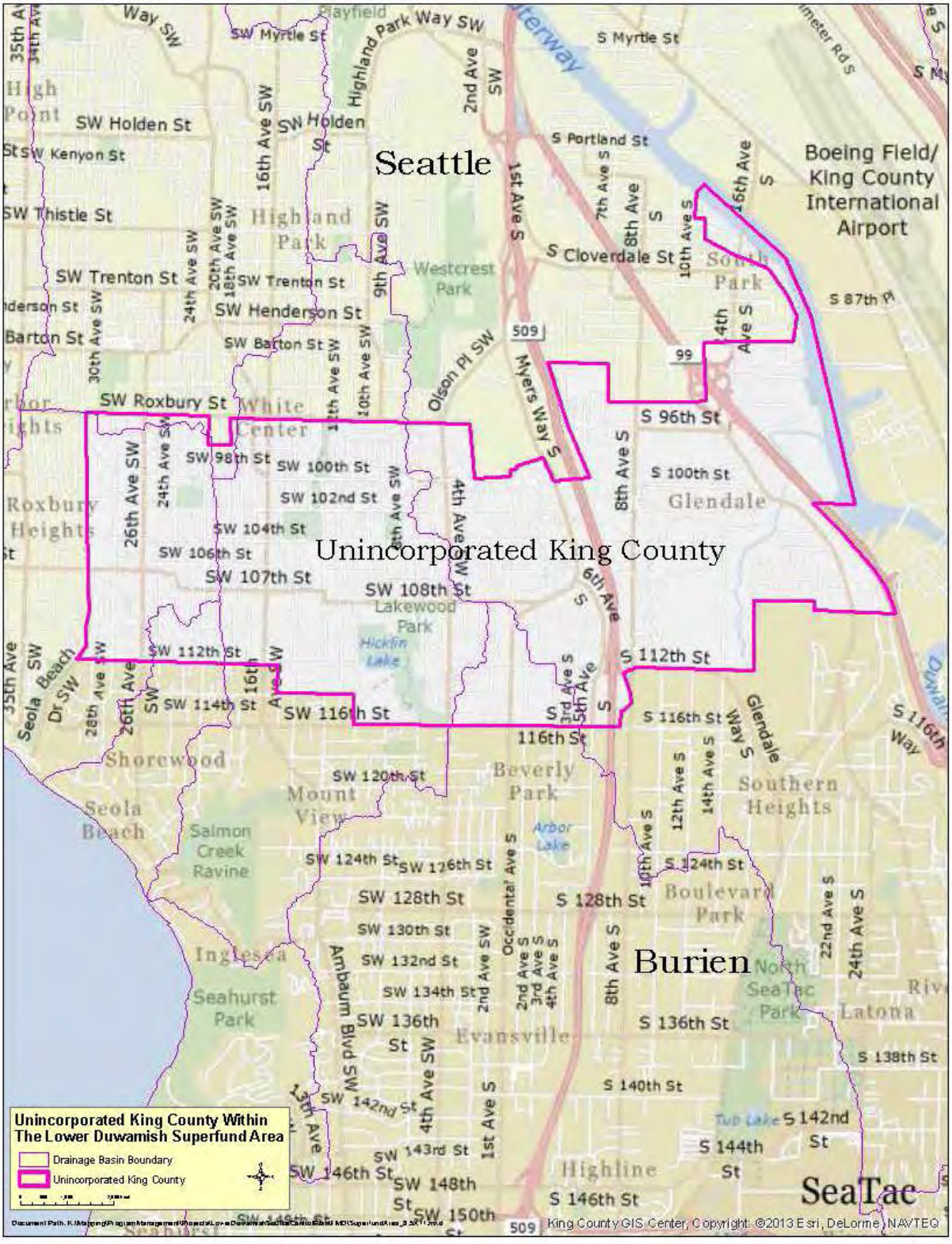

Figure 3-1. Drainage Basins in Unincorporated King County near the Lower Duwamish Waterway

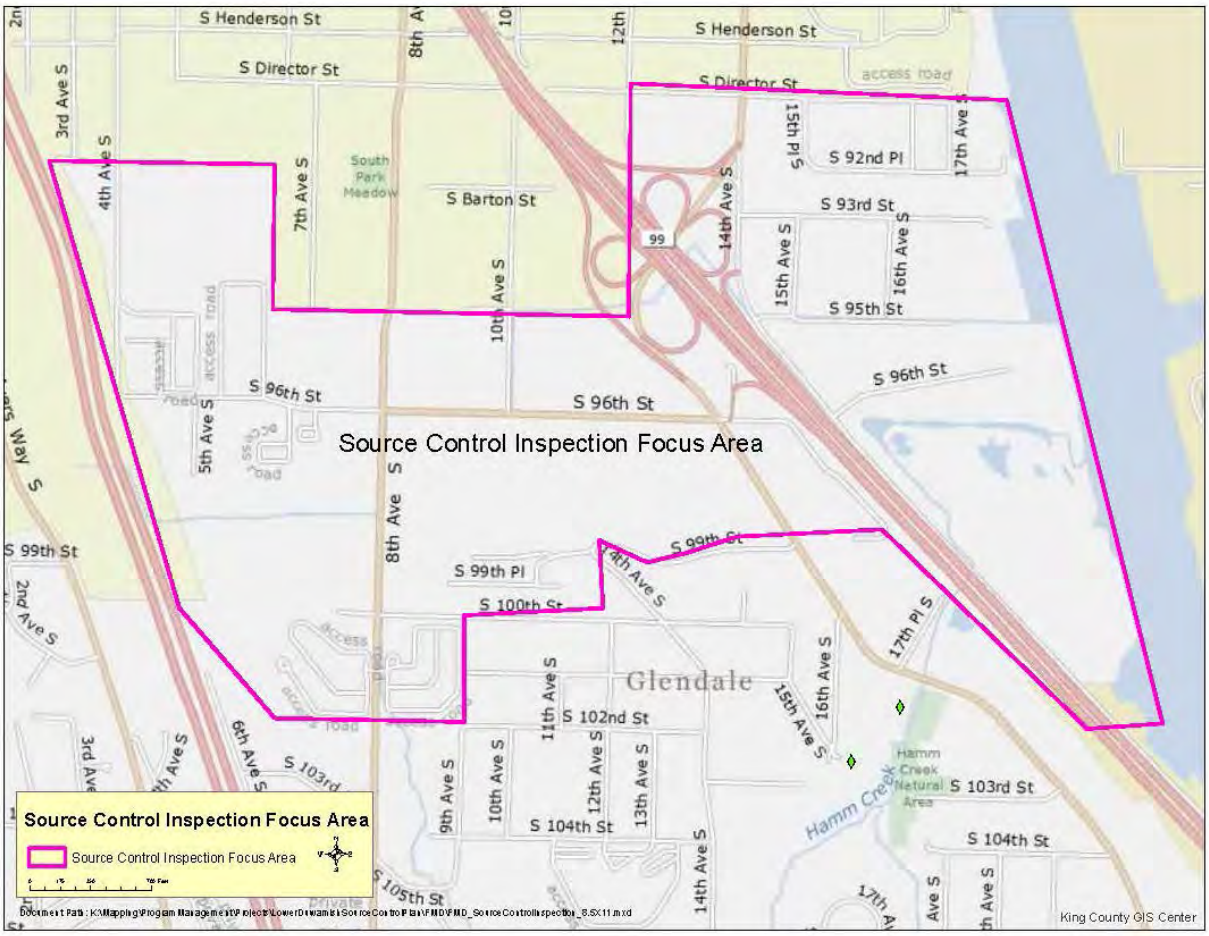

Figure 3-2. Source Control Inspection Focus Area in the South 96th Street Corridor

Background

The South 96th Street Corridor has long been home to a number of industrial activities. While King County's source control program has an inspection rate of approximately once every five years, increasing the frequency of inspections of businesses that have a higher potential to pollute presents the opportunity to more readily identify and control sources of pollutants and prevent new sources that could lead to stormwater and sediment recontamination.

Scope of Work

Over the next five years, WLRD Stormwater Services Section (SWS) intends to increase the frequency of source control inspections, depending on the nature of the business and its potential to pollute. A property will be assigned scores based on its primary use and compliance history (Tables 3-3 and 3-4); the scores will be combined to determine inspection frequency (Table 3-5). The scoring criteria include whether or not the business has an ISGP. Additional inspections will also be conducted in response to complaints or referrals from field staff. Every attempt will be made to coordinate inspections with Ecology staff through participation in the Duwamish Inspectors Group and through ongoing communication.

Table 3-3. Primary Use Scores for Land Uses in the South 96th Street Corridor

Land Use	Score
4-Plex	1
Air Terminal and Hangers	2
Apartment Complex	1
Apartment(Mixed Use or with pool)	2
Auditorium//Assembly Bldg.	1
Bank	1
Bowling Alley	1
Campground	1
Car Wash	3
Church/Temple/Mosque	1
Club	1
Condominium (Mixed Use or with pool)	2
Condominium (Residential)	1
Convenience Store with Gas	3
Convenience Store without Gas	2
Daycare Center	1
Driving Range	1
Equipment Repair/Sales/Storage	3
Farm stand	1
Golf Course	3
Greenhouse/Nursery/Arbor Services	3
Grocery Store	3
Group Home	1
Health Club	1
Health Club with Pool	2
High Tech/High Flex	2
Hospital	2
Hotel/Motel/Inn	2
Industrial (Gen Purpose)	3
Industrial Park	2
Industrial (Heavy)	3
Industrial (Light)	3
Marina	2
Medical/Dental Office	1
Mini Warehouse	1

Land Use	Score
Mining/Quarry/Ore Processing	2
Mobile Home Park	1
Mortuary/Cemetery/Crematory	1
Movie Theater	1
Nursing Home	1
Office Building	2
Office Park	2
Park Private (Amuse Center, Pool)	2
Park Public (Zoo/Arbor)	1
Parking Lot (Associated or Commercial)	2
Post Office	1
Rehabilitation Center	2
Resort/Lodge/Retreat	1
Restaurant(Fast Food)	1
Restaurant/Lounge	3
Retail Store	3
Retail(Line/Strip)	2
Retirement Facility	2
School (w/ Pool, Lab and/or Food Prep)	2
School	1
Service Building	1
Service Station (w/o Repair)	2
Shopping Center (Large)	3
Shopping Center (Neighborhood)	3
Skating Rink(Ice/Roller)	2
Ski Area (Food Service, Maintenance)	2
Sport Facility/Play Fields	1
Tavern/Lounge	2
Terminal (Auto/Bus/Other)	1
Utility (Radio/T.V.)	1
Utility Yard	2
Vehicle Repair	3
Vehicle Sales/Rental	3
Vet/Animal Control Service	1
Warehouse	2

Table 3-4. Compliance History Scores for Properties in the South 96th Street Corridor

Compliance History	Score
No problems found or immediately corrected minor problems	0
Compliance achieved after corrective action letter or follow-up contact	1
Trouble achieving and/or maintaining compliance	3

Table 3-5. Inspection Frequency Based on Scores for Properties in the South 96th Street Corridor

Total Score	Inspection Frequency	Category
1–2	Every 5 years	Low
4–3	Every 3 years	Medium
5–6	Annually	High

Another goal is to encourage and increase continued compliance among businesses in the corridor. The increase in oversight and technical assistance is anticipated to result in reduced potential of recontamination of stormwater. The presumption is that increasing the frequency of inspections of businesses that have a higher potential to pollute will reduce stormwater contamination and prevent new sources of contamination.

The increase in inspections relies on continued coordination with the City of Seattle and Ecology for properties that drain to the City's drainage system or operate under an Ecology NPDES permit. In addition, continuing to share source control activities and information through the LDW SCWG is an important component of this effort.

Source Tracing and Control in Unincorporated Areas in the LDW Drainage Basin

Source tracing sampling will be conducted in the South 96th Street Corridor and, to the extent possible, for three outfalls[3] located near the South Park Bridge (see Figure 3-1). Once the areas are annexed, the County will stop sampling at these sites because they will no longer be under the County's MS4. Appendix E describes the types of samples for chemistry analysis and the assessment methodology to determine if any follow-up source tracing actions are needed.

Scope of Work

King County will assume responsibility for the collection and analysis of four sediment traps previously analyzed by Ecology (Leidos 2015). In-line grabs or catch basin solids will be sampled, as needed, to assist in tracing sources of contaminants deemed to be of concern. In addition, King County may use the results of the solids sampling at the nearest catch basin to the county's MS4 discharge point to determine which systems will be investigated.

For the three outfalls near the South Park Bridge, the County will evaluate the influence of tides in these outfalls to determine whether sampling is feasible. If possible, an in-line solids grab sample will be collected for each of the three outfalls. Sampling may be repeated every two years to evaluate trends in these systems.

Based on recent sampling results for South 96th Street Corridor (Leidos 2015), the County intends to work with Ecology on source control at businesses in the corridor that are the probable sources of zinc to the MS4 system. Zinc concentrations in two sediment traps exceed the LAET (or Sediment Quality Standards [SQS]) source tracing screening level but not the 2LAET screening level. Two phthalate compounds also exceed screening levels in these same sediment traps but are at levels commonly seen in storm drain systems (Windward 2010).

Table 3-6. Summary of Water and Land Resources Division Additional and Accelerated Actions in 2014–2018

Additional and Accelerated Action	Completion Date
Mapping of MS4	
• Launch King County MS4 database	• June 2014
• Complete the MS4 legacy data migration of all available stormwater features into the central King County stormwater geodatabase for the LDW	• September 2014

[3] King County outfalls Nos. 3037, ST0247, and DT0248.

Additional and Accelerated Action	Completion Date
• Complete gap analyses for the MS4 mapping in the LDW	• November 2014
• Complete conveyance system mapping of the County's MS4 in the LDW	• June 30, 2015
• Complete mapping of commercial facilities on properties in the LDW regulated by the County, as part of the MS4 mapping program	• June 30, 2015
• Submit progress reports on the MS4 mapping effort to Ecology	• Annually, through the Municipal Stormwater NPDES annual report, until project is complete
Source Control Inspections in South 96th Street Corridor	
• Inventory parcels, businesses, and private drainage facilities in the South 96th Street Corridor; information will be gathered from the King County Assessor's database, aerial photographs, inspection records, and field reconnaissance	• June 30, 2015
• Develop inspection prioritization matrix based on potential to pollute and consequences of pollution, considering the nature of the business (if known), potential pollutants, risk of recontamination of river sediment, and previous inspection results	• September 30, 2015
• Evaluate each business to determine inspection schedule	• September 30, 2015
• Develop inspection schedule	• End of 2015
• Conduct source control inspections that include identification of all activities that occur or could occur on-site and BMPs to minimize or prevent stormwater contamination; consider the conveyance system and possible illicit connections; address identified issues through a progressive enforcement scheme as outlined in the County's Stormwater Management Program (SWMP) document[a]	• 2016–2018
• Include findings in Ecology's LDW Source Control Status Report	• Annually
• Provide Ecology with previous year's collected data and activities	• Annually (2016–2018)
Source Tracing and Control in Unincorporated Areas	
• Collect and analyze four sediment traps in South 96th Street Corridor	• Annually
• Collect and analyze one in-line solids grab from storm lines associated with three outfalls draining to the LDW	• Every other year

Additional and Accelerated Action	Completion Date
Reporting	
• Summarize previous year's activities for inclusion in Ecology's LDW Source Control Status Report	• Annually
• Provide Ecology with previous year's collected data and activities	• Annually starting in 2016

[a] The County's SWMP document is available at http://your.kingcounty.gov/dnrp/library/water-and-and/stormwater/stormwater-management-program/2013-swmp-and-appendices.pdf.

3.4 King County International Airport in the Department of Transportation

KCIA will supplement its ongoing LDW source control efforts and commitments in 2014–2018 through annual sampling and source tracing in its drainage system. These actions are described below, followed by a summary in Table 3-8.

KCIA Sampling and Source Tracing

There are approximately 15 miles of stormwater drainage pipe in the KCIA storm drainage system. Four stormwater outfalls discharge into the LDW: one to Slip 4, one to former Slip 5, one to Slip 6; and one to the Norfolk storm drain (SD)/CSO (Figure 3-3). Two pump stations lift the water and pump it to two of the outfalls (Slip 4 and former Slip 5) that drain the north and central basins of the airport, respectively. Two gravity lines drain the south central basin to Slip 6 and south basin to Norfolk SD/CSO.

Several off-site stormwater sources discharge into the airport drainage system:

- Public stormwater systems such as Airport Way and East Marginal Way discharge stormwater into the airport drainage system.
- Private stormwater systems, such as the Museum of Flight property, Woodland Meadows property, and the International Auto Auction, Inc., property, connect to the airport stormwater system for discharge to the LDW. These entities are in City of Tukwila municipal jurisdiction.

Airport activities are generally divided into airport and tenant activities. Air transportation activities, such as aircraft testing and painting, aircraft maintenance/storage, aircraft fueling, and aircraft de-icing and washing, are primarily performed by the tenants. Because of applicable industrial activities, each of the six larger tenants at the airport has been issued an ISGP administered by Ecology; KCIA tracks their compliance through tenant inspections. Remaining tenants adhere to the requirements of KCIA's ISGP, King County's MS4 Permit, and all applicable local, state, and federal laws required in lease agreements. Airport and tenant activities have the potential to introduce pollutants into the stormwater system, such as fuels, oil, and greases, de-icing/anti-icing agents, suspended sediments, and other chemical contaminants. Corrective actions, as indicated by source investigation, are implemented by either KCIA or responsible tenants.

Background

KCIA's source control program focuses on three major drainage basins in its facility—Slip 4, former Slip 5, and Slip 6—that are governed by several federal, state, and local environmental laws and local code requirements. KCIA initiated stormwater and stormwater solids sampling

programs to comply with the 2008 North Boeing Field (NBF) MTCA Agreed Order (Slip 4) and NPDES ISGP obligations. To prevent recontamination of Slip 4 after MTCA cleanup, stormwater solids sampling was initiated at NBF and KCIA in 2004. KCIA initiated stormwater sampling at its Former Slip 5 and Slip 6 basins in 2008 to collect data for characterization. KCIA continues to collect stormwater solids data annually.

Slip 4, former Slip 5, and Slip 6 source control summaries have been provided to Ecology to be incorporated into its annual Source Control Status Report. Updates will be provided for inclusion in subsequent Ecology status reports. Summary of types of sample data from these three basins are summarized in Table 3-7.

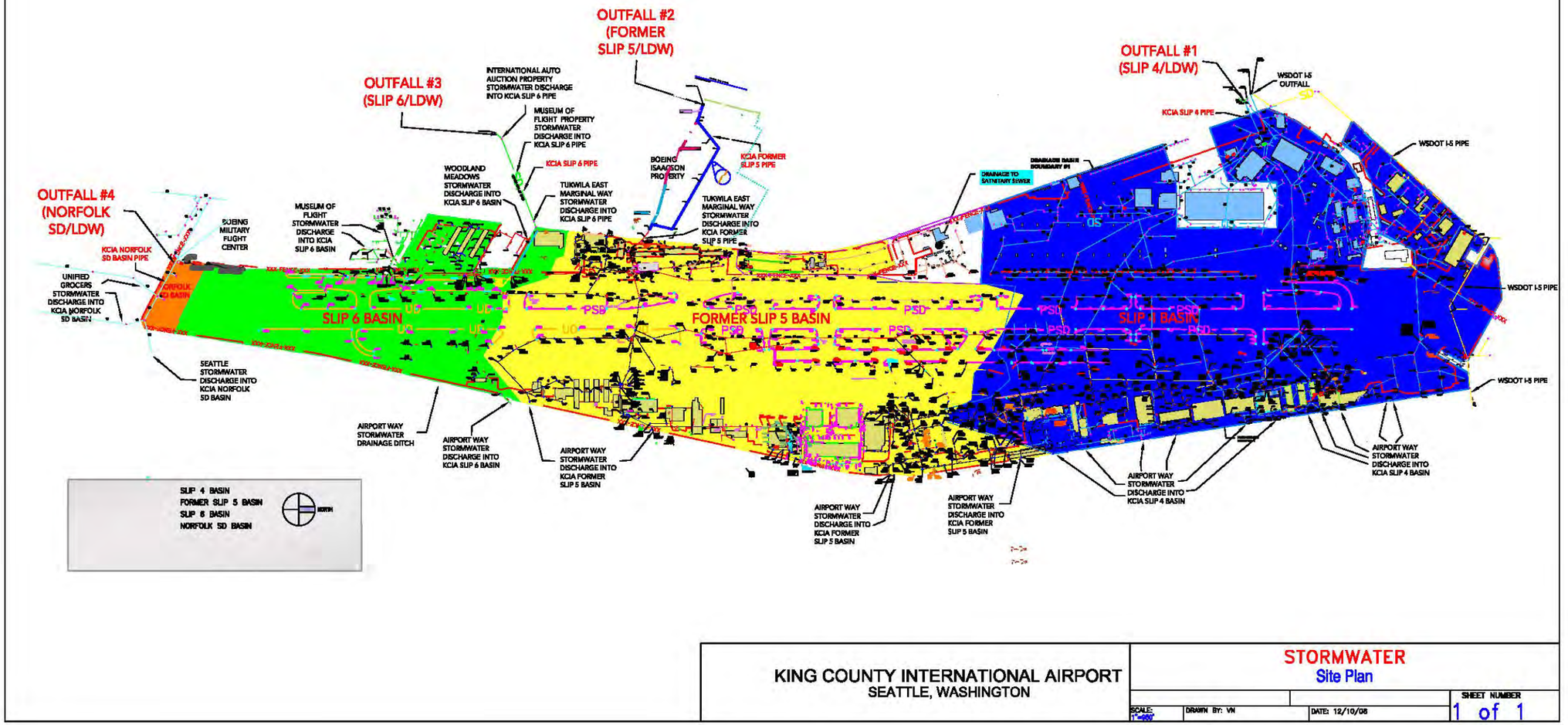

Figure 3-3. King County International Airport Stormwater Site Plan

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Table 3-7. Summary of source tracing samples collected from 2010-2013 in KCIA Basins that drain to the Lower Duwamish Waterway

Sample Type and Year	KCIA Basin and Number of Samples		
	Slip 4	Former Slip 5	Slip 6
In-line Solids Grab			
2005	1	---	---
2006	---	---	---
2007	---	---	---
2008	1	---	---
2009	1	2	1
2010	2	2	1
2011	---	---	---
2012	2	2	---
2013	3	2	1
Sediment Traps			
2005	4	---	---
2006	8	---	---
2007	10	---	---
2008	9	---	---
2009	4	2	1
2010	4	1	1
2011	3	---	---
2012	2	2	1
2013	1	2	---
Catch Basins/Oil Water Separators			
2006	8	---	---
2007	---	---	---
2008	---	---	---
2009	4	---	---
2010	---	---	---
2011	---	---	---
2012	6	5	1
2013	---	---	---

Slip 4 Basin

Before King County and the City of Seattle could complete the Early Action sediment cleanup of Slip 4 in the LDW Superfund site, Ecology identified upland sources of pollution, particularly of PCBs, that could recontaminate sediments. NBF, a KCIA tenant, was one of these sources. In 2005, SPU installed 10 in-line sediment traps at the KCIA Slip 4 basin up-gradient and down-gradient of NBF to characterize stormwater solids. SPU sampled the traps semi-annually or annually through 2012. KCIA took over annual sampling of these traps and continues the sampling in accordance with the 2008 Ecology NBF MTCA Agreed Order.

Since 2006, KCIA has conducted investigations, source control, and cleanup in the Slip 4 basin:

- 2006, KCIA Oil Water Separator (OWS)/vault sampling
- 2006 and 2012, OWS cleaning
- 2009, north drain line source trace investigation
- 2011, north drain line cleaning

- 2011, Georgetown Steam Plant (GTSP) structure cleanup
- 2012–2013, TCE investigation
- 2014, KCIA data gaps investigation

KCIA is completing the data gaps investigation report and is planning on conducting additional source tracing investigations, line cleaning, and reporting in the Slip 4 basin in accordance with the NBF/GTSP Remedial Investigation/Feasibility Study (RI/FS) work plan (Leidos 2013). Sample data is being compared to site-specific RI screening levels and the results will be reported as part of the RI/FS process. The NBF/GTSP remedial investigation is expected to be completed in 2017. As part of the Agreed Order, all data will be submitted to Ecology.

Other Basins

In 2008, with the assistance of SPU, KCIA started an evaluation of stormwater solids discharges from other KCIA drainage basins into the LDW. SPU installed in-line sediment traps at discharge points to Slip 6 (KCIA1), former Slip 5 (KCIA2), and former Jorgensen Forge (KCIAJ) drainage basins at KCIA. SPU collected annual in-line sediment trap and in-line solids grab samples from 2009 to 2012. KCIA took over the sampling at these locations in 2012.

KCIA relocated the following drainages and sampling locations after the traps were installed:

- In 2009, Jorgensen Forge stormwater drainage was rerouted into the former Slip 5 drainage basin.
- In 2012, the KCIA2 sampling location was relocated to the South Pump Station, approximately 300 ft. east and up-gradient of KCIA2, to characterize stormwater exclusive to KCIA and to avoid effects of observed stormwater backflow conditions at KCIA2.
- In 2013, KCIA1a was relocated to a new up-gradient location to eliminate other off-site stormwater discharges to the sampling location.

Summaries of the source tracing datasets from Slip 6 and former Slip 5 basins as compared to source tracing screening levels (see Appendix E) are discussed below. Summaries include data from Ecology as applicable.

Data from Slip 6 Basin

Slip 6 basin data from KCIA1 indicate that average arsenic, copper, lead, mercury, LPAH, and total PCB concentrations were below LAET screening level. Average BEPH, and BBP were above LAET but below Second Lowest Apparent Effects Threshold (2LAET) screening level levels. Total HPAH concentrations and zinc were above 2LAET.

Average data from KCIA1a for arsenic, copper, lead, zinc, mercury, total PCBs, total LPAHs, and two phthalate compounds were also below LAET. Total HPAHs were above 2LAET screening levels. An Ecology grab sample collected from same location (Ecology ID VT1593) in May 2013 predominantly exhibited the same result.

Overall, source tracing activities have found elevated total HPAH, BEPH, BBP, and phenanthrene levels were attributable to off-site sources. In addition, no specific increasing or decreasing trends were observed from the data; concentrations fluctuated from year to year,

which may indicate that elevated contaminant levels are short-lived and non-persistent. Contaminant concentrations at KCIA1a were generally lower than at KCIA1.

Data from Former Slip 5 Basin

At the former Slip 5 basin, in-line sediment trap (KCIA2) and grab sample data indicate that average metals (arsenic, copper, lead, mercury), total LPAH, total HPAH, BEPH, BBP, and total PCB concentrations were below LAET. Zinc concentrations were above LAET screening levels.

Similar to KCIA1, the KCIA2 in-line sediment trap is susceptible to backflow conditions. Samples therefore can include contributions from areas draining to KCIA such as stormwater/tidal backflow from down-gradient off-site sources such as the LDW and East Marginal Way drainage during high tide and high street runoff events. Because there are backflow prevention devices at South Pump Station, the pump station is not affected by off-site sources and thus more accurately represents any potential airport pollutant contribution to the LDW. KCIA submitted an ISGP sampling point modification for this reason, and stormwater solids grab samples have been collected at the pump station since 2012 to more accurately characterize pollutant concentrations of KCIA stormwater.

Recent stormwater solids data in 2012 indicated no LAET exceedances in average metals (arsenic, copper, lead, mercury, zinc), total LPAH, total HPAH, BEPH, BBP, and total PCB concentrations. Ecology 2013 data from the South Pump Station showed similar results.

Overall, no specific increasing or decreasing trends were observed from the former Slip 5 basin data. Elevated zinc levels at KCIA2, in comparison to the 2012 pump station data, appeared attributable to off-site sources.

Scope of Work

KCIA intends to continue sampling stormwater solids through collection of annual in-line-sediment trap samples, in-line solids grabs and sump samples at three basins discussed above. These samples during 2014–2018 will be used to evaluate (1) the effectiveness of source control activities and BMPs, (2) changes from airport/tenant industrial activities, and (3) pollutant contribution trends. In-line sediment trap monitoring will assist in source tracing, identification, and control activities at the airport. KCIA will work with the appropriate regulatory authorities to resolve any issues resulting from this work.

For the Slip 4 basin, KCIA intends to conduct source control activities in accordance with the NBF/GTSP RI/FS work plan and RI screening levels. For the former Slip 5 basin and Slip 6 basin, KCIA intends to evaluate source tracing data, as presented in Appendix E.

A prioritization for source control activities is performed if levels above the 2LAET are observed. The following source control activities will be occur:

- Sample up-gradient laterals for parameters exceeding 2LAET.
- Review other data including stormwater data.
- Review status of stormwater maintenance records for compliance with standards.
- Review inspection reports of current year, including illicit discharges and spill response reports.

KCIA may also collect samples from other media including surface debris, soil, and anthropogenic materials such as road material and paint.

Appendix E includes details on the types of samples for chemistry analysis and the methodology to determine if any follow-up source tracing actions are needed.

Table 3-8. Summary of King County International Airport Additional and Accelerated Actions in 2014–2018

Additional and Accelerated Action	Completion Date
Sampling and Source Tracing	
• Conduct annual in-line sediment traps sampling	• Annually
• Evaluate KCIA stormwater solids that may pose a potential for recontamination to LDW sediments	• Annually
Reporting	
• Provide information for Ecology's annual LDW Source Control Status Report	• Annually
• Provide Ecology with previous year's collected data and activities	• Annually (2016–2018)

3.5 Roads Services Division in the Department of Transportation

RSD will conduct additional maintenance in support of source control activities in King County's ROW in unincorporated areas of the LDW drainage basin:

- All catch basins east of State Route 99 in the unincorporated King County ROW that drain to the LDW will be cleaned annually to help prevent pollutants from entering the LDW.
- To the extent that grant funding is available, RDS intends to address legacy loads by cleaning stormwater lines in the County's ROW in unincorporated areas of the LDW drainage basin. Because legacy contaminants may adhere to the stormwater lines, cleaning the lines may prove to be effective in helping prevent pollutants from entering the LDW. Line cleaning would be done in conjunction with WLRD's source tracing and elimination program to ensure removal of contaminated solids in the conveyance system after a source has been identified and controlled. RSD has faced significant funding challenges in recent years, and therefore, the line cleaning is contingent on obtaining other funds for this work.

RSD also intends to initiate additional sampling in the ROW in the LDW drainage area when excavating soil for a project. The sidewalls and soils below the excavation depth will be sampled for general characterization. If the County becomes aware of additional soil contamination in the ROW during the course of construction, normal maintenance, or other activities in the ROW, the County will continue to comply with MTCA reporting requirements. The County will also continue to appropriately manage and dispose of any contamination disturbed during construction or maintenance activities.

3.6 Facilities Management Division in the Department of Executive Services

FMD intends to participate in the source control sampling program in catch basins upstream of the outfalls on the Harbor Bond properties and to coordinate with the tenants on these parcels to

obtain and analyze the samples. Three tenants currently occupy Harbor Bond parcels that discharge to outfalls:

- The southernmost parcel contains five identified outfalls (Nos. 2007 through 2011) and is leased by Ardagh Ltd., a glass container manufacturer that operates under a state ISGP.
- J. A. Jack & Sons, Inc., a limestone processing facility on the next parcel north, operates under a state Sand and Gravel General Permit. A treatment and infiltration system on the parcel directs overflows to the Ardagh parcel to the south.
- Cadman Concrete and Lehigh NW Cement operate cement and ready-mix concrete facilities on a parcel several parcels farther north of the Cadman-Lehigh parcel. One outfall (No. 2244) is the discharge point for a large stormwater cistern that overflows infrequently. Cadman-Lehigh also operates under a state Sand and Gravel General Permit.

The sampling strategy involves taking a first round of solid grab samples from the last catch basin prior to the discharge outfall. In addition, Ardagh's recently renewed stormwater permit requires that they (1) collect a solid grab sample from all its outfalls, (2) clean the stormwater lines leading to these outfalls before October 1, 2016, and (3) analyze solids samples for a majority of the COCs in the LDW.

The Sand and Gravel General Permits for J.A. Jack and Cadman-Lehigh are scheduled to be updated within a year. The new permit sampling requirements for discharges to listed waterbodies will likely mirror the new requirements for the ISGP and expand the list of analytes to include most of the LDW COCs.

FMD will coordinate sampling with each tenant and obtain a split sample so that FMD can analyze for all the COCs not analyzed in each tenant sample. Sampling will have to be done before line cleaning occurs because the contributing areas are small and the solids loads are expected to be minimal. After the Sand and Gravel General Permits are renewed, FMD will coordinate the split sampling of the outfalls associated with these tenants.

Table 3-9 gives the anticipated sampling schedule for the Harbor Bond property outfalls that drain to the LDW. Appendix E includes details on the types of samples for chemistry analysis and the assessment methodology for determining if any follow-up source tracing is needed.

Table 3-9. Outfall Sampling Schedule for Harbor Bond Properties

Outfall ID	Tenant	Anticipated Sampling Date	Notes
2007	Ardagh	N/A	This outfall has been abandoned and the flows routed to Outfall No. 2010.
2008	Ardagh	2016	Coordinate split sample with Ardagh
2009	Ardagh	2016	Coordinate split sample with Ardagh
2010	Ardagh/J.A. Jack	2016/2017	Coordinate split sample with Ardagh at lowest catch basin. Coordinate split sample with J.A. Jack at its overflow discharge point to the Outfall No. 2010 system.
2011	Ardagh	N/A	The outfall for this system lies on county property. The nearest catch basin or inlet is upstream and off-site.
2244	Cadman-Lehigh	2017	Coordinate split sample with Cadman-Lehigh at the sampling manhole prior to the outfall.

3.7 Development of 2019-2023 Source Control Implementation Plan

In 2014–2018, the county divisions involved in LDW source control work will develop the next 5-year LDW source control plan for implementation in 2019–2023. The County expects to submit its next 5-year plan to Ecology by December 31, 2017. It is important to note that many of the County's current source control programs already have projects, such as CSOs control projects, planned to be completed in this timeframe. These projects are described in Appendix B.

3.8 Reporting

In addition to established reporting requirements through permits, agreements, or other mechanisms between Ecology and King County, the County will submit the following reports to Ecology:

- Ongoing progress reports on the County's implementation of planned source control actions in 2014–2018 will be submitted through Ecology's annual LDW Source Control Status Report.[17]
- Annual reports will document the previous year's collected data and activities. For those programs already with reporting requirements under another authority, the previous year is defined as that reporting period ending in the previous calendar year. Therefore, reporting periods will vary in the annual report. In addition, the report for 2014-2015 activities will include past source control sample data that have been discussed in this plan.

The county divisions responsible for implementing additional and accelerated source control actions intend to submit a report to Ecology by the end of March 2019 that summarizes the progress and effectiveness of action implementation. The report will be made available to the public through the County's "Our Duwamish" website.[18]

[17] Ecology's annual Source Control Status Reports are available at http://www.ecy.wa.gov/programs/tcp/sites_brochure/lower_duwamish/source_control/sc.html.

[18] King County's "Our Duwamish" website is available at http://www.kingcounty.gov/environment/watersheds/green-river/OurDuwamish.aspx.

4.0 Continuing Coordination

Achievements in source control have been and continue to be the result of collaboration among King County divisions, the City of Seattle, Ecology, and other agencies involved in the LDWG and the LDW SCWG. This chapter summarizes the external and internal LDW source control coordination the County will continue during 2014–2018.

4.1 External Coordination

Over the next five years and beyond, the County intends to continue to collaborate with regional partners and governmental agencies. Examples of existing efforts anticipated to continue are as follows:

- Conducting joint inspections, referrals, and investigations with the City of Seattle, Ecology, and EPA
- Coordinating with Ecology and LDWG partners on LDW Source Control Strategy and Action Plans
- Participating in the LDW SCWG or its successor
- Coordinating annual work plans as part of the LDW SCWG
- Coordinating with the City of Seattle on source tracing in combined sewer areas
- Coordinating source control inspections in the LDW with Ecology and municipalities
- Coordinating with the City of Seattle on the development of a pollution prevention program and implementing appropriate stormwater BMPs in combined sewer basins
- Working with the City of Seattle on developing a Joint Operations and System Optimization Plan to improve the functioning of the combined sewer system
- Working with the cities of Seattle, Tukwila, Kent, and Auburn to implement Phase I stormwater permits
- Facilitating regional discussions on operations and maintenance issues regarding stormwater infrastructure as part of the Regional Operations and Maintenance Program
- Working with Central Sound Phase I and Phase II Permit Coordinators Groups for NPDES Municipal Stormwater Permit holders
- Participating in regional and national forums that promote product stewardship
- Coordinating Interagency Resource for Achieving Cooperation and Interagency Compliance Team activities focused on regional issues
- Participating in the Management Coordination Committee to improve local hazardous waste programs
- Participating on the PSCAA Advisory Council
- Coordinating activities with the City of Seattle, Port of Seattle, Boeing, and other potentially responsible parties through existing agreements
- Implementation of the Regional Roads Maintenance Endangered Species Act Program with 34 other jurisdictions in Washington State

4.2 Internal Coordination

The County will work on enhancing internal coordination and communication over the next five years. In the past year, a team of representatives from the four primary county divisions involved in source control (WTD, WLRD, KCIA, and RSD) and from FMD, SWD, Public Health, DEPR, and LHWMP has been meeting regularly to coordinate this 2014–2018 LDW source control implementation plan. The County intends to continue to employ a cross-divisional team to coordinate source control efforts and enhance communication. It is working to formalize a method for ongoing coordination across departments and will include this method in its next 5-year LDW source control plan.

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Appendix A

List of Potential Contaminants of Concern Included in the Lower Duwamish Waterway Final Feasibility Study

Table 3-1 Summary of COCs and Selection of Risk Drivers for Benthic Invertebrates

COPC	SMS Criteria			No. of Detected Concentrations in Surface Sediments		Benthic COC?	Benthic Risk Driver?	Rationale for Selection/Exclusion as Risk Driver
	Unit	SQS	CSL	> SQS, < CSL	> CSL			
Metals (mg/kg dw)								
Arsenic	mg/kg dw	57	93	5	8	Yes	Yes	Detected concentration(s) > SQS
Cadmium	mg/kg dw	5.1	6.7	2	11	Yes	Yes	Detected concentration(s) > SQS
Chromium	mg/kg dw	260	270	1	8	Yes	Yes	Detected concentration(s) > SQS
Copper	mg/kg dw	390	390	0	12	Yes	Yes	Detected concentration(s) > SQS
Lead	mg/kg dw	450	530	2	19	Yes	Yes	Detected concentration(s) > SQS
Mercury	mg/kg dw	0.41	0.59	14	23	Yes	Yes	Detected concentration(s) > SQS
Nickel	n/a	n/a	n/a	9 (DMMP SL)	4 (DMMP ML)	Yes	No	Moderate TRV uncertainty; areas with concentrations greater than the TRV were all in planned sediment remediation areas
Silver	mg/kg dw	6.1	6.1	0	10	Yes	Yes	Detected concentration(s) > SQS
Zinc	mg/kg dw	410	960	26	16	Yes	Yes	Detected concentration(s) > SQS
PAHs (mg/kg oc)								
2-Methylnapthalene	mg/kg oc	38	64	0	3	Yes	Yes	Detected concentration(s) > SQS
Acenaphthene	mg/kg oc	16	57	16	3	Yes	Yes	Detected concentration(s) > SQS
Acenaphthylene	mg/kg oc	66	66	0	0	No	No	No detected concentration(s) > SQS
Anthracene	mg/kg oc	220	1,200	2	0	Yes	Yes	Detected concentration(s) > SQS
Benzo(a)anthracene	mg/kg oc	110	270	9	3	Yes	Yes	Detected concentration(s) > SQS
Benzo(a)pyrene	mg/kg oc	99	210	5	3	Yes	Yes	Detected concentration(s) > SQS
Benzo(g,h,i)perylene	mg/kg oc	31	78	9	7	Yes	Yes	Detected concentration(s) > SQS
Total benzofluoranthenes	mg/kg oc	230	450	5	4	Yes	Yes	Detected concentration(s) > SQS
Chrysene	mg/kg oc	110	460	23	1	Yes	Yes	Detected concentration(s) > SQS
Dibenzo(a,h) anthracene	mg/kg oc	12	33	15	4	Yes	Yes	Detected concentration(s) > SQS
Dibenzofuran	mg/kg oc	15	58	7	3	Yes	Yes	Detected concentration(s) > SQS

Table 3-1 Summary of COCs and Selection of Risk Drivers for Benthic Invertebrates (continued)

COPC	SMS Criteria			No. of Detected Concentrations in Surface Sediments		Benthic COC?	Benthic Risk Driver?	Rationale for Selection/Exclusion as Risk Driver
	Unit	SQS	CSL	> SQS, < CSL	> CSL			
Fluoranthene	mg/kg oc	160	1,200	31	8	Yes	Yes	Detected concentration(s) > SQS
Fluorene	mg/kg oc	23	79	11	3	Yes	Yes	Detected concentration(s) > SQS
Indeno(1,2,3-cd) pyrene	mg/kg oc	34	88	15	8	Yes	Yes	Detected concentration(s) > SQS
Naphthalene	mg/kg oc	99	170	0	2	Yes	Yes	Detected concentration(s) > SQS
Phenanthrene	mg/kg oc	100	480	24	3	Yes	Yes	Detected concentration(s) > SQS
Pyrene	mg/kg oc	1,000	1,400	1	3	Yes	Yes	Detected concentration(s) > SQS
Total HPAH	mg/kg oc	960	5,300	21	3	Yes	Yes	Detected concentration(s) > SQS
Total LPAH	mg/kg oc	370	780	3	3	Yes	Yes	Detected concentration(s) > SQS
Phthalates (mg/kg oc)								
Bis(2-ethylhexyl) phthalate	mg/kg oc	47	78	48	58	Yes	Yes	Detected concentration(s) > SQS
Butyl benzyl phthalate	mg/kg oc	4.9	64	69	8	Yes	Yes	Detected concentration(s) > SQS
Diethyl phthalate	mg/kg oc	61	110	0	0	No	No	No detected concentration(s) > SQS
Dimethyl phthalate	mg/kg oc	53	53	0	2	Yes	Yes	Detected concentration(s) > SQS
Di-n-butyl phthalate	mg/kg oc	220	1,700	0	0	No	No	No detected concentration(s) > SQS
Di-n-octyl phthalate	mg/kg oc	58	4,500	0	0	No	No	No detected concentration(s) > SQS
Other SVOCs (mg/kg oc)								
1,2,4-Trichlorobenzene	mg/kg oc	0.81	1.8	0	1	Yes	Yes	Detected concentration(s) > SQS
1,2-Dichlorobenzene	mg/kg oc	2.3	2.3	0	3	Yes	Yes	Detected concentration(s) > SQS
1,4-Dichlorobenzene	mg/kg oc	3.1	9	0	3	Yes	Yes	Detected concentration(s) > SQS
2,4-Dimethylphenol	µg/kg dw	29	29	0	1	Yes	Yes	Detected concentration(s) > SQS
2-Methylphenol	µg/kg dw	63	63	0	0	No	No	No detected concentration(s) > SQS
4-Methylphenol	µg/kg dw	670	670	0	4	Yes	Yes	Detected concentration(s) > SQS
Benzoic acid	µg/kg dw	650	650	0	7	Yes	Yes	Detected concentration(s) > SQS

Table 3-1 Summary of COCs and Selection of Risk Drivers for Benthic Invertebrates (continued)

COPC	SMS Criteria			No. of Detected Concentrations in Surface Sediments		Benthic COC?	Benthic Risk Driver?	Rationale for Selection/Exclusion as Risk Driver
	Unit	SQS	CSL	> SQS, < CSL	> CSL			
Benzyl alcohol	µg/kg dw	57	73	2	2	Yes	Yes	Detected concentration(s) > SQS
Hexachlorobenzene	mg/kg oc	0.38	2.3	4	2	Yes	Yes	Detected concentration(s) > SQS
Hexachlorobutadiene	mg/kg oc	3.9	6.2	0	0	No	No	No detected concentration(s) > SQS
n-Nitrosodiphenylamine	mg/kg oc	11	11	0	2	Yes	Yes	Detected concentration(s) > SQS
Pentachlorophenol	µg/kg dw	360	690	1	0	Yes	Yes	Detected concentration(s) > SQS
Phenol	µg/kg dw	420	1,200	18	7	Yes	Yes	Detected concentration(s) > SQS
PCBs (mg/kg oc)								
Total PCBs	mg/kg oc	12	65	301	173	Yes	Yes	Detected concentration(s) > SQS
Pesticides								
Total DDTs [a]	n/a	n/a	n/a	1 (NOAEL)	1 (LOAEL)	Yes	No	Moderate TRV uncertainty; the 1 sample with a concentration greater than the TRV is in a planned sediment remediation area
Total chlordane [a]	n/a	n/a	n/a	19 (NOAEL)	14 (LOAEL)	Yes	No	High uncertainty in exposure data and TRV; 13 of 14 samples with LOAEL exceedances were in planned sediment remediation areas

Notes:

1. This table is derived from Table 5-6 of the RI (Windward 2010).
2. Statistics in this table were calculated using the RI baseline dataset.

a. No SMS numerical criteria were available for these contaminants. Thus, the comparison is with the DMMP SL and ML for nickel or with the NOAEL or LOAEL for total DDTs and total chlordane.

COC = contaminant of concern; CSL = cleanup screening level of SMS; DDT = dichlorodiphenyltrichloroethane; DMMP = Dredged Material Management Program; HPAH = high-molecular-weight polycyclic aromatic hydrocarbon; HQ = hazard quotient; LOAEL = lowest-observed-adverse-effect level; LPAH = low-molecular-weight polycyclic aromatic hydrocarbon; mg/kg oc = milligrams per kilogram organic carbon; ML = maximum level; n/a = not applicable; NOAEL = no-observed-adverse-effect level; oc – organic carbon; PAH = polycyclic aromatic hydrocarbon; PCB = polychlorinated biphenyl; RI = remedial investigation; SL = screening level; SMS = Washington State Sediment Management Standards; SQS = sediment quality standard of SMS; SVOC = semivolatile organic compound; TRV = toxicity reference value

Table 3-2 Summary of COCs and Selection of Risk Drivers for Crab, Fish, and Wildlife Species

COC[a]	Receptor of Concern	NOAEL-based HQ	LOAEL-based HQ	Risk Driver?	Rationale for Selection or Exclusion as Risk Driver
Total PCBs	Crabs	**10**	**1.0**	No	Low risk estimate (LOAEL HQ equal to 1.0) and high level of uncertainty associated with TRV and exposure data.
	English Sole	**4.9 – 25**	0.98 – **5.0**	No	Exposure concentrations were within the LOAEL range. A LOAEL range was used because of the high level of uncertainty associated with the TRV.
	Pacific Staghorn Sculpin	**1.5 – 19**	0.30 – **3.8**	No	
	River Otter	**5.8**	**2.9**	Yes	LOAEL-based HQ for river otter was greater than 1.0 (HQ of 2.9), and the uncertainties associated with the exposure and effects data were relatively low.
Total PCBs and PCB TEQ	Spotted Sandpiper	**1.9 – 15**	0.18 – **1.5**	No	LOAEL-based HQs for total PCBs were less than 1.0, but equal to 1.5 for PCB TEQ. The effects data used to calculate risk estimates for total PCBs were less uncertain than those for PCB TEQ.
Cadmium	Juvenile Chinook Salmon	**5.0**	**1.0**	No	High level of uncertainty associated with the selected TRV and low risk estimates.
	English Sole	**6.1**	**1.2**	No	
	Pacific Staghorn Sculpin	**3.0 – 5.2**	0.60 – **1.0**	No	
Chromium	Spotted Sandpiper	**1.3 – 8.8**	0.26 – **1.8**	No	Elevated risks were driven by a single benthic invertebrate tissue sample (and co-located sediment was not elevated).
Copper	Spotted Sandpiper	0.62 – **1.5**	0.45 – **1.1**	No	Sediment concentrations were similar to PSAMP rural Puget Sound concentrations, and HQs will be less than 1 following planned sediment remediation in EAAs.
Lead	Spotted Sandpiper	0.58 – **19**	0.17 – **5.5**	No	Elevated risks were driven by a single benthic invertebrate tissue sample (and co-located sediment was not elevated).
Mercury	Spotted Sandpiper	**1.1 – 5.3**	0.21 – **1.0**	No	HQs will be less than 1 following planned sediment remediation in EAAs.
Vanadium	English Sole	**5.9**	**1.2**	No	High uncertainty in effects data (few toxicity studies), and sediment concentrations of vanadium in exposure areas were less than the 90th percentile vanadium concentration in PSAMP rural Puget Sound sediment.
	Pacific Staghorn Sculpin	**3.2 – 5.9**	0.65 – **1.2**	No	
	Spotted Sandpiper	**2.0 – 2.7**	**1.0 – 1.4**	No	

Notes:

1. This table is derived from Table 5-16 of the RI (Windward 2010).
2. HQs for fish are highest when more than one approach was used.
3. **Bold** identifies NOAEL-based HQs greater than 1.0 or LOAEL-based HQs greater than or equal to 1.0.

a. A contaminant was identified as a COC if the LOAEL-based HQ was greater than or equal to 1.0.

COC = contaminant of concern; EAA = early action area; HQ = hazard quotient; LOAEL = lowest-observed-adverse-effect level; NOAEL = no-observed-adverse-effect level; PCB = polychlorinated biphenyl; PSAMP = Puget Sound Ambient Monitoring Program; RI = remedial investigation; TEQ = toxic equivalent; TRV = toxicity reference value.

Table 3-3 Summary of COCs for Human Health Seafood Consumption and Direct-Contact Sediment Exposure Scenarios

COC[a]	Human Health Exposure Pathway	
	Seafood Consumption	Direct Contact
Total PCBs[b]	X	X
Arsenic	X	X
cPAHs	X	X
Dioxins/furans	X	X
Aldrin[c]	X	
BEHP	X	
Alpha-BHC[c]	X	
Beta-BHC[c]	X	
Carbazole[c]	X	
Total chlordane[c]	X	
Total DDTs[c]	X	
Dieldrin[c]	X	
Gamma-BHC[c]	X	
Heptachlor[c]	X	
Heptachlor epoxide[c]	X	
Hexachlorobenzene[c]	X	
Pentachlorophenol	X	
TBT	X	
Toxaphene[c]		X
Vanadium	X	

Notes:

a. Contaminants with an excess cancer risk greater than 1×10^{-6} or a non-cancer HQ greater than 1 for at least one RME seafood consumption scenario were identified as COCs.

b. PCB TEQ was also identified as having risks greater than 1×10^{-6} for at least one RME seafood consumption scenario and at least one RME direct contact scenario.

c. These contaminants were qualified as tentatively identified compounds at estimated concentrations (JN-qualified), indicating uncertainty regarding both their presence and concentration.

BEHP = bis(2-ethylhexyl) phthalate; BHC = benzene hexachloride; COC = contaminant of concern; cPAH = carcinogenic polycyclic aromatic hydrocarbon; DDT = dichlorodiphenyltrichloroethane; HQ = hazard quotient; PCB = polychlorinated biphenyl; RME = reasonable maximum exposure; TBT = tributyltin; TEQ = toxic equivalent

Source: AECOM 2012.

Appendix B

King County's Ongoing Source Control Commitments in the Lower Duwamish Waterway

This appendix details the ongoing source control efforts that are part of King County's regulatory requirements and long-term commitments described in Chapter 2. The actions described in Chapter 3 serve to supplement the ongoing source control efforts and commitments that several King County divisions and a multi-jurisdictional program carry out. Implementation of the actions will ensure that the County's ongoing and planned LDW source control efforts are as effective as possible and meet or exceed permit requirements and other commitments.

The following sections describe LDW source control efforts of the following county divisions: WTD, WLRD, SWD, KCIA, RSD, FMD of the Department of Executive Services, and Environmental Health Services Division of Public Health. The work of the LHWMP, a multi-jurisdictional program that focuses on reducing public and environmental exposure to hazardous materials, is also described.

Wastewater Treatment Division

WTD protects water and sediment quality in the LDW through the actions listed below and described further in this section:

- Implementing the County's CSO Control Program (known as Protecting Our Waters)
- Complying with NPDES permits that regulate WTD wastewater treatment plants
- Carrying out the county Industrial Pretreatment Program
- Implementing the county Sediment Management Program
- Inspecting and maintaining WTD facilities
- Providing educational and public outreach activities
- Participating in the RainWise Program
- Funding the Grants Program

WTD is also responsible for some of the actions described in Chapter 3.

More information on WTD's programs is available at: http://www.kingcounty.gov/environment/wtd.aspx.

Protecting Our Waters Program, WTD's Combined Sewer Overflow Control Program

WTD has been implementing the County's CSO Control Program, Protecting Our Waters, since the late 1970s. King County has spent $389 million on CSO control to date. The regional wastewater system includes CSO "relief points" in the combined sewer area of Seattle to prevent backups in homes and streets from extreme variations in stormwater volumes. These include 38 locations in the county system and about 90 in the SPU system. Half of the County's 38 CSOs have completed projects to be controlled to the Washington State standard of no more than one untreated CSO discharge per year on a 20-year average. In 2012, the King County Council approved an amendment to WTD's long-term CSO control plan, approving nine projects to control the remaining 14 uncontrolled CSOs (Figure B-1) at a total project cost of $710 million

(2010 dollars; predicted to be over $1 billion of future funds spent by completion). The costs of LDW CSO control projects underway are $174 million (2010 dollars). This amended plan prioritizes the control of LDW CSOs ahead of the others to support the Superfund cleanup efforts. LDW CSO control will decrease untreated CSO volume by 104 MGY and CSO pollutant loadings in the LDW by approximately 60 percent.

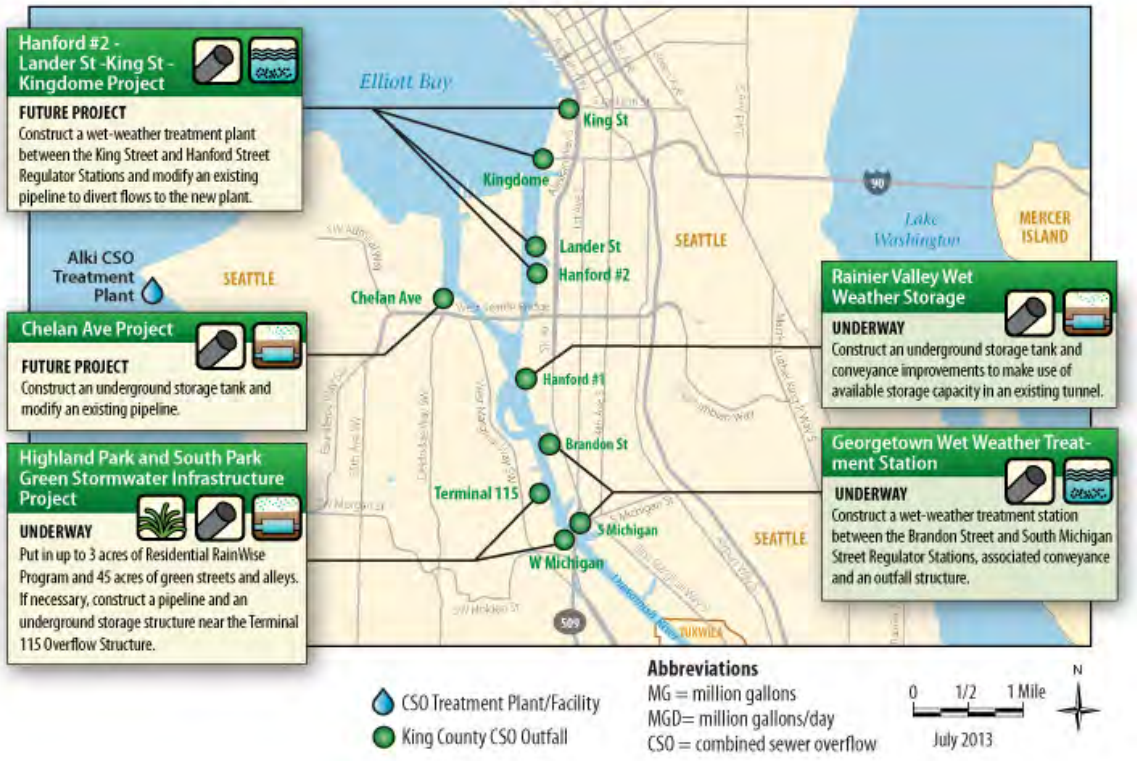

Figure B-1. Projects in WTD's Long-Term CSO Control Plan

Control of all the County's CSOs by the end of 2030, including the projects approved by the County Council, is included in the consent decree that was signed in 2013 by the County, Ecology, EPA, and the U.S. Department of Justice. Three of the nine projects will control the five uncontrolled CSOs located in the LDW: Rainier Valley Wet Weather Storage project (controlling Hanford #1 CSO) and Georgetown Wet Weather Treatment Station (controlling Brandon and South Michigan CSOs) are now under way, and the West Michigan/Terminal 115 project is being evaluated for the feasibility of using GSI to provide early overflow reduction.

In regard to total loading of solids to the LDW, upstream sediment dominates the input of contaminants into the waterway. The solids inputs from the Green River, stormwater, and CSOs reported in these studies are shown in Table B-1 and compared to estimated inputs after CSO control.[1]

[1] Estimates of solids inputs are from the LDW Feasibility Study which can be found at http://yosemite.epa.gov/R10/CLEANUP.NSF/LDW/Lower+Duwamish+Waterway+Superfund+Site+Technical+Documents#FS.

To provide context for CSO control in the LDW, the loading of solids and the estimated concentrations of these solids were compared to estimate average inputs of PCBs from CSOs, stormwater, and the Green River (Figure B-2).[2] PCB sources to the LDW are dominated by upstream sources before CSO controls are installed. When completed and online, the CSO projects in the LDW are predicted to prevent approximately 0.014 pound of PCBs per year from entering the LDW, representing a 60 percent reduction in PCB input from the combined basins (64 percent reduction from County's CSOs).[3]

Table B-1. Pre- and Post-CSO Control Annual Average Solids Inputs to the Lower Duwamish Waterway

Source	Sediment Pre-CSO Control (MT/Y)	Sediment Post-CSO Control (MT/Y)
Stormwater	1,222	1,222 [a]
CSOs	35.1	14.9
Green River	101,600	101,600

[a] Stormwater reductions resulting from source control efforts will also occur but have not been estimated.

[2] Assumes that CSOs and stormwater have similar average concentrations of PCBs adsorbed to their sediments (315 parts per billion [ppb] dry weight) and that Green River sediment concentrations average 36 ppb dry weight, which is consistent with best estimate concentrations used in the LDW Feasibility Study (Table 5-2a) as inputs for model predictions (AECOM 2012). The executive summary for the Feasibility Study can be found at: http://www.epa.gov/region10/pdf/sites/ldw/fs13/final_fs_executive_summary_103112.pdf.

[3] Load reductions for CSOs are based on reduced untreated volumes following CSO control and for treated volumes, an assumption of 75% reduction in total suspended solids based on the average efficiency over time of the selected enhanced sedimentation treatment technology. Note the NPDES permit requirement is 50% reduction as during highest flow events the treatment efficiency can be lower. Predicted volume changes are derived from the 2012 CSO Control Plan.

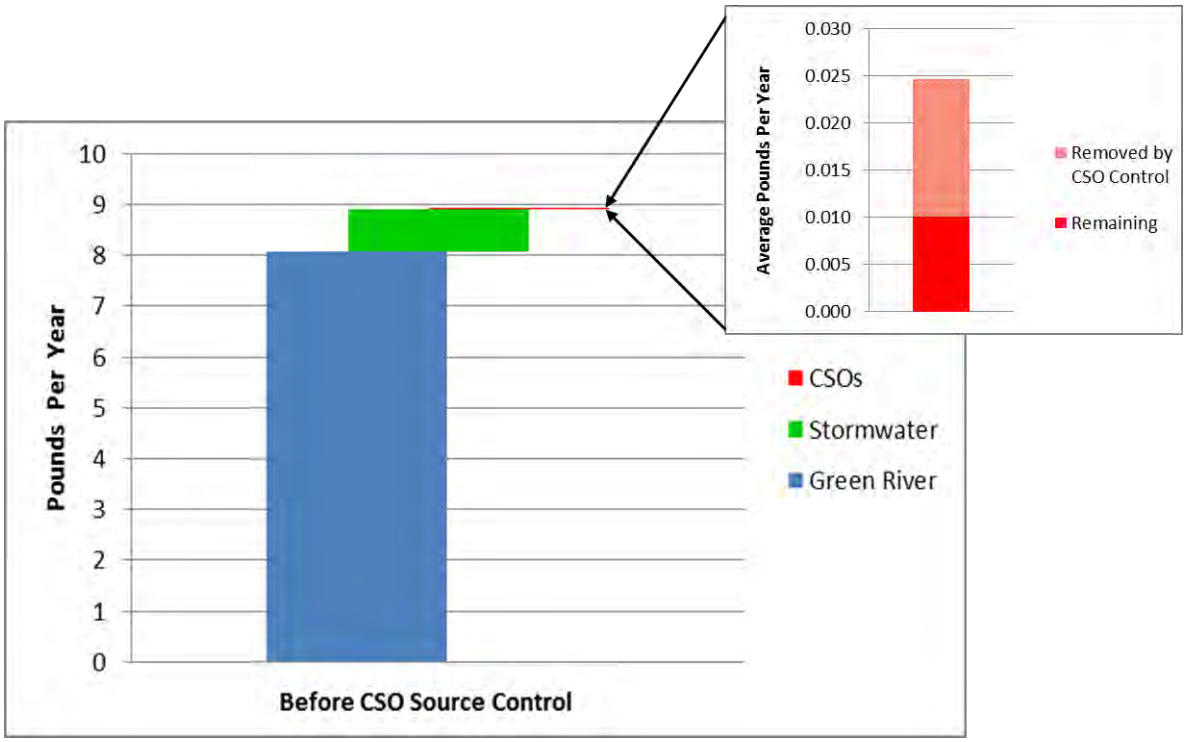

Figure B-2. Estimated Relative Particulate PCB Inputs to the Lower Duwamish Waterway

Activities associated with the County's long-term CSO control plan in the 2014-2018 time frame and designed to significantly reduce pollutant loadings in the LDW include the following (in 2010 dollars):

- **Rainier Valley Wet Weather Storage (Hanford #1) CSO control project, $19 M.** The Hanford #1 CSO currently overflows into the Duwamish River via the Diagonal storm drain a few times a year during storms. This project will remove 100,000 gallons per year of CSO discharges from the LDW and send the wastewater to West Point for treatment. The project is in design, will begin construction by the end of 2016, and will be completed by the end of 2019. It has been coordinated with Seattle's upstream Genesee CSO control project, which will capture SPU CSOs into Lake Washington and convey them with Hanford #1 flows for treatment at the County's future Hanford/Lander/King/Kingdome CSO control project.
- **Georgetown Wet Weather Treatment Station (Brandon/South Michigan) CSO control project, $140 M.** This project is in predesign and includes the construction of a CSO wet weather treatment facility between the Brandon Street and South Michigan Street regulator stations, related conveyance pipeline, and a new outfall structure to release the treated water into the Duwamish Waterway. The facility will be able to treat up to 66 million gallons of combined rain and wastewater a day and average 102 MGY that would otherwise have discharged directly to the Duwamish without treatment during large storm events. The facility plan will be submitted to Ecology and EPA by the end of 2015. Construction is expected to begin by the end of 2017 and be completed by the end of 2022.

- **West Michigan and Terminal 115 CSO control project, $15 M.** GSI opportunities are being evaluated in 2014 for early CSO control. Groundwater monitoring wells have been installed in portions of the project area to determine GSI design options. In addition, rain garden rebates, through the joint City of Seattle and King County RainWise program, are available to property owners in the project area through 2015. These early actions will help determine the need and size of a storage pipe, which would be constructed by the end of 2025. In total, the project will remove 1.5 MGY of CSO discharges from the LDW, with some stormwater recharging groundwater and the rest treated at West Point.
- **CSO treatment of Seattle's Henderson area CSOs, no net cost with reimbursement.** King County has agreed to allow Seattle to convey 34 MGY of captured CSOs from the city's upstream Henderson area to the County's existing Henderson Pump Station and Henderson/MLK CSO storage and treatment facilities. Seattle's flows will be directed to WTD's South Plant for treatment with the highest flows stored in the Henderson Tunnel. If the storage capacity of the tunnel is exceeded, excess flows are treated that would otherwise have discharged directly to the Duwamish without treatment.
- **Water Quality Assessment and Monitoring Study, $2 M.** County Ordinance 17413, which approved the amendment to the long-term CSO control plan, called for the County Executive to conduct a water quality assessment and monitoring study (assessment) to optimize water quality improvements in the sub-basins where CSOs discharge. This assessment will update the work done for the 1998 water quality assessment of the Duwamish River and Elliott Bay and also conduct a new assessment of Lake Union and the Ship Canal.

  The purpose of the current assessment is to provide information on how CSO control can best work in conjunction with other water quality projects, to evaluate the effectiveness of emerging technologies, and to build a foundation for conducting post-construction monitoring of CSO control projects. It will also help in deciding whether to pursue an integrated CSO control plan under the consent decree, which may allow sequencing of CSO projects with other water quality improvement projects to obtain the greatest benefit as early as possible. The assessment also looks at the potential to effect water quality impairments in these systems including all listed sediment and tissue impairments.

  The assessment is under way and includes reviewing and analyzing the large amount of existing scientific and technical data on impairments in receiving waters where county CSOs discharge (the Lake Washington Ship Canal, Duwamish River, and Elliot Bay); identifying and filling data gaps; assessing the sources of impairments; and reviewing planned and potential corrective actions. In 2016, recommendations are expected on the sequencing and integration of CSO control projects and other corrective actions. The information will influence the next CSO control program update, scheduled for 2018, and could be used to make decisions regarding partnering for stormwater treatment, sequencing of CSO control and use of Green Stormwater Infrastructure for Combined Sewer Overflow Control. In addition, the assessment will add to the understanding of the LDW and inform other water quality decisions by identifying which pathways are providing greatest relative contributions and which actions have the potential to best reduce those pathways.

- **GSI evaluations, $0.2 M.** Evaluation of the potential to implement GSI in the South Park and Highland Park areas for early CSO reduction and eventual reduction by 0.2 MG of the storage tank needed to control the West Michigan and Terminal 115 CSOs is expected to be complete by December 2014.
- **CSO Control Program review, $1 M.** The next CSO Control Program review and submittal of an updated long-term CSO control plan to Ecology and EPA are scheduled to be completed by June 2018.
- **Coordination with City of Seattle, $0.6 M.** The County and Seattle are developing a Joint Operations and System Optimization Plan that must be submitted to EPA and Ecology no later than March 1, 2016, to meet consent decree requirements. Because Seattle's combined system is directly linked with the County's system, the County needs to maintain control of its LDW CSOs as the City controls its LDW CSOs. Therefore, ongoing coordination on CSO control efforts is a high priority for both agencies.

Once a CSO control project is constructed, the County implements post-construction monitoring. The purpose of the monitoring is to verify the effectiveness of CSO controls and demonstrate compliance with water quality standards and protection of designated uses and sensitive areas.

More information on the County's Protecting Our Waters Program is available at: http://www.kingcounty.gov/environment/wastewater/CSO.aspx.

Permit Compliance

WTD complies with its NPDES permit for West Point. The permit includes discharge, loading, reporting, and monitoring requirements for all the facilities and outfalls associated with West Point, including CSO outfalls that discharge to the Duwamish River. Many actions required under the permit contribute to source control, in particular implementing the nine minimum controls for CSOs. For example, a detailed description of a pollution prevention program, appropriate BMPs, and the legal authority and administrative procedures that will be used to ensure the program is being implemented in combined basins is required to be submitted to Ecology in the 2017 CSO Annual Report. Where the legal authority or administrative procedures are not in place, a detailed description of the steps needed to establish such a program and the timeline for getting the program in place will be included

The NPDES permit also includes implementation of the Industrial Pretreatment Program. The KCIW carries out this program, which is an important component of WTD's LDW source control efforts, particularly prior to completion of the WTD's LDW CSO control projects.

More information on the NPDES permits for WTD's facilities is available at: http://www.kingcounty.gov/environment/wtd/About/System/NPDES.aspx.

King County Industrial Waste Program

KCIW regulates industrial wastewater discharged into the King County wastewater system from industrial facilities to protect surface water and biosolids quality, the environment, public health, and the wastewater system. The program ensures that industrial facilities either treat wastewater to reduce harmful substances or use BMPs before discharging the wastewater to the sanitary sewers.

KCIW regulates approximately 180 facilities in the LDW drainage basin, which represents approximately 25 percent of all the facilities regulated by the program.

KCIW issues several types of industrial wastewater discharge approvals for wastewater discharged to the King County wastewater system. The type of approval is determined by the nature of the business, volume and characteristics of wastewater, and potential risks to the system. The program evaluates discharges on a case by case basis and may make specific permitting decisions depending on the pollutants of concern such as assigning facility specific discharge limits. The program ensures that discharges meet all applicable discharge limits and minimize volume of wastewater entering the sanitary system. The program requires sampling and conducts its own sampling annually to monitor industrial users. The frequency is site-specific and depends on the discharge volume, characteristics of the discharge, potential risk to the health of utility workers, conveyance system, potential to impact treatment efficiency and operations, and potential of the final effluent to impact biosolids and receiving water quality. The program uses its authority to enforce regulations, where applicable, including issuing fines to facilities that fail to meet compliance standards established by the program. The goal of the enforcement plan is to bring facilities into compliance with regulations as soon as practicable.

KCIW is also one of the regulatory agencies that coordinates the investigation and control of sources of pollutants in the LDW.

Sediment Management Program

WTD carries out a SMP to remediate contaminated sediments near CSO outfalls. The SMP addresses sediment contamination near CSOs identified on the state's Contaminated Site List. The SMP's objectives are to repair potential environmental damage through a timely, efficient, and economical process; to prevent harm to public health; and to limit future liability. Sites in the LDW either have been addressed under the Elliot Bay Duwamish Restoration Program or are being addressed through the County's participation in the LDWG and SCWG under the LDW Superfund cleanup. The County's efforts included past and ongoing source control work to identify and control the sources of pollution that may pose health or environmental problems if they accumulate in sediments and to prevent recontamination of cleanup areas in the LDW.

- The County and City of Seattle conducted a series of source control efforts in the Norfolk and Duwamish/Diagonal basins prior to sediment cleanups to reduce the potential for recontamination. Nearfield modeling estimated which chemicals have the potential to recontaminate the sediment, and source control efforts were targeted on those chemicals. These efforts included a broad investigation to try to identify phthalate sources in both basins, including product testing and atmospheric deposition testing, and a specific source identification of a historical phthalate spill in the Duwamish/Diagonal basin.
- The County and City of Seattle developed a joint program to inspect every business in the Duwamish/Diagonal basin prior to the Duwamish/Diagonal early action cleanup. The joint program identified on-site problems related to discharges to sewers or storm drains, site activities and BMPs, materials storage, and waste handling and disposal. Problems were handed to the appropriate regulatory programs to resolve. Follow-up inspections several years later identified the need for periodic inspections to address new source issues resulting from business or staff turnover. This basin-wide study became the approach that has been applied throughout the LDW drainage basin. Ongoing efforts are coordinated through the SCWG.
- Following source control efforts, over 6,200 linear feet of the Diagonal SD and several main tributaries were cleaned to prevent material in the lines from recontaminating the Duwamish/Diagonal sediment cleanup. Even with the cleaning, ongoing releases of phthalates were predicted to accumulate near the outfall at levels above state standards.
- The Sediment Phthalate Work Group was formed by the County, Cities of Seattle and Tacoma, Ecology, and EPA to address phthalate recontamination. The group was tasked with trying to determine the source of phthalates, the risks they represent, and the potential to control them, and to make recommendations to address the regulatory conundrum they create for recontamination of cleanup sites. This work lead to the understanding of the problems faced with controlling chemicals that are transported through the air-water-sediment pathway, including BEHP, PCBs, dioxin/furans, and PAHs.

Further characterization of the combined system in the LDW through whole water sampling of discharges, in-line sediment traps, and in-line solids grab samples is used to identify potential sources in the CSO basins. Elevated contaminants are then traced back to their sources, where possible, and the information is shared with the appropriate regulatory agency for follow-up. Once ongoing sources have been controlled, WTD staff (or owners of combined sewer lines) carries out line cleaning to remove historical contamination in sediments that could be mobilized

during high flows. Together, these actions represent the ongoing source control efforts in the combined system that will continue on an as-needed basis during the 2014−2018 period.

To address gaps in knowledge of sources entering the system and the LDW, the County started several ongoing studies that will further target and refine source control efforts into the future. Studies that will continue and be completed in the 2014-2018 period include the following:

- **CSO basin input study.** Information is lacking on apportionment between the contributions from domestic wastewater, infiltration (groundwater), and stormwater runoff to combined sewers in CSO basins. Understanding this breakdown can help target future source tracing and control efforts in combined basins. This study involves collecting flow-proportioned samples of wastewater from both the Brandon and South Michigan CSO basins to evaluate these three source pathways to the combined system which can assist in future source control efforts for CSO inputs to the LDW. This work is scheduled to be complete in 2016.
- **Atmospheric deposition study.** In 2005 to 2007 King County focused atmospheric studies on phthalates in the LDW basin, but data was also collected for PAHs and PCBs.[4] A renewed atmospheric deposition study was initiated in 2011 and provides important information for evaluating the atmospheric deposition pathway in the LDW for metals, mercury, PAHs, PCBs, and dioxins/furans.[5] Five stations representing various land uses located in the Lower Duwamish Valley and the Green River watershed were sampled for bulk atmospheric deposition (wet and dry deposition) from July 2011 through October 2012. Two stations were located in the urban areas of the LDW: Duwamish and South Park stations. The Duwamish station represents an industrial area and the South Park station represents a mix of industrial/commercial and residential land uses. Of the remaining stations, one station was in an urban residential neighborhood (Beacon Hill), one station was located in a suburban/commercial area (Kent), and one station was located in the rural area of Enumclaw (Mud Mountain).[6] The data report was completed in December 2013. Additional atmospheric disposition sampling was conducted in 2013 to fill a spatial gap in Georgetown and to collect supplementary data for PCBs and dioxins/furans in the Lower Duwamish Valley. The report documenting the 2013 sampling was completed in 2015 (King County 2015a).
- **Green River watershed studies.** The County is conducting three studies in the Green River watershed: whole water, stream sediments, and stream suspended solids. The results of all three studies will assist in understanding upstream sources to the LDW. They will provide a better understanding of apportionment of contaminants being transported downstream, the use of different types of measurements, and distribution of key contaminants within major tributary basins within the watershed. These studies will help target future sampling and source control efforts in the watershed.

[4] In most cases, PCBs and most PAHs were not detected with the less sensitive analytical methods available at the time.
[5] Analysis of newer atmospheric deposition data uses more sensitive analytical methods than the earlier King County studies.
[6] A sixth station was added in the Kent area toward the end of the study for paired comparison with the original Kent station; microscale effects were suspected in Kent after interim review of the dioxin/furan data.

- **Whole water study**. The whole water study will make relative comparisons of PCBs, arsenic, and PAHs in the Green River and its major tributaries. This study includes collection and analysis of surface water samples from four major tributaries to the Green River (Newaukum, Soos, and Mill creeks and the Black River) and at two locations on the Green River main stem: an upstream location at Flaming Geyser State Park (upriver of the major tributaries being sampled) and a downstream location in Tukwila at Foster Links Golf Course (downstream of the tributaries). At each of the six locations, composite samples were collected during the dry season to represent baseflow conditions (September 2011) and during storm events (between October 2011 and October 2012). The data report will be completed in March 2014 (King County 2014a). In 2013 and 2014, additional water samples were collected from locations further upstream in the Green River above most rural development (at Kanaskat-Palmer State Park) and above the Howard Hanson Dam, where salmon migration is blocked, to assess potential contributions from these two sources. This data report was be completed in 2015 (King County 2015b).
- **Stream sediments study**. An assessment of sediment quality in the Green River Watershed was conducted to characterize chemical concentrations and to better understand the relative differences in sediment quality in the watershed. Stream basins sampled included Mill Creek in Auburn, Mill Creek in Kent, Jenkins Creek, and Covington Creek in 2012, and Soos, Newaukum, and Springbrook creeks in 2008-2010. Stream basin sampling sites were placed approximately every creek mile, where possible. Green River main stem locations were sampled in 2012 and included an upstream location at Flaming Geyser State Park (upriver of the major tributaries being sampled), a downstream location at Foster Links Golf Course (downstream of the tributaries), and just upstream of Soos Creek and Mill Creek in Kent. A total of 58 samples were collected and analyzed for metals, mercury, PCBs, PAHs, and other organic compounds, including dioxin/furans in a subset of samples. The data report was completed in February 2014 (King County 2014b).
- **Suspended Solids Study**. The suspended solids study will make relative comparisons of PCBs, arsenic, dioxins/furans, and PAHs associated with suspended solids in the Green River and its major tributaries. This study is also intended to provide a characterization of particulate contaminant concentrations upstream of the LDW from the Green River and from major tributaries. The same six locations are being sampled in the Green River and tributaries as in the whole water study described above. The study will use two types of collection methods. One method (sediment trap) will collect suspended solids over a three month period and the other method (using a filter bag) will collect suspended solids during storm events and during one baseflow event. Sampling occurred during 2013−2015, and a data report will be completed in 2016.

- **Combined basin stormwater inspections**. This effort looks at the relative significance of stormwater sources by systematically canvassing the properties in the Brandon and South Michigan basins to evaluate the magnitude of stormwater issues in combined basins. Together with the CSO basin input study, the work will refine the understanding

of the relative significance of these source pathways. The inspections are conducted by an Ecology inspector funded by King County. This work is scheduled to be complete in 2015.

- **Nearfield discharge modeling.** This ongoing effort has developed a nearfield model that can predict sediment deposition around a CSO discharge. Sediment samples to characterize chemical concentrations near outfalls have been collected at several CSOs, including in the LDW, to refine and validate the model. The calibrated model will be used to evaluate recontamination potential following cleanup and help identify COCs for recontamination to target ongoing and future source control efforts. Work is scheduled to be complete in 2016.

Ongoing Flow Monitoring and Facilities Inspection/Maintenance Programs

An important component of ensuring water and sediment quality protection throughout WTD's service area is the ongoing monitoring, inspection, and maintenance of WTD's facilities to ensure they are operating properly.

WTD's Flow Monitoring Program monitors approximately 30 locations in LDW combined sewer basins. Flow monitoring is conducted using portable area-velocity flow meters. Data from these locations are used for fulfilling permit overflow reporting requirements, calibrating CSO basin models, planning and designing CSO control projects, and optimizing system operations to minimize overflows. Flow is monitored on both a short-term basis (one to two years duration) and a long-term basis (more than two-year duration) depending on project-specific and regulatory requirements. Figure B-3 shows the current location of flow meters in the LDW drainage basins.

WTD's Facilities Inspection Program inspects sewer lines on a seven-year cycle so that each sewer line is inspected at least once every seven years. CSO outfall pipes are inspected about every five years.

In addition, a rock box located on the West Duwamish Interceptor is cleaned once a year. The rock box is located at an overflow structure, just before the interceptor siphons under the Duwamish River. The rock box is a 10-yard sump in the line that allows for settling of solids in the wastewater before it goes through the siphon in order to keep the siphon from clogging and causing overflows to the LDW.

If any issues are found resulting from any of the investigations, such as cleaning or repair needs, actions are taken as appropriate.

More information on WTD's Flow-Monitoring and Facilities Inspection programs is available at: http://www.kingcounty.gov/environment/wtd/Construction/Assets.aspx and http://www.kingcounty.gov/environment/wastewater/CSI/FlowMonitoring.aspx.

Figure B-3. Portable Flow Meters in King County's Combined Sewer System in the Lower Duwamish Waterway Drainage Basins

Educational and Public Outreach Activities

WTD offers educational information as part of its source control activities. The following activities that are likely to continue over the next five years include the following:

- **Informational websites.** WTD provides several websites for people to access information on how to protect the LDW. Examples include websites on how to safely dispose of materials people do not want or no longer need; on Lower Duwamish cleanup efforts and associated public meetings; "Our Duwamish" website that provides source control educational information and links to organizations that are involved in the LDW source control area; and on controlling fats, oil, and grease from being discharged to the sewer system.
- **Community outreach.** WTD reaches out to communities in the LDW source control area to engage them in LDW cleanup efforts, CSO control planning efforts and project design, Green Grants program, RainWise program, and other WTD capital projects in the area. In addition, WTD staffs informational tables at farmer's markets in the LDW basins, at Boeing employee events, and local summer street fairs; conducts interviews and briefings with community leaders; and participates in community meetings sponsored by other organizations. CSO informational materials are available in English, Vietnamese, and Spanish to increase the opportunity for communities to learn about the projects.
- **Sponsored river tours.** WTD staff also provides information on river tours sponsored by the Duwamish River Cleanup Coalition and informational tables at public meetings on the Superfund cleanup.
- **Wastewater education and tours program.** WTD treatment plant tours, open houses, and education programs provide information on the history of the need for sanitation and clean water, treatment processes, resource recovery programs, pollution prevention for homes and businesses, and Puget Sound and LDW health. In 2013, the education and tours program reached over 13,000 participants, including 7,100 fourth to seventh graders. More than 2,500 community members, including university and professional groups, toured WTD's treatment plants.
- **Annual participation and sponsorship of the Duwamish River Festival.** The festival offers opportunities for the public to learn more about the continuing efforts to restore the Duwamish River.
- **KCIW educational programs and workshops.** The KCIW program provides a newsletter and biannual workshops to update industrial dischargers of regulations and procedures, and posts links on its website with helpful information about local, regional, state, and federal resources they can access to better manage their pretreatment systems. Fact sheets are also produced to provide more specific information on how the program implements its regulations. Compliance awards serve as an incentive for industrial facilities to strive to meet and to maintain compliance with environmental regulations. In addition, a specific poster on the do's and don'ts to protect the LDW are provided during inspection visits (Figure B-4), and businesses are sent a letter following each inspection with helpful tips on what they can do to improve their practices.

WTD also funds the LHWMP, which in addition to outreach and education activities, focuses on product substitution and legislation to control chemicals at their product source; information on the program is provided later in this chapter.

More information on WTD's educational and outreach activities is available at: http://www.kingcounty.gov/environment/wtd/Education.aspx.

Figure B-4. Source Control Education Poster for Businesses

RainWise Program

WTD is working closely with SPU to offer the RainWise Program in selected portions of the WTD wastewater service area, including the LDW basins. Property owners who live in a targeted CSO basin in the LDW may be eligible for rebates to hire a trained RainWise contractor to install a rain garden or cistern. The program has met success in helping control stormwater runoff and CSOs. The County plans to offer this program through 2016.

Information on the RainWise Program is available at: http://www.kingcounty.gov/environment/wastewater/CSO/BeRainwise.aspx.

Lower Duwamish Waterway Grants Program

From 2011 through 2015, WTD has grant funding available for air or water quality improvement projects, environmental education, and community outreach efforts in the Duwamish River Valley. These grants are to help improve air and water quality in the Duwamish watershed, support the successful implementation of future CSO control projects in this area, and meet regulatory obligations for clean air. They are also offered to promote partnerships in the LDW basins with the goals of advancing source control for the LDW Superfund cleanup, developing local expertise in water and air quality protection, and enhancing small-scale environmental and economic opportunities in the community. Examples of projects include the following:

- Air quality improvements to sources of air pollution or projects that help solve air pollution
- Identifying sources of air pollution in the area
- Educating citizens and businesses about air pollution and ways to reduce exposure to air pollution
- Outreach to local businesses and community to promote air or water quality goals
- Stormwater bioretention/biofiltration projects (such as rain gardens, bioswales, and filter strips)
- Stormwater controls and practices that prevent contaminated stormwater from entering the river

WTD is expanding this program in 2015-2016, as noted in Chapter 3.

More information on currently available grants can be found at: http://www.kingcounty.gov/services/environment/grants-and-awards/waterworks.aspx

Water and Land Resources Division

WLRD helps protect the County's water and lands so that its residents can enjoy them safely today and for generations to come. WLRD provides diverse services, such as water quality studies and analyses, river and floodplain management, watershed basin stewardship, rural and agricultural services, and implementation of and compliance with the County's NPDES Phase I Municipal Stormwater Permit.

WLRD's SWMP includes a number of programs that address pollutant prevention and reduction in stormwater discharges to the LDW and other receiving waters in King County. These actions

and their associated agencies can be found in the 2013 SWMP document.[7] WLRD also coordinates the actions of other King County agencies that have responsibilities under the NPDES Phase I Municipal Stormwater Permit. Implementation of the permit includes code enforcement; mapping; agency coordination; development and redevelopment requirements; construction, inspection, and maintenance of stormwater management facilities and conveyance systems; source control; spill response; illicit connection detection and removal; property management; operation and maintenance of the MS4; and public education and outreach. These programs are in unincorporated areas of the county. The nexus for some of the programs with the LDW is small, and some programs are implemented by other agencies, as described in this chapter.

The programs WLRD primarily implements and that have most relevance to the LDW are the Source Control, Facility Inspection, IC/IDDE, and MS4 Mapping programs in unincorporated areas.

- The Source Control Program provides technical assistance, education, and code compliance activities to business and property owners. The goal of these activities is to reduce and eliminate existing or potential pollutant discharges to the MS4 and surface waters in unincorporated King County, a small portion of which are in the LDW drainage basin (see Figure 3-2).
- The Facility Inspection Program ensures that stormwater flow control and water quality treatment facilities are properly functioning and appropriately maintained.
- The IC/IDDE Program addresses potential sources of stormwater pollution by conducting investigations, inspections, and follow-up actions to ensure compliance with King County's Water Quality Code; identifying illicit connections and discharges; and removing them.
- WLRD is responsible for mapping and documenting the MS4 in the County's jurisdiction, on the properties it owns or operates, and on properties that are discharging to the County's MS4.

These stormwater management programs and WLRD's public education and outreach program are described further in this section. In addition, WLRD is responsible for some of the actions described in Chapter 3.

More information on WLRD's programs is available at: http://www.kingcounty.gov/environment/wlr.aspx.

Source Control Inspection Program

Source control inspections are conducted on commercial, industrial, and multifamily sites. The inspections focus on providing technical assistance to business and property owners in the implementation of source control BMPs for pollutant-generating activities. Any problems or shortfalls that are identified during a site inspection are followed up with corrective actions letters. Follow-up inspections are conducted to ensure compliance has been met. For difficult or

[7] The SWMP is available at: http://your.kingcounty.gov/dnrp/library/water-and-land/stormwater/stormwater-management-program/2013-swmp-and-appendices.pdf.

larger issues, water quality engineers work with the business or property owner until the problems are corrected and a compliance letter is issued. Code enforcement actions are taken where needed. Whenever reasonable, inspections are conducted jointly with Ecology for those businesses that have either general or individual NPDES permits. The same applies for businesses that are located in unincorporated King County but drain to the City of Seattle.

Stormwater Facility Inspections Program

Facility inspections of publically and privately owned and maintained stormwater flow control and water quality treatment facilities are conducted annually unless records allow a less frequent inspection schedule. The inspections ensure that stormwater facilities are properly maintained and operated. Custodial agencies that own stormwater facilities are issued Maintenance Orders and owners of private facilities are issued Maintenance Correction Letters, if necessary. If any water quality problems are found, or there appears to be inadequate use of BMPs, the site is referred to the Source Control Inspection Program to correct the problems.

Water Quality Complaint/Illicit Discharge Detection and Elimination and Spill Response Programs

County programs are in place to address illicit connections and discharges and other water quality requests and complaints. Reports are received in a number of ways, including RSD's 24-hour hotline, WLRD's Stormwater Services Section (SWS) Drainage and Water Quality hotline, Illegal Dumping Task Force hotline or website, other regional jurisdictions, state agencies, and discoveries by County staff.

Water Quality Complaint Investigations

Water quality complaints are investigated within three days so that immediate or ongoing water pollution problems can be controlled or eliminated. Complaints and concerns are received by phone, through the online complaint form, or are referred from Ecology's Emergency Referral and Tracking System (ERTS). Initial review determines if the incident is located in the County or in another jurisdiction and if other agencies should be involved, such as Public Health. If it is a recurring problem or under some other investigation or enforcement, follow-up is conducted and enforcement action is coordinated with the appropriate agencies.

When the County receives reports of dumped or spilled materials outside of its jurisdiction, the appropriate agency or municipality is notified of the situation. Investigators then coordinate with other agencies or internal staff as needed to resolve the problem. Resolution includes determining whether there is a problem (or the result of natural phenomena such iron oxide discoloration), tracing the source of the problem and eliminating it, stopping the discharge, providing education on proper disposal options or BMPs, assisting with cleanup, and referring the site for a full source control inspection.

Illegal Dumping

Custodial agencies respond in several ways to illegally dumped materials or spilled materials on their properties such as the road ROW, parks, pumps stations, and park-and-rides. Illegally dumped solid waste is usually removed by the custodial agency, thus preventing potential illicit discharges. Dumped material suspected of being hazardous waste (such as methamphetamine laboratory waste), large-scale spills, unidentifiable dumped materials, or other potentially dangerous conditions require responses from either a spill response contractor, Ecology's Northwest Regional Office (NWRO) Spill Response Unit, or other appropriate parties.

Illicit Connections, Illicit Discharges Detection and Elimination, and Spills

Any illicit connections, discharges, or spills discovered during maintenance or as a result of investigations or inspections of the stormwater system are reported to SWS, an investigation request is completed, and the relevant information is entered into the SWS complaint tracker database. The investigation request is assigned to a drainage investigator for an initial investigation, and, if necessary, to a water quality engineer who ensures that the connection is removed or plugged. BMPs are implemented to eliminate the discharge, or the source of the spill is found and cleanup occurs.

Spills or illicit discharges to receiving waters or to the MS4 are reported to the state and other appropriate agencies or jurisdictions, and investigated by the County. Spills or discharges of a material or size requiring a response beyond the County's capacity to respond are addressed by a spill response contractor, Ecology's NWRO Spill Response Unit, or other appropriate parties.

Public Education and Outreach

King County implements public outreach and education programs, many of which are through programs in County departments and divisions, and through partnerships with LHWMP, regional salmon recovery groups, grant exchange program, and the King Conservation District. Some programs are focused on topics related to stormwater but include other critical missions, such as stewardship, soil conservation, wastewater, and habitat restoration or protection. Other programs focus on stormwater impacts and behavior changes that alter these impacts (yard care, animal waste, car washing, low impact development practices, vehicle oil leaks, etc.).

Public education and outreach programs are regional in nature or focused on particular target audiences including the general public; business owners; homeowners, landscapers, and property managers; engineers, contractors, and developers; and livestock owners. These programs include videos, on-site assistance, classes, written materials, technical standards, events, and websites.

King County facilitated the formation of a regional outreach consortium—Stormwater Outreach for Regional Municipalities (STORM). Over 80 municipalities throughout the region saw the advantage of combining their resources to create a strategy and campaign for outreach that would transcend jurisdictional boundaries. King County serves on the Steering, Campaign, and Measurement committees. STORM will coordinate its efforts with the Salmon Conservation Plan implementation, occurring at the Water Resources Inventory Area (WRIA) level, and with the Puget Sound Partnership.

More detail on the public education and outreach programs associated with King County's SWMP is available at: http://your.kingcounty.gov/dnrp/library/water-and-land/stormwater/stormwater-management-program/2013-swmp-and-appendices.pdf.

Solid Waste Division

King County's SWD provides garbage transfer, disposal, and recycling services for residents and businesses in all of King County, except for Cities of Seattle and Milton. SWD also provides household hazardous waste disposal options and recycling education programs. SWD's service area has a population of about 1.28 million, or about 70 percent of King County's total population as a whole. SWD's customers live in both incorporated and unincorporated areas of the county with the exception of the City of Seattle. Customers dispose of more than 800,000 tons of solid waste each year.

SWD is responsible for the County's Brownfields Program, which provides technical and financial assistance to qualified private individuals and businesses, nonprofit organizations, and municipalities in King County to assess and clean up contaminated sites, called brownfields. SWD's Brownfields Program is funded with grants from EPA to conduct ESAs on properties with confirmed or suspected contamination.

Formal Phase I and Phase II ESAs are conducted on behalf of government and non-profit entities; however, private businesses may also receive free technical assistance in brownfields assessment and cleanup planning. A Phase I ESA is a preliminary investigation into a site's history to determine if any activity or actions occurred on the site that could have contaminated the soil or groundwater. If such activities or actions are identified, they are called recognized environmental conditions (RECs). If the Phase I ESA has identified RECs, a Phase II is conducted to determine whether the RECs have created a contamination issue. The Phase II ESA generally focuses on taking samples of soil and groundwater to be tested in the laboratory for suspected pollutants. If contamination is confirmed, the Phase II ESA provides data that can be used to design a cleanup action plan (CAP) and prepare an estimate of cleanup cost.

SWD does not have enforceable mechanisms for source control in the LDW; however, its Brownfields Program supports remediation and source control efforts in the LDW through site assessments that can lead to voluntary site cleanups and redevelopment by independent parties. The program has conducted one site assessment located in the Duwamish area; a former gas station in Georgetown purchased by an artist's collaborative for a community art project. The Brownfields Program paid for Phase I and II ESAs as well as a supplemental Phase II ESA at this site. The intent is for this site to enter Ecology's Voluntary Cleanup Program. In addition, the Brownfields program has facilitated three EPA Targeted Brownfields Assessments in the LDW drainage basin; these include a former industrial cleaner manufacturing plant, a metals foundry, and a former electroplating facility. Contaminants were reduced at all three sites through independent site cleanups.

The target area for the current EPA grant is the Duwamish Manufacturing/Industrial Center and its surrounding residential neighborhoods. The grant period is fiscal years 2013−2016. Assessments conducted in the Duwamish have the potential to support source control by providing education and technical assistance to program participants and promoting cleanup of contaminated sites through Ecology's Voluntary Cleanup Program by independent parties, thereby reducing the risk of contaminant migration to the Duwamish River.

SWD's Brownfields Program will conduct public outreach and education to members of the Duwamish community, including partners identified in the EPA grant application. These include the Duwamish River Cleanup Coalition, Environmental Coalition of South Seattle (ECOSS), Manufacturing Industrial Council of Seattle, SoDo Business Association, South Park Neighborhood Association, South Park Retail Merchants Association, TRAC Associates, and YWCA Seattle-King-Snohomish. SWD will also post and distribute fact sheets of assessment projects in a variety of public venues, including the Brownfields Program website.

More information on SWD's Brownfields Program is available at: http://your.kingcounty.gov/solidwaste/brownfields/index.asp.

King County International Airport

KCIA, also known as Boeing Field, is one of the busiest primary non-hub airports in the nation. Located just five miles south of downtown Seattle, it averages more than 200,000 operations (takeoffs and landings) each year. The airport's economic impact is $3.2 billion in terms of local business sales, supporting 12,618 jobs, and creating $804 million in labor income in the County. The airport's 150 tenant businesses also directly support 4,900 jobs in the local economy.

The airport serves small commercial passenger airlines, cargo carriers, private aircraft owners, helicopters, corporate jets, and military and other aircraft. It is also home to Boeing's 737 aircraft flight-test program and other Boeing operations.

KCIA's primary pathway to the LDW is stormwater. KCIA has been in compliance with stormwater regulations related to Ecology's NPDES permits, which include industrial, municipal, and CSGPs. KCIA complies with Ecology's regulations under the toxics cleanup, UST, and dangerous waste programs. KCIA intends to continue its source control programs and services, or their equivalents, in the next five years and in the future within the limits of the County's obligations, priorities, and budget constraints. The activities are described in this section. KCIA is also responsible for one of the actions described in Chapter 3 (see Table 3-8).

More information on KCIA's programs is available at:
http://www.kingcounty.gov/transportation/kcdot/Airport.aspx.

Enforceable Mechanisms for Source Control-Industrial Stormwater General Permit

Ecology issued an ISGP for KCIA that covers industrial activities involving airport transportation (Chapter 90.48 RCW, Federal Clean Water Act). The KCIA ISGP coverage includes all the areas inside the KCIA property boundary. The ISGP includes the following requirements:

- Developing a facility Stormwater Pollution Prevention Plan (SWPPP) to document and mitigate pollutant generating sources
- Implementing source control through operational, structural, and treatment BMPs
- Conducting monthly stormwater discharge sampling, analyses, and review; additional sampling events are performed as needed to trace sources of pollutants
- Performing monthly facility inspections to review airport and tenant BMPs
- Performing corrective actions, as needed
- Reporting quarterly discharge monitoring results to Ecology
- Providing annual reports to Ecology to present findings of screening level exceedances source control activities, and corrective actions
- Providing SWPPP training for staff

Ecology also has issued ISGPs for seven KCIA tenants. All other tenants operating at KCIA are covered under the KCIA ISGP and must comply with its specific requirements. New tenants with applicable industrial activities will be required to be covered under a separate ISGP. These permits have five-year terms and are extended, accordingly, in five-year terms, as applicable industrial activities continue.

Municipal Stormwater Permit

As a custodial agency and county property, KCIA adheres to the County's NPDES Phase I Municipal Stormwater Permit (Chapter 90.48 RCW, Federal Clean Water Act). The permit regulates the discharges from MS4s owned or operated by King County. WLRD is the lead agency managing permit compliance for the County. Regulatory requirements and associated actions pertaining to the permit include the following:

- **Mapping.** KCIA has provided, and continues to provide, updated KCIA stormwater drainage maps to WLRD.
- **Development standards.** KCIA and tenants control the quality and quantity of stormwater runoff in accordance with KCC and development standards, including the King County Surface Water Design Manual. The mechanisms include, but are not limited to, commercial site development permits, building permits, grading permits, and demolition permits, which are generally under King County Department of Permitting (DPER) oversight and enforcement.
- **Structural stormwater controls.** KCIA has installed, and will maintain, various stormwater facilities in accordance with KCC. KCIA Stormwater Facilities are provided in Table B-2.

Table B-2. List of KCIA Stormwater Facilities

KCIA ID Number	Location of SW Facility	Type
1541	King County WTD	Oil/Water Separator
1091	KCIA Maintenance Shop	Oil/Water Separator
1640	A-1, (NE Safety Area, Shultz)	Oil/Water Separator
1657	Main Runway (E RPZ)	Oil/Water Separator
1650	A-1 (SE RPZ)	Oil/Water Separator
1670	A-2 (W KC Jet Center)	Oil/Water Separator
1680	A-2 (W American Avionics)	Oil/Water Separator
1756	A-3 (W Terminal)	Oil/Water Separator
1757	A-3 (W Arrivals)	Oil/Water Separator
1772	A-4 (W Ameriflight)	Oil/Water Separator
1778	A-4 (W Vulcan)	Oil/Water Separator
2008	A-8 (W Clay Lacy)	Oil/Water Separator
1726	A-9 (W Clay Lacy Washpad)	Oil/Water Separator
1756	A-3 (W Terminal)	Oil/Water Separator
MoF	B-4 (NE SW Hangars)	Oil/Water Separator
SWA	B-4 (NE SW Hangars)	Oil/Water Separator
WV1	B-4 (NE SW Hangars)	Detention Vault
1592	B-7 (SE AOC)	Oil/Water Separator
1801	B-6 (E South Pump Sta)	Oil/Water Separator
SFS	B-6 (StormFilter)	Oil/Water Separator, Detention Vault, Storm Filter Vaults
WV2	B-8 (E Control Tower)	Detention Vault
NPS	North Pump Station	Detention Vault
SPS	South Pump Station	Detention Vault
SRC	B-1 (W Safety Area)	Infiltration System
WQ1	B-6 (N South Pump Station)	Detention Vault

- **Source control assessments.** KCIA performs annual tenant assessments to ensure tenants are in compliance with requirements of the permit. Pollutant generating activities and BMPs are reviewed and updated each year. Tenants are also informed on spill response and de-icing policy updates. Tenants and operators at KCIA are required to comply with federal, state, and local environmental laws in accordance with their lease agreements.
- **Illicit Connection/Illicit Discharge Detection and Elimination.** KCIA performs annual IC/IDDE inspections at its discharge points to the LDW. The inspections include recording stormwater discharge conditions and collecting turbidity, pH, and temperature data. Source tracing, identification, and control will be performed as needed. To date, no illicit connections have been observed.

  KCIA's Spill Response Policy gives requirements and procedures for tenants and operators during spill response events. The policy includes notification requirements and spill prevention, spill response, and reporting and procedures.
- **Operation and maintenance.** KCIA periodically cleans up stormwater facilities and catch basins, if inspection and sampling results indicate a need. Cleaning, collection, and waste disposal are performed by contractors.

  Mechanical sweeping of airport pavement occurs daily. This source control activity also adheres to the Federal Aviation Administration's (FAA) Foreign Object Debris (FOD) requirements. Sweeping wastes are stored in covered containment facility for disposal by waste contractors.
- **Property maintenance**. KCIA performs annual inspections of solids/sediment accumulation at stormwater facilities, including vaults, oil-water separators, infiltration systems, and StormFilter systems, and maintains the facilities as necessary. KCIA inspects oil-water separators weekly to remove floatables and petroleum hydrocarbons. KCIA tenants are required under lease agreement to perform maintenance. These facilities are shown in Figures B-5 and B-6.

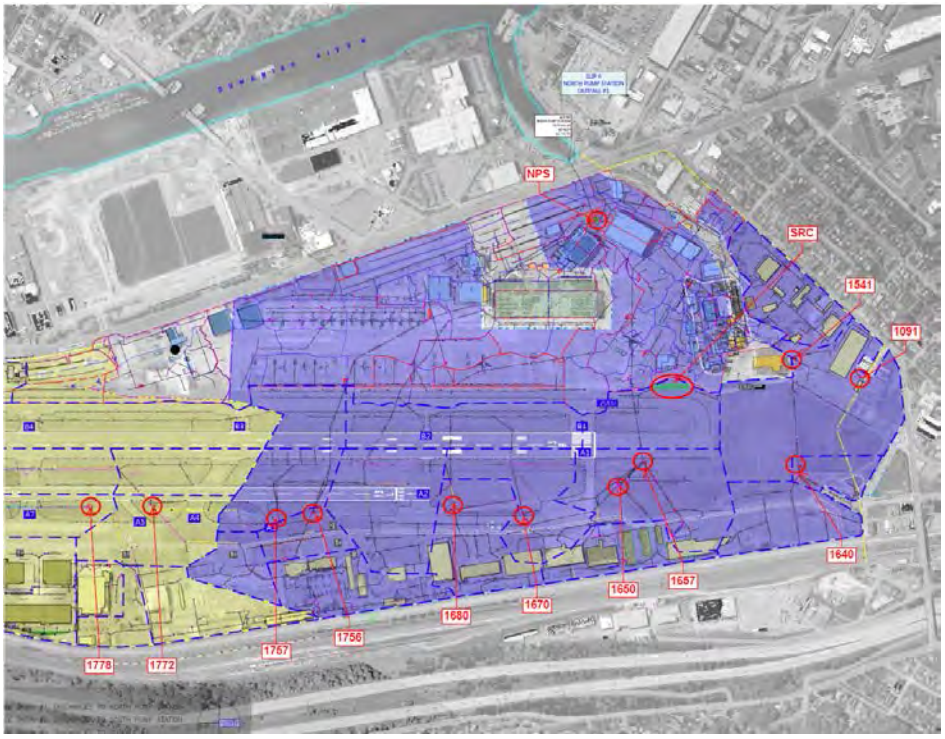

Figure B-5. Location of KCIA Stormwater Facilities - North

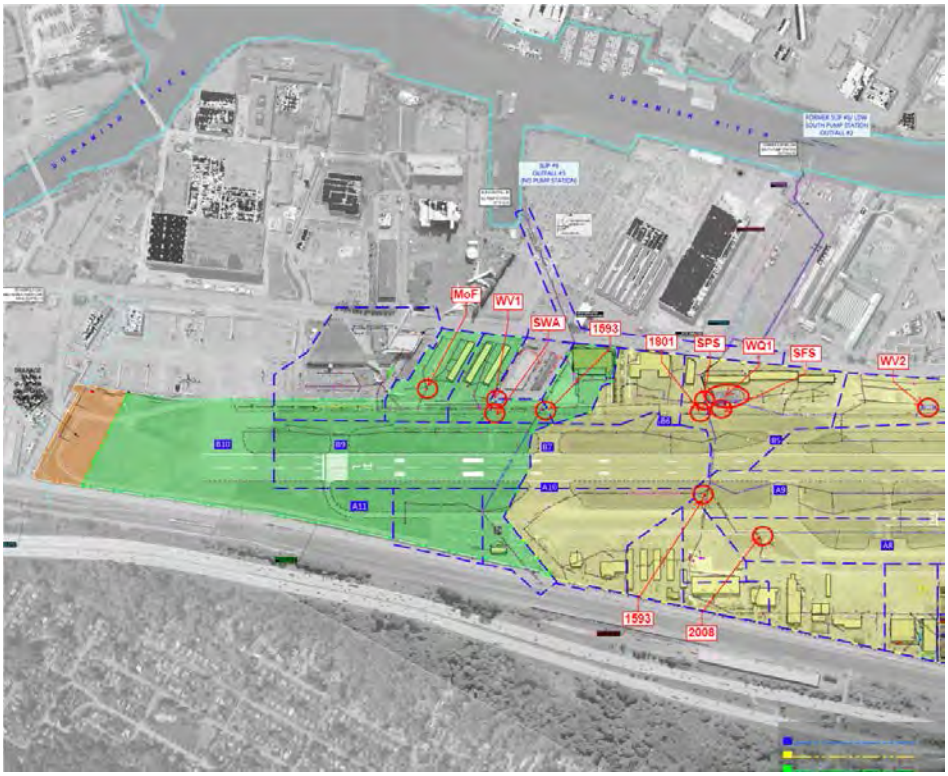

Figure B-6. Location of KCIA Stormwater Facilities - South

The NPDES Phase I Municipal Stormwater Permit covers all areas inside the KCIA property boundary. KCIA and other custodial agencies attend quarterly meetings with WLRD to discuss the status of compliance, stormwater management plan updates, annual reports, permit issues, and other related items. The permit has a five-year term and is extended, accordingly, in five-year terms.

Construction Stormwater General Permit

Development and construction at KCIA are performed in accordance with KCC Chapter 9.04, Surface Water Runoff Policy. For construction projects greater than one acre, KCIA and its tenants are also required to apply for coverage under Ecology's CSGP (Chapter 90.48 RCW, Federal Clean Water Act). The permit requires the following:

- Developing a construction SWPPP
- Implementing temporary erosion and sediment control BMPs
- Conducting monthly stormwater sampling
- Notifying Ecology
- Performing monthly construction site inspections
- Performing corrective actions, as needed
- Reporting monthly discharge monitoring results to Ecology
- Providing SWPPP training for staff

The CSGP requirements are limited to the construction area/boundary and through construction completion. The County's DPER also conducts inspections for building, commercial site development, demolition, and grading permits.

North Boeing Field/Georgetown Steam Plant Site Model Toxic Control Act Agreed Order

In accordance with the MTCA, Ecology signed Agreed Order DE 5685 with Boeing, KCIA, and the City of Seattle to facilitate remedial action at the North Boeing Field/Georgetown Steam Plant Site. Boeing, KCIA and the City are PLPs to the site. Under the Agreed Order, which became effective August 14, 2008, Ecology will conduct an RI/FS and interim actions, as needed.

The RI/FS is intended to identify contamination sources to sediments of Slip 4 of the LDW and clean up upland areas affected by site contaminants. The RI/FS work plan has been completed (Ledios 2013). Currently, the RI is expected to be completed by February 2017 and the FS by February 2018. Remedial actions will be performed in accordance with the preferred and approved alternatives. Periodic technical meetings are held to inform Ecology on status, issues, and next steps.

Cleanup of Contaminated Sites

As part of redevelopment activities, KCIA performs site investigations, feasibility studies, and site cleanups in accordance with Ecology's Toxic Cleanup Program and MTCA requirements (Chapter 70.105D RCW, Chapter 173-340 Washington Administrative Code (WAC).

Boeing, KCIA and the City are currently under a Model Toxics Control Act (MTCA) Agreed Order for North Boeing Field since 2008 and been cleaning other contaminated sites for about seven years.

The clean-up process typically starts with discovery of a release during a construction/redevelopment process. Notification of such a release is submitted to Ecology. KCIA clean-ups have been previously performed under an Ecology Agreed Order, Ecology Voluntary Clean-up Program (VCP), or as independent clean-ups. Investigations, EPA documents, feasibility studies, remedial design plans, clean-up reports, and performance monitoring plans/reports have been provided to Ecology as part of this process. Ecology has conducted Site Hazard Assessments (SHA) for several sites at KCIA.

If the County becomes aware of additional soil, groundwater, or surface water contamination on its property during the course of construction, normal maintenance, or other activities on the property, the County will continue to comply with MTCA reporting requirements. The County will also continue to appropriately manage and dispose of any contamination disturbed during construction or maintenance activities.

Management of Underground Storage Tanks

KCIA ensures tenant UST compliance under Ecology's UST Program (Chapter 173-360 WAC). Under UST program regulations, tenant/operators must perform UST system notifications, inspections, monitoring, and reporting. Tenants who own and operate fueling stations and tanks at KCIA will continue to comply with UST requirements in the next five years and beyond as operation continues. KCIA keeps and annually reviews UST records. KCIA coordinates with the County's Department of Transportation (DOT) to document aboveground and belowground storage tanks owned and operated by the County.

Dangerous Waste Disposal and Reporting

KCIA, as a waste generator, complies with Ecology's Dangerous Waste Regulations (Chapter 173-303 WAC) and RCRA to ensure hazardous wastes are properly disposed of and recorded. KCIA is required to submit a Dangerous Waste Report to Ecology each year for its waste streams. Tenants and operators are also required to comply with these requirements.

Hazardous Materials Abatement

For demolition of building structures at KCIA, hazardous material surveys are performed in accordance with the following:

- EPA 40 Code of Federal Regulations (CFR), Part 763
- Washington State Department of Labor and Industries (L&I) WAC 296-62-077, WAC 296-155-176, WAC 296-800-170, Chapter 296-841 WAC
- PSCAA Regulation III, Article 4

The surveys identify hazardous materials that require abatement and proper disposal prior to demolition. Asbestos-related activities are coordinated with DPER and with PSCAA.

Airport De-icing and Washing Policy and Facilities

To maximize stormwater protection, KCIA constructed de-icing and washing pads for aircraft. De-icing/wash pads were constructed to include oil-water separators before discharge to the sanitary sewer system. An aircraft de-icing and washing policy was established to ensure that tenants and operators are knowledgeable of approved de-icing locations and procedural

requirements. KCIA also manages and maintains a KCIW Discharge Authorization (4109) to allow for de-icing/washing discharges into the sanitary sewer system.

Capital Improvement Program

Through its capital improvement program, KCIA has updated its infrastructure to support source control and remediation. These include rehabilitating runways and taxiways, refurbishing stormwater pump stations, repairing/replacing damaged stormwater pipes, and updating aging ground vehicles. In addition, the program allows for redevelopment activities such environmental investigations, hazardous materials abatement, building demolition, feasibility studies, and environmental cleanups. Table B-3 presents relatively recent major airfield projects and completion dates.

Table B-3. Recent Major Projects at KCIA

Project	Completion Date
Main Runway Rehabilitation Project	2006
Short Runway Rehabilitation Project	2001
Taxiway Bravo Rehabilitation Project	2008
Taxiway Alpha Rehabilitation Project	2013
South Pump Station Rehabilitation Project	2004
North Safety Area Project	2005
Stormwater Pipe Rehabilitation Project	2014

Public Outreach and Education

KCIA participates in outreach activities intended for educating tenants and operators to control discharges of pollutants into the KCIA stormwater system. Some of these activities include the following:

- **Spill response training**. Spill response training is performed annually by Airport Operations to inform tenants of notification, response, and spill prevention requirements.
- **De-icing policy training**. De-icing policy training is performed annually during the fall to inform tenants on approved deicing procedures and locations.
- **KCIA Website**. The King County International Airport website informs readers on environmental accomplishments including green roofs, sound insulation, stormwater protection, and site cleanups. Inhabit, an environmental newsletter, previously performed this outreach.

KCIA tenants are also reminded of the airport's ongoing compliance with environmental regulations during annual tenant assessments.

Community outreach is performed as a County effort with a representative from King County Department of Transportation attending for KCIA. KCIA Roundtable meetings are convened regularly with its stakeholders to discuss status and concerns. The KCIA planner also attends Georgetown Community meetings.

Roads Services Division

King County's RSD designs, builds, operates, and maintains roads, bridges, and other features in the ROW in unincorporated areas of King County including part of the LDW drainage basin. The RSD service area includes about 1,500 miles of roadway and 180 bridges. RSD also has some

areas of responsibility regarding maintenance of the County's MS4 system per the County's NPDES Phase I Municipal Stormwater Permit, including street sweeping and vactoring, repairing, and cleaning stormwater flow control and water quality treatment facilities, catch basins, and conveyance systems (pipes and ditches. These efforts help address contaminants such as petroleum hydrocarbons, PAHs, and metals.

RSD has faced significant funding challenges in recent years. If funding can be secured, the division will be responsible for the stormwater line cleaning action described in Chapter 3.

More information on RSD's programs is available at: http://www.kingcounty.gov/transportation/kcdot/Roads.aspx.

Regional Road Maintenance Endangered Species Act Program

King County implements the Regional Road Maintenance Endangered Species Act Program Guidelines, which are designed to minimize the impacts of road maintenance activities on receiving water bodies in order to protect their biota. The program emphasizes training and education for all Traffic and Roads Maintenance staff to promote the selection and use of BMPs to protect receiving water bodies from pollutants.

The program focuses on sediments and associated contaminants, with focus on petroleum hydrocarbons, PAHs, and metals. It covers unincorporated King County and areas in participating cities.

Snow and Ice Response Program

The snow and ice response program applies sand, salt, and anti-icer to roads in unincorporated King County during inclement weather to improve traction and safety for the motoring public. Improved traction reduces the likelihood and severity of vehicle accidents which, in turn, limits and minimizes spills of automotive fluids. Recovery of sand post-event through sweeping and catch basin cleaning minimizes the amount of sediment that is transported downstream to receiving water bodies. The program covers unincorporated King County and the cities that contract with the RSD. It addresses sediments and associated contaminants as well as substances that could be spilled as a result of vehicle accidents.

Routine Road Maintenance

The Roads Maintenance Section maintains road ROW and associated stormwater conveyance systems throughout unincorporated King County. Maintenance is ongoing and covers a wide variety of activities designed to preserve the condition and functionality of infrastructure within the ROW. Activities include cleanup of automotive fluid spills, removal of illegally dumped solid waste, removal of landslide material, snow and ice response, stabilization of eroding soils, street sweeping, litter removal, shoulder grading, removal of creosote-treated timbers, and sediment removal from catch basins, pipes, ditches, and stormwater ponds. All of these activities can minimize delivery of pollutants to receiving water bodies. Pollutants addressed include sediments and associated contaminants, as well as substances potentially spilled as a result of vehicle accidents.

Facilities Management Division

King County's FMD operates and manages the County's capital assets by developing and maintaining cost-conscious, sustainable, high-quality facilities and environments. FMD ensures

that developed sites and vacant sites with stormwater facilities are inspected annually for stormwater and water quality compliance.

FMD is the custodial agent for seven parcels located directly on the LDW (referred to as the Harbor Bond properties), five developed parcels, and 145 vacant parcels scattered in the drainage areas of the LDW (Figure B-7). The Harbor Bond properties have been leased to a variety of tenants for almost a century for industrial and commercial purposes that benefitted from both rail and water access. A number of programs, permits, and activities are in place to reduce the potential of recontamination from the FMD properties in the LDW drainage area.

Harbor Bond Properties

The Harbor Bond properties occupy the right bank of the Duwamish River from RM 1.0 to 1.4 (Figure B-8). These parcels include most of the underwater portion of Slip 1 and extend south to include the current operations of Manson Construction Company (Manson), Cadman Aggregate and Ready-Mix (Cadman), United Western Supply, J.A. Jack & Sons, Inc., and Ardagh (formerly Saint-Gobain Containers). The business operations, stormwater management systems, and regulatory permits vary considerably:

- Manson leases the Slip 1 parcel and the ground and dock area to the south for storage and repair of marine construction vessels, equipment, and supplies. Stormwater from the ground lease area is captured and directed to an on-site infiltration system with no direct discharge to the LDW. The company holds an industrial discharge permit for limited discharges to the sanitary sewer. Ecology has determined that Manson is not required to operate under an ISGP.
- Cadman imports, stores, and sells cement and aggregate, and also operates a large ready-mix batch plant. Stormwater is directed to an on-site cistern where it is stored for later use in the ready-mix product. Although there is a discharge pipe to the LDW, the company has not reported a discharge for several years on their quarterly discharge reports to Ecology. The cistern has been sized, according to company reports, for the 100-year storm event. The company operates under a Sand and Gravel General Permit administered by Ecology. It also holds an industrial waste discharge permit for limited discharges of process water to the sanitary sewer.
- United Western Supply operates a large warehouse and trans-shipment business. Most materials are stored indoors with very limited outdoor storage and off-loading from rail cars. No storm drains serve the property, which is mostly roofed, and discharges infiltrate and are not treated. Ecology does not require an ISGP.
- J.A. Jack & Sons, Inc., imports limestone spall and processes and sells industrial and agricultural limestone in bags and bulk. The facility treats stormwater with an oil/water separator and stores stormwater in a vault for infiltration. Any overflow that formerly entered the LDW at Outfall 2007 has now been rerouted to discharge from Outfall 2010. J.A. Jack & Sons operates under a Sand and Gravel General Permit.
- Ardagh operates a large facility along the LDW. Stormwater runoff from the county-owned property is restricted to large warehouse roof areas (one storm outfall) and mixed roof and paved areas for vehicular traffic (three separate outfalls). No stormwater exposed to industrial processes discharges from the property. The entire facility operates under an Ecology-administered ISGP.

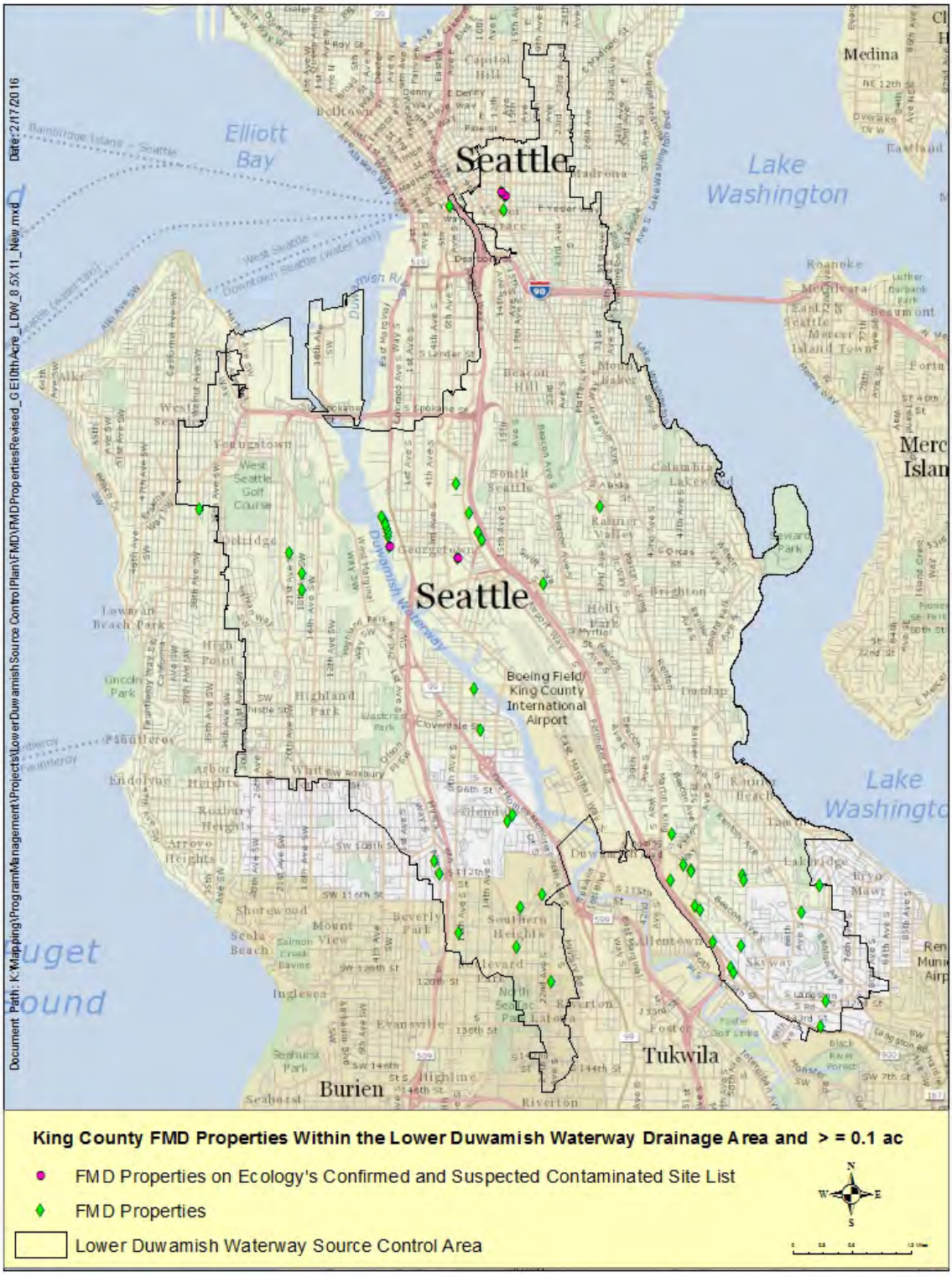

Figure B-7. King County Facilities Management Division Properties in the Lower Duwamish Waterway

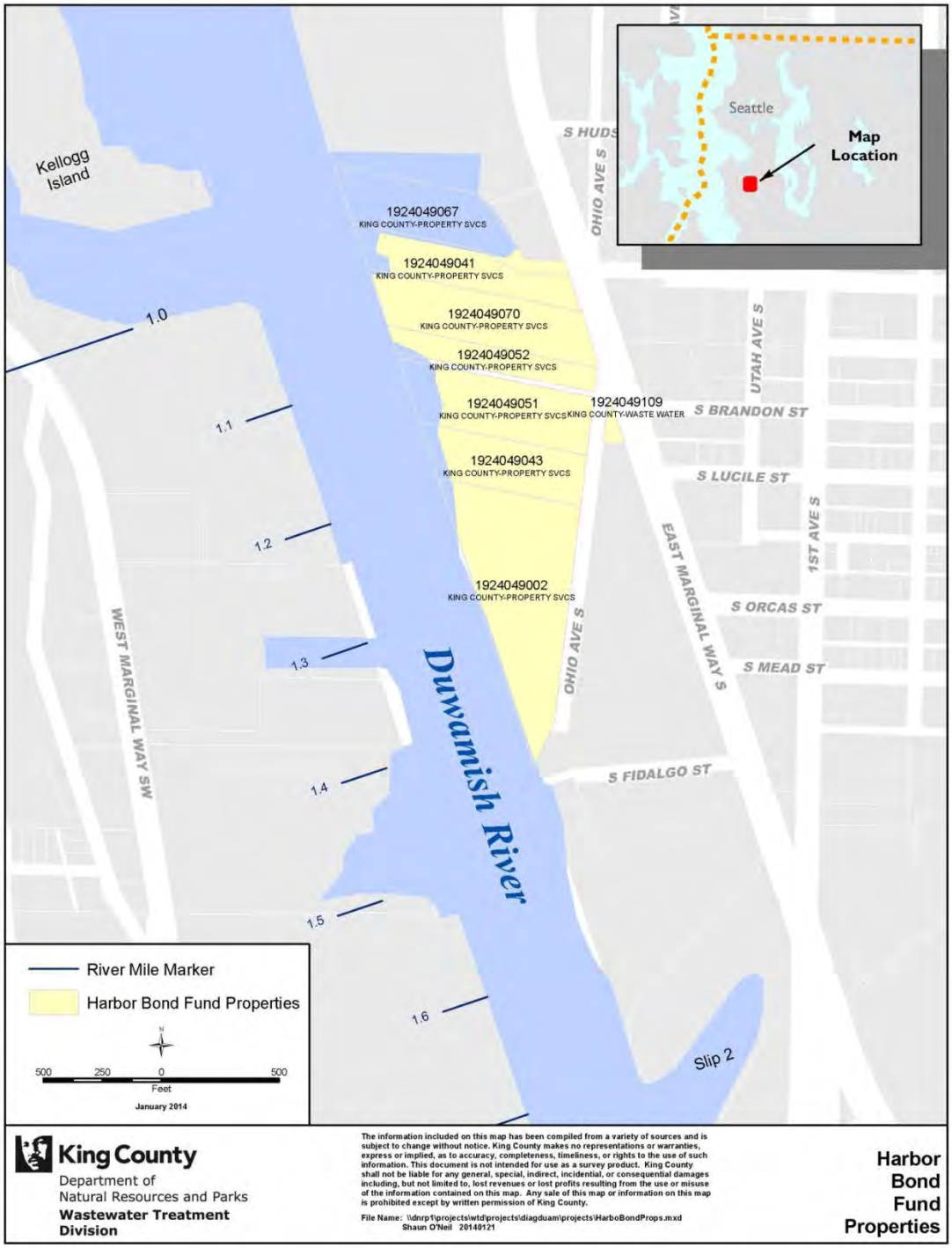

Figure B-8. Harbor Bond Properties on the Lower Duwamish Waterway

FMD contracts with WLRD to perform water quality compliance inspections at these properties every five years in compliance with the County's NPDES Phase I Municipal Stormwater Permit. Inspections are coordinated with Ecology industrial permit inspections, Seattle stormwater compliance inspections, and, most recently, the Ecology's Local Source Control Specialist (previously Urban Waters Initiative inspection).[8] These inspections ensure the stormwater collection systems are maintained and operated according to the approved designs and stormwater pollution prevention plans. Inspections also confirm that water quality BMPS are in place.

As custodial agent for King County, FMD administers leases with all these tenants and ensures the leases, as they are renewed, contain specific and comprehensive language requiring conformance with the most current applicable environmental regulations, including those for stormwater.

FMD will continue to coordinate and assist where possible to implement elements of the Ecology's January 2011 LDW Source Control Action Plan (RM 1.0 to 1.2). Recently completed actions called for in the plan include the following:

- Coordinated business inspections at the Cadman and J.A. Jack & Sons, Inc. facilities
- Confirmation of non-connectivity of a Manson catch basin to the Cadman system
- Source control inspection at United Western Supply

Remaining actions include participating in a visual bank survey at the Manson site with possible follow-up sampling and possible follow-up actions after Ecology conducts a confirmation analysis of the success of an earlier cleanup at the Manson site.

Other Properties

The County manages five other developed parcels in the contributing area:

- The Orcas Street fleet maintenance facility contains paved parking for approximately 110 vehicles and a large warehouse structure enclosing all vehicle maintenance functions.
- The Barclay Dean facility on Seventh Avenue South houses county Sheriff's offices, indoor storage, and paved parking for about 20 vehicles.
- The Records and Elections Warehouse on East Fir Street includes three warehouse buildings and paved parking for about three dozen vehicles.
- The Youth Services Center (YSC) is a major facility on 12th Avenue South occupying more than four city blocks and includes courtrooms, offices, a major youth detention facility, and paved parking for more than 400 vehicles. [two parcels]

All these developed parcels are inspected annually under contract with WLRD for stormwater facility compliance, and every five years for water quality compliance. The County has funded a complete replacement of the YSC facility; Phase One will occur in the next five years. The design-build request for proposals indicates an intent to conform with Seattle's GSI techniques.

[8] The Urban Waters Initiative was an interagency coordination effort of Ecology that provides increased resources to speed up pollution reduction efforts to benefit the waters, the sediments, and human and marine inhabitants of the Duwamish Waterway. It is now referred to as Local Source Control Specialist funding.

These techniques will minimize stormwater runoff from the new facility that would otherwise discharge to the combined sewer system.

The remaining 145 properties are scattered throughout the rest of the contributing area and include a 19th century cemetery and small riverfront park. The remainder of the parcels are small, vacant properties that have come to the County through the failure to pay property taxes (Tax Title Properties) or as the result of open space dedications through formal platting processes. FMD is obligated by state law to retain custodial control over Tax Title Properties if they cannot be surplused through a defined process.

These remaining properties have recently been folded into the stormwater inspection program conducted by WLRD. If constructed drainage facilties are discovered on the property, the parcel becomes part of the Stormwater Facility Inspection Program. If there are no drainage improvements, the parcel is inspected to determine if there are potential sources of water pollution (usually illegal dumping of polluting wastes). The water quality inspection occurs on a five-year rotation. Discovered drainage deficiencies or polluting situations are corrected by Roads Maintenance crews, private contractors or the Solid Waste Community Litter Program. The 105 parcels with an area of less than a tenth of an acre are managed on a complaint basis.

More information on FMD's programs is available at: http://www.kingcounty.gov/operations/FacilitiesManagement.aspx.

Environmental Health Services Division, Public Health – Seattle & King County

The mission of Public Health is to identify and promote the conditions under which all people can live in healthy communities and can achieve optimum health. Public Health's Environmental Health Services Division supports efforts to control point sources that can potentially contribute to sediment contamination in the LDW. This is accomplished through the following regulatory and oversight activities that are described in the following sections:

- Minimize potential human and environmental exposures to sewage and chemicals released from properties that have on-site sewage (septic) systems
- Administer and enforce state and local regulations governing the safe handling of solid waste; there are 12 permitted solid waste facilities and 42 permit exempt solid waste facilities discharging into the LDW drainage basin.
- Continue other regulatory activities related to the release of wastes from plumbing structures, food facilities, and water recreation facilities into public sewer systems
- Help prevent pollutants from entering the LDW through non-regulatory activities

More information on Public Health's programs is available at http://www.kingcounty.gov/healthservices/health.aspx.

On-site Wastewater Program Regulatory Activities

Public Health administers and enforces the "on-site" (on the property) sewage (septic) code put forth in Chapter 246-272A WAC and Chapter 13 of the King County Board of Health Code. These regulatory standards are intended to minimize human and environmental exposure to sewage from on-site sewage systems. There are 45 properties with known on-site sewage systems in the LDW drainage basin; however, Public Health records for on-site sewage systems are not complete, particularly for areas outside of Seattle. Public Health evaluates and approves

the design, location, size, age, functionality, installation, and maintenance contracts of on-site sewage systems for building permit applications on new systems (since 1999), remodels, and additions. Homes for sale (since 2009) must submit a current maintenance report performed by a Public Health-certified maintainer to Public Health and the buyer. Public Health assigns inspectors to investigate complaints of septic failure within two weeks of receipt. Property owners must repair their system or connect to public sewers. Failure to do so results in enforcement (i.e., notice of violation, notice and orders, civil penalties, and legal action).

The On-site Wastewater Program runs certification programs for all septic system pumpers, installers, and on-site system maintainers. The program provides outreach and "Sanitarian of the Day" phone support to property owners.

Solid Waste Program Regulatory Activities

Under Chapter 173-350 WAC and King County Board of Health Code Title 10, the Solid Waste Program administers and enforces state and local regulations governing the safe handling of solid waste. Solid waste includes municipal solid waste (garbage); construction, demolition, and land clearing debris (CDL); compost materials; recycling materials; contaminated soils; medical waste; and moderate risk waste. Regulations minimize the potential for contaminants to leave the site by having runoff collection at the site to protect surface water and groundwater, controlling windblown dust, and minimizing vehicle track-out. Public Health follows up with enforcement as necessary and appropriate. The enforcement process is implemented when the same violations are observed at a facility within a period of a year. When a violation is observed, the inspection report would be marked as "Complete." If the same violation was observed multiple times within a period of a year, then the report would be marked as "Unsatisfactory." Continued non-compliance would initiate a Notice of Violation and then a Notice & Order to assess $250 per day civil penalties if they are still out of compliance beyond the deadline date of the Notice & Order. The Notice & Order allows for the facility operator to appeal.

For the 12 permitted solid waste facilities in the LDW drainage basin (Table B-4), Public Health reviews site schematics, evaluates operational plans, issues permits, monitors operations, and performs routine inspections (Figure B-9). The frequency of inspections is based on the facility type: six to eight times per year for Moderate Risk Waste; four times per year for Solid Waste Piles; six to eight times per year for Transfer Stations; and eight times per year for Material Recovery Facility. Public Health can increase the frequency of inspections when warranted if issues arise at a facility. Inspectors verify that solid waste handling activities and vehicle use are in compliance with regulations. Since 2014, Public Health received applications for three more proposed solid waste facilities in the LDW drainage area.

Table B-4. Solid Waste Facilities in the LDW Drainage Basin Permitted by Public Health – Seattle & King County

Name	Type of Facility	Site Address
South Transfer Station (Seattle Public Utilities)	Municipal transfer station	8100 Second Avenue South Seattle, WA 98108
South Recycle & Disposal Station (Seattle Public Utilities)	Municipal transfer station	8100 Second Avenue South Seattle, WA
South Seattle Household Hazardous Waste Facility	Moderate risk waste processing facility	8100 Second Avenue South Seattle, WA 98108

Eastmont Waste Management (Waste Management)	Recycling operation – Material Recovery facility	7201 West Marginal Way SW Seattle, WA 98108
CDL Recycle, LLC	Construction, demolition, and land clearing debris processor	7201 East Marginal Way Seattle, WA 98108
Alaska Street Reload and Recycling	Solid waste piles that accept dredge materials and petroleum contaminated soils	70 South Alaska Street Seattle, WA 98134
Lafarge	Solid waste piles that accept dredge materials and petroleum contaminated soils	5400 West Marginal Way Southwest, Seattle, WA 98106
Seattle City Light South Service Center	Moderate risk waste processing facility	3613 Fourth Avenue South Seattle, WA 98134
Rabanco Recycling-SP	Solid waste piles that accept dredge materials and petroleum contaminated soils	2733 3rd Avenue South, Seattle, WA 98134
Rabanco Recycling-TS	Transfer station for construction and demolition and material recovery facility	2733 3rd Avenue South, Seattle, WA 98134
Cleanscapes (A Recology Company)	Material Recovery Facility	4401 East Marginal Way South, Seattle, WA 98134
Waste Management Biomedical Waste Treatment Facility	Biomedical Waste Treatment Facility	149 Southwest Kenyon Street, Seattle, WA 98108

Public Health reviews and assesses the waste handling practices of 30 permit-exempt solid waste facilities in the basins discharging into the LDW (Figure B-9). Staff reviews annual reports and performs site visits at each facility to assess the types of solid waste present and waste-handling processes, and the measures used to prevent contaminants from adversely impacting the environment. Occasionally, Public Health will change a permit-exempted facility to a permitted facility and work with facility owners and operators on the regulatory requirements.

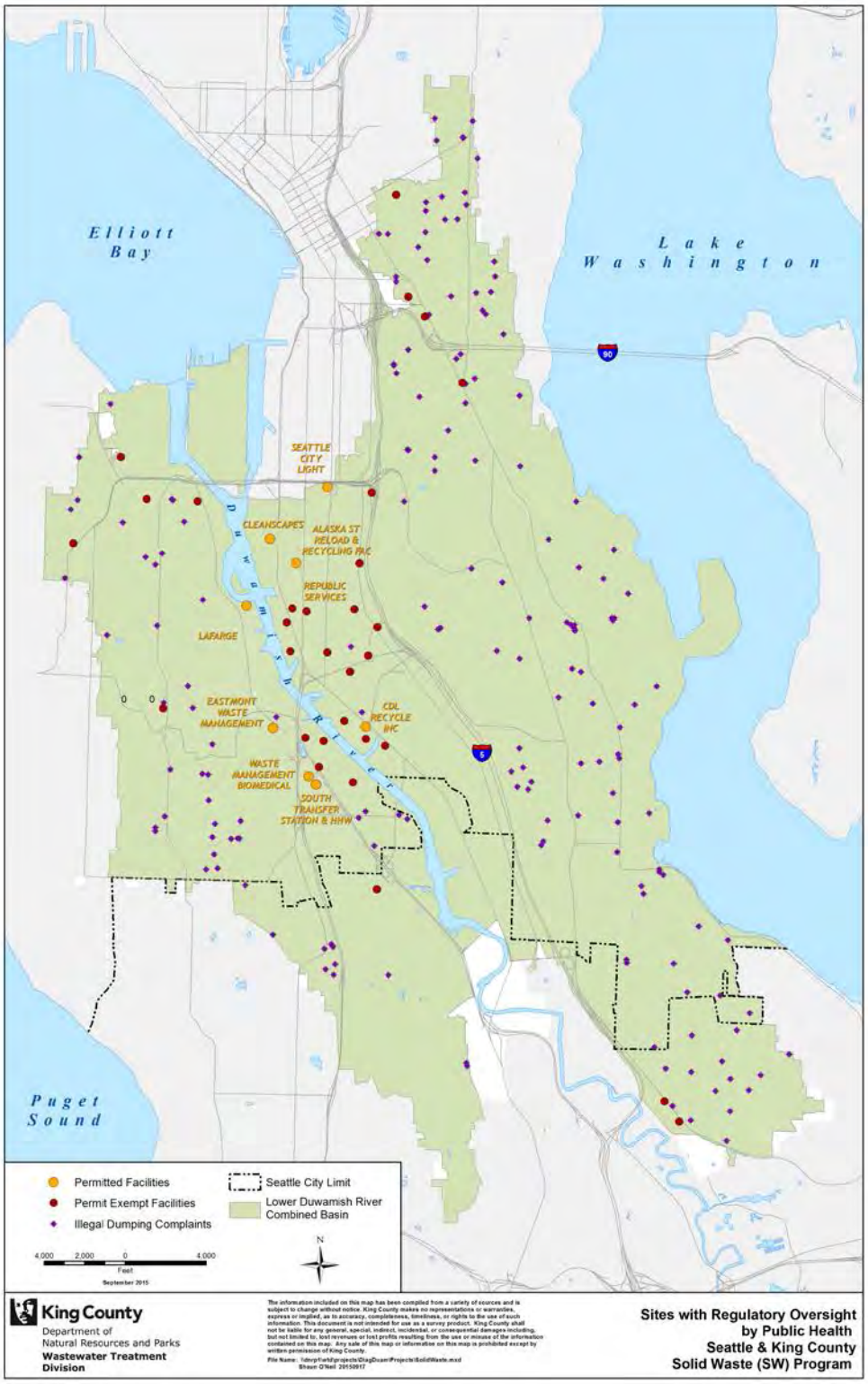

Figure B-9. Sites with Regulatory Oversight by Public Health – Seattle & King County, Solid Waste Program

Public Health responds to rodent complaints in Seattle, including areas near the LDW. Under King County Board of Health Code Chapter 8.06 (Rodent Control Regulations), staff performs site visits to identify rodent presence and educate residents on actions necessary to control rodents (for example, removing harborage areas and food sources). Public Health follows up on cases that are not corrected and enforces compliance as necessary and appropriate.

Public Health also responds to complaints of unlawful garbage dumping. Under Chapter 173-350 WAC and King County Board of Health Code Chapter 10.11, staff investigates complaints of dumping in partnership with King County cities. Figure B-9 shows the locations of complaints in the basins discharging into the LDW. Staff performs a site visit to assess conditions and to educate the owner of what is needed to comply with code. If no action is taken after a follow-up letter, Public Health enforces compliance as necessary and appropriate.

Public Health's Solid Waste Program maintains active websites with educational materials informing the public and businesses about solid waste disposal: http://www.kingcounty.gov/healthservices/health/ehs/toxic/SolidWaste.aspx, and rodent control: http://www.kingcounty.gov/healthservices/health/ehs/rats.aspx.

Other Public Health Regulatory Activities

Other Public Health staff in the Environmental Health Services Division support source-control efforts in the area of the LDW through a variety of regulatory efforts and oversight activities, including enforcement of standards related to the release of wastes into public sewer systems. Examples include:

- Under the Washington State Environmental Policy Act (SEPA), Chapter 43.21C RCW, Chapter 197-11 WAC, King County Board of Health Code Section 2.06.10, and Seattle Municipal Code (SMC) Chapter 25.05, Public Health is authorized to review and comment on permit applications or agency projects and proposals.
- Public Health administers and enforces the Uniform Plumbing Code as adopted under KCC Chapter 16.32 and SMC Chapters 22.500−22.506, including standards for proper disposal of wastewater into a sanitary sewer. Inspectors will not approve building permits for structures that do not have a proper point of discharge. The program currently allows for collected rainwater to be used in non-potable applications (e.g., flushing toilets and urinals). These actions can result in reduced releases into the stormwater system.
- Under Chapters 246-215, 246-260, 246-262 WAC and King County Board of Health Code Chapters 2, 5, and 14, Public Health enforces state and local food safety regulations (Chapter 246-215 WAC and Chapter 5 Board of Health Code) and state and local water recreation facility (WRF) regulations (Chapters 246-260 and 246-262 WAC and Chapter 14 Board of Health Code), including standards governing the proper disposal of food and WRF wastewater into a sanitary sewer. The program works closely with food establishments to require proper management and disposal of food wastes, such as oils and grease.

Non-Regulatory Activities

Through a Memorandum of Understanding between Public Health and DNRP, Public Health maintains a website with educational materials about potential health impacts from exposure to fecal matter from CSOs. In addition, Public Health runs a hotline to address general questions and complaints. In response to rare sewage discharges from CSOs in the LDW, Public Health

collects water samples at marine beaches downstream of the LDW. Other activities Public Health participates in are as follows:

- Provides guidance to SPU's IDDE team on the risk level associated with discharges and appropriate response.
- Participates on the PSCAA advisory council; staff provides counsel and input on agency programs and regulations.
- Provides outreach through its Dirt Alert Program to areas along the coastline of King County affected by the Tacoma Smelter Plume, including drainage areas to the LDW. The educational materials on arsenic and lead helps prevent exposures in this area and supports the recruitment of homeowners in highly affected areas for free soil sampling.
- Collaborates with Washington State Department of Health (DOH) on outreach messaging for DOH fish advisories in King County, including the fish advisory for the LDW. Public Health is seeking funding to provide grants to community partners.

Public Health is one of the five agencies comprising the LHWMP. Public Health staff supports LHWMP to maintain educational outreach, inform the public about household hazardous chemicals, and work with businesses in vulnerable geographic areas to provide guidance for secondary containment to small quantity generators as an incentive and to prevent pollution.

Local Hazardous Waste Management Program

King County's LHWMP is a multi-agency program focused on moderate risk waste in King County, including in all incorporated cities and unincorporated county areas. Participating agencies include the County's SWD and WLRD, Public Health –Seattle and King County, SPU and the Sound Cities Association. The program implements the moderate risk waste plan required by Chapter 70.105 RCW, as updated most recently in 2010 and approved by Ecology. It addresses hazardous wastes generated by residents and generated in small quantities by businesses and institutions.

Services include household hazardous waste collection; public education; small quantity generator technical assistance; small quantity generator waste collection; and targeted outreach, technical support, and financial incentives to communities and businesses. These efforts help keep pollutants out of surface waters, including the LDW, and the environment. The programs include the following:

- On-site technical assistance visits to small businesses and institutions
- Educational services to help reduce potential exposures and increase better waste practices
- Policy initiatives, such as product stewardship legislation addressing mercury-containing lamps, unused pharmaceuticals, paint, batteries, and other hazardous products
- Training of investigators in identification of sources of COCs
- Working with selected industries, including dry cleaners, nail salons, artists, and janitorial services, to address and explore options for shifting away from the wide variety of hazardous products used

Of particular importance to the LDW source control efforts are LHWMP's on-site technical assistance visits to small businesses and institutions. LHWMP investigators provide on-site consultation services throughout the County; in 2013, they were on-site at more than 500 locations, including many in the LDW. Over the past 22 years, LHWMP has assisted more than 35,000 businesses and institutions with direct eyes-on-site technical assistance visits.

LHWMP also works with selected industries and the various ethnic groups known to work in each industry. Currently, the program is focusing on dry-cleaning companies to explore options for shifting away from perchloroethylene (PERC) and other chlorinated solvent spot cleaners. The program is also working with artists to address the wide variety of hazardous products they use in glass work, pottery, printing, painting, jewelry, and various other trades. Nail salons are another focus, mainly addressing worker and customer exposures to hazardous solvent vapors. LHWMP is also targeting janitorial/custodial services, both in commercial and residential settings, focusing on safe use of cleaning products and promotion of safer alternative cleaners. Lastly, the program works closely with landscape service companies and their workers, promoting proper use of pesticides and pesticide-reduction techniques.

More information on LHWMP's services is available at: http://www.lhwmp.org/home/.

Appendix C

Schedule in Consent Decree to Complete King County's Long-Term Combined Sewer Overflow Control Plan Projects

APPENDIX B: CSO Control Measures, Design Criteria, Performance Criteria, and Critical Milestones

CSO Control Project and Discharge Serial Number (DSN)	CSO Control Measure(s)	Description	Design Criteria	Performance Criteria in a Typical Year	Critical Milestones	Estimated Project Cost in 2010 Million Dollars
Hanford #1 (DSN 031)	Increased Conveyance and Storage Tank	Increased conveyance to the Bayview Tunnel and storage tank near Rainier Avenue	0.34 MG of peak CSO storage with conveyance[2]	Reduce to one overflow event per year on a 20-Year Moving Average	• Submission of Facilities Plan by December 31, 2014 • Completion of Bidding by December 31, 2016 • Construction Completion by December 31, 2019	$19.2
Brandon St./S. Michigan St. (DSN 041/039)	CSO Treatment and Conveyance	High rate clarification treatment to control CSOs along the East Waterway	66 MGD of peak CSO treatment and new conveyance system	CSOs shall meet all NPDES Permit limits and State water quality standards	• Submission of Facilities Plan by December 31, 2015 • Completion of Bidding by December 31, 2017 • Construction Completion by December 31, 2022	$139.7

CSO Control Project and Discharge Serial Number (DSN)	CSO Control Measure(s)	Description	Design Criteria	Performance Criteria in a Typical Year	Critical Milestones	Estimated Project Cost in 2010 Million Dollars
W. Michigan St./Terminal 115 (DSN 042/038)	Storage Pipe[1]	Storage pipe along West Marginal Way	0.32 MG of peak CSO storage[2]	Reduce to one overflow event per year on a 20-Year Moving Average	• Submission of Facilities Plan by December 31, 2020 • Completion of Bidding by December 31, 2022 • Construction Completion by December 31, 2025	$14.8
Chelan Ave. (DSN 036)	Storage Tank	Storage tank near West Duwamish Waterway	3.85 MG of peak CSO storage on West Duwamish Waterway near Chelan Avenue	Reduce to one overflow event per year on a 20-Year Moving Average	• Submission of Facilities Plan by December 31, 2018 • Completion of Bidding by December 31, 2020 • Construction Completion by December 31, 2023	$51.7

CSO Control Project and Discharge Serial Number (DSN)	CSO Control Measure(s)	Description	Design Criteria	Performance Criteria in a Typical Year	Critical Milestones	Estimated Project Cost in 2010 Million Dollars
Hanford #2/ Lander St./King St./Kingdome (DSN 032/030/028/029)	CSO Treatment	High rate clarification treatment facility in South Seattle neighborhood	151 MGD of peak CSO treatment and modifications to existing conveyance system	CSOs shall meet all NPDES Permit limits and State water quality standards	• Submission of Facilities Plan by December 31, 2024 • Completion of Bidding by December 31, 2026 • Construction Completion by December 31, 2030	$270.8
3rd Avenue West (DSN 008)	Joint City-County Storage Tank OR Independent County Storage Tank	Storage tank on north side of Ship Canal OR Storage tank near Seattle Pacific University ($56.4 million)	7.23 MG of peak CSO storage OR 4.18 MG of peak CSO storage	Reduce to one overflow event per year on a 20-Year Moving Average at one County site and multiple City sites	• Submission of Facilities Plan by December 31, 2018 • Completion of Bidding by December 31, 2020 • Construction Completion by December 31, 2023	$50.3
University (DSN 015)	Joint City-County Storage Tank[1] OR Independent County Storage Tank[1]	Storage tank near University of Washington OR Storage tank near University of Washington ($54.5 million)	5.23 MG of peak CSO storage OR 2.94 MG of peak CSO storage	Reduce to one overflow event per year on a 20-Year Moving Average at one County site and multiple City sites	• Submission of Facilities Plan by December 31, 2023 • Completion of Bidding by December 31, 2025 • Construction Completion by December 31, 2028	$45.2

Appendix D

Facilities Management Division Properties in the Lower Duwamish Waterway Drainage Area

PIN	DESCRIPTION	ACREAGE	USE TYPE	ADDRESS	CURRENT TENANT	REQUIRES SWPPP	SEWER SERVICE	ON CSCL LIST	KC INSPECTION	OTHER_DESC
1800014	LUTHER COLLINS DC	0.7	TAX TITLE	900 S LUCILE ST	-	NO	-	NO	2012	UNDER I-5
3800011	BENNETT DC #47	0.01	TAX TITLE	55xx S Langston Rd	-	NO	-	NO	NO	3' X 75' Strip back yard
5200078	MAPLE S.A #49	0.01	TAX TITLE	67xxVista Ave S	-	NO	-	NO	NO	SM. STRIP-NO ACCESS
133000460	ALINE HEIGHTS ADD.	0.38	TAX TITLE	16TH AVE S & S 101st ST	-	NO	-	NO	2012	POR TR 58 & 59
182000255	ALLENTOWN ACRES	0.42	TAX TITLE	12401 EMPIRE WAY S	-	NO	-	NO	2011	
182000320	ALLENTOWN ACRES	1.71	TAX TITLE	12601 EMPIRE WAY S	-	NO	-	NO	2011	
185000100	ALLENTOWN ACRES	0.14	TAX TITLE	120XX 56TH PL S	-	NO	-	NO	2013	
223049135	TAX LOT 135	0.01	TAX TITLE	96xx 58th Ave S	-	NO	-	NO	NO	118 SQ FT Strip betwn lots
424049013	TAX LOT 9013	0.02	TAX TITLE	24xx S Judkins St	-	NO	-	NO	NO	
523049019	TAX LOT 19	0.05	TAX TITLE	108xx 6th Ave S	-	NO	-	NO	NO	1500 SQ FT ON SR-509
523049188	TAX LOT 188	0.07	TAX TITLE	102xx 4th Ave S	-	NO	-	NO	NO	300 SQ FT ON SR-509
603002374	BEACON HILL VIEW ADD	0.03	TAX TITLE	92XX 42ND AVE SO	-	NO	-	NO	NO	
792000018	BEVERLY HEIGHTS GRDN TRS	0.01	TAX TITLE	124xx 24 Ave S	-	NO	-	NO	NO	Back yard
792000019	BEVERLY HEIGHTS GRDN TRS	0.01	TAX TITLE	124xx 24 Ave S	-	NO	-	NO	NO	Back yard
795001102	BEVERLY PARK DIV 1	0.64	PARK SITE	11xxx 4th Ave S	-	NO	-	NO	2012	
795001240	BEVERLY PARK DIV 1	0.5	PARK SITE	111xx 4th Ave S	-	NO	-	NO	2012	
923049112	TAX LOT 9112	0.33	TAX TITLE	114xx Military Road S	-	NO	-	NO	Sched 2015	
942001050	JEFFERSON PARKING LOT	1.9	PARKING LOT	415 6TH AVE	King Co. Parking Garage	NO	COMBINED	NO	2011	
985000261	BOULEVARD PARK ADD	0.11	TAX TITLE	18TH AVE S / S 116 ST	-	NO	-	NO	2014/15	
985000670	BOULEVARD PARK ADD	0.19	TAX TITLE	12250 DES MOINES MEMORIAL DR	-	NO	-	NO	2013	
1035000130	BRADNERS GARDEN TRACTS	0.01	TAX TITLE	972x Beacon Ave S	-	NO	-	NO	NO	4' strip betwn lots
1037000120	BRAILES FIRST ADD.	0.61	TAX TITLE	46 Ave S & S VIictor St	-	NO	-	NO	2012	topography

PIN	DESCRIPTION	ACREAGE	USE TYPE	ADDRESS	CURRENT TENANT	REQUIRES SWPPP	SEWER SERVICE	ON CSCL LIST	KC INSPECTION	OTHER_DESC
1105000430	BRIGHTEN BEACH ACRE TRACT	0.01	TAX TITLE	46xx S Holly St	-	NO	-	NO	NO	8' X 62' Strip back yard
1105000860	BRIGHTEN BEACH ACRE TRACT	0.04	TAX TITLE	70XX 48TH AVE SO	-	NO	-	NO	NO	
1108000688	BRIGHTON BEACH ORCHRD ADD	0.05	TAX TITLE	46xx S Othello St.	-	NO	-	NO	NO	5/6 INTEREST IN ROAD
1223049127	TAX TITLE TL 9127	0.2	TAX TITLE	S 116th St at S 116th Pl	-	NO	-	NO	Sched 2015	Street
1282301050	BYRON ADDN	0.01	TAX TITLE	3223 33 Ave S	-	NO	-	NO	NO	436 SFTriangle back yard alley access
1443500642	CEDAR GROVE ADD	0.01	TAX TITLE	48XX S AUSTIN ST	-	NO	-	NO	NO	
1447200140	CEDARHURST DV3 LOT12 BK18	0.04	TAX TITLE	Hwy 509 & S 124 St.	-	NO	-	NO	NO	1800 SQ FT Triangle
1623049267	TAX LOT 267	0.09	TAX TITLE	242x S 132nd St	-	NO	-	NO	NO	3' X 125' STRIP
1623049390	TAX LOT 390	0.03	TAX TITLE	243x S 130th Pl	-	NO	-	NO	NO	3' X 292' STRIP
1623049410	TAX LOT 410	0.1	TAX TITLE	12800 24TH AV S	-	NO	-	NO	NO	Paved access
1704900457	COLUMBIA HEIGHTS	0.03	TAX TITLE	44xx S Brandon St.	-	NO	-	NO	NO	1' X 146' STRIP
1721801605	COMMERCIAL STREET	0.01	TAX TITLE	10422 1 Ave SW	-	NO	-	NO	NO	6' X 102' Strip at property lines
1722800985	ORCAS BLDG/MOTOR POOL 3-2005-002	1.8	MAINTENANCE BUILDING	5815 PADILLA PL S	King Co. Fleet Adm.	NO	COMBINED	YES	2010/11/12/13/14/15	707 S ORCAS ST
1753700545	CORGIAT ADD'N	0.01	TAX TITLE	65xx Beacon Ave S	-	NO	-	NO	NO	no access private back yards
1756700050	CORLISS ADD TO COLUMBIA	0.15	TAX TITLE	30xx S Edmunds St.	-	NO	-	NO	NO	topo - buildable
1801500010	COY HILL ADD	0.17	TAX TITLE	129XX 74TH AVE SO	-	NO	-	NO	2013	
1824049111	TAX LOT 111	0.01	TAX TITLE	19 S NEVADA ST	-	NO	-	NO	NO	
1924049002	DUWAMISH - BALL-INCON	8.72	OTHER DEVELOPED	5801 E MARGINAL WY S	Ardagh Glass	YES	SEPARATE	YES	2013	
1924049041	DUWAMISH - MANSON	3.3	OTHER DEVELOPED	5209 E MARGINAL WY S	Manson	YES	SEPARATE	NO	2012	
1924049043	DUWAMISH - BALL-INCON	3.36	OTHER DEVELOPED	5427 OHIO AV S	J A Jacks	YES	SEPARATE	NO	2013	
1924049051	DUWAMISH - UTILITIES W.	4.69	OTHER DEVELOPED	5409 OHIO AV S	Western Utilities/Ardagh Glass	NO/YES	SEPARATE	NO	2013	

PIN	DESCRIPTION	ACREAGE	USE TYPE	ADDRESS	CURRENT TENANT	REQUIRES SWPPP	SEWER SERVICE	ON CSCL LIST	KC INSPECTION	OTHER_DESC
1924049052	DUWAMISH - MANSON	2.11	OTHER DEVELOPED	5225 E MARGINAL WY S SE	Cadman	YES	SEPARATE	NO	2013	
1924049067	DUWAMISH - MANSON	3.29	OTHER DEVELOPED	5225 E MARGINAL WY S SE	Manson	YES	SEPARATE	NO	2012	
1924049070	DUWAMISH - MANSON	4.67	OTHER DEVELOPED	5225 E MARGINAL WY S SE	Cadman	YES	SEPARATE	NO	2013	
2113700550	DUMAR DIV. # 03	0.01	TAX TITLE	79xx 16 Ave SW	-	NO	-	NO	NO	
2115200100	DUMAR'S HIGHLAND PARK SUP	0.07	TAX TITLE	Highland Pkwy n/o SW Austin St.	-	NO	-	NO	2012	30' X 67' Topo betwn Parks
2124049241	COMET LODGE CEMETERY	2.06	TAX TITLE	2000 S GRAHAM ST	-	NO	-	NO	2011	
2124049283	TAX LOT 283	0.01	TAX TITLE	49xx 28th Ave S	-	NO	-	NO	NO	5' X 89' STRIP
2124049290	TAX LOT 9290	0.01	TAX TITLE	30TH AVE S	-	NO	-	NO	NO	
2144800024	EARLINGTON ACRES TRACT	0.005	TAX TITLE	82XX S 128TH ST	-	NO	-	NO	NO	
2254501175	EDES & KNIGHTS ADD SUPPL.	0.02	TAX TITLE	1312 E SPRING ST	-	NO	-	NO	NO	8' X 104' ALLEY R/W
2254501210	EDES & KNIGHTS ADD SUPPL.	0.01	TAX TITLE	E Spring St. betwn 13 & 14 Ave	-	NO	-	NO	NO	8' X 34' ALLEY R/W
2254502530	EDES & KNIGHTS ADD SUPPL.	0.01	TAX TITLE	E Marion betwn 16 & 17 Ave	-	NO	-	NO	NO	Alley R/W
2324039005	TAX LOT 9005	0.13	TAX TITLE	SW HUDSON ST	-	NO	-	NO	2014	
2444600540	FAEGRE'S 1ST ADD	0.02	TAX TITLE	22xx SW Dakota	-	NO	-	NO	NO	7" X 50' STRIP IN ALLEY betwn lots
2624049026	TAX LOT 26	0.01	TAX TITLE	74xx Rainier Ave S	-	NO	-	NO	NO	9' WALKWAY
2624049118	TAX LOT 118	0.05	TAX TITLE	74xx Rainier Ave S	-	NO	-	NO	NO	9' WALKWAY
2824049031	TAX LOT 31	0.01	TAX TITLE	68xx A Vista Ave S	-	NO	-	NO	NO	
2908700085	YOUTH SERVICE CENTER	5.88	BUILDING SITE	300 12th Ave	King Co. Court & Youth Services	NO	COMBINED	YES	2011/12/13/14/15	Scheduled for redevelopment '16-'17
2976800797	GUTHRIES TERRACE PARK	0.02	TAX TITLE	1065x 63rd Ave S	-	NO	-	NO	NO	
2976800894	GUTHRIES TERRACE PARK	0.04	TAX TITLE	AIRPORT WAY S	-	NO	-	NO	NO	
3031200110	HALL BERG 1/4 ACRE TRS	0.03	TAX TITLE	72XX 33RD AVE SO	-	NO	-	NO	NO	
3124049005	TAX LOT 05	0.01	TAX TITLE	8140 DETROIT AV SW	-	NO	-	NO	NO	DIRT ROAD

PIN	DESCRIPTION	ACREAGE	USE TYPE	ADDRESS	CURRENT TENANT	REQUIRES SWPPP	SEWER SERVICE	ON CSCL LIST	KC INSPECTION	OTHER_DESC
3145600160	HARTUNGS ADD TO COLUMBIA	0.01	TAX TITLE	S side S Bennett at 47 Ave S	-	NO	-	NO	NO	6' X 82' STRIP
3145600260	HARTUNGS TO COLUMBIA	0.01	TAX TITLE	S side S Bennett at 47 Ave S	-	NO	-	NO	NO	6' X 82' STRIP
3151600046	HARWOODS ADDN.	0.01	TAX TITLE	1164x 60th Ave S	-	NO	-	NO	NO	10' X 50' STRIP
3275900030	HIDDEN VALLEY ADD	0.07	TAX TITLE	1072x 16th Ave S	-	NO	-	NO	NO	RAVINE - NO ACCESS
3325049035	TAX LOT 35	0.02	TAX TITLE	914 22 Ave	-	NO	-	NO	NO	7' X 79' STRIP
3325049058	TAX LOT 58	0.01	TAX TITLE	353 SQ FT.	-	NO	-	NO	NO	9' X 30' STRIP IN YARD
3325049059	TAX LOT 59	0.01	TAX TITLE	93x 24th Ave	-	NO	-	NO	NO	10' X 90' STRIP IN YARD
3330500206	HILLMAN CITY DIV NO. 1	0.01	TAX TITLE	456x S Lucile St	-	NO	-	NO	NO	2' X 103' STRIP
3330501655	HILLMAN CITY DIV. NO. 01	0.02	TAX TITLE	452x S Mead St	-	NO	-	NO	NO	SM BETW. 2 PROP. 10FT
3331000395	HILLMAN CITY ADD #2 L1 B4	0.07	TAX TITLE	S Brandon & 37 Ave S	-	NO	-	NO	NO	one bldg site contig 0400 0405
3331000400	HILLMAN CITY DIV. 2	0.03	TAX TITLE	54xx 37 Ave S	-	NO	-	NO	NO	one bldg site contig 0405 0395
3331000405	HILLMAN CITY DIV. 2	0.04	TAX TITLE	54xx 37 Ave S	-	NO	-	NO	NO	one bldg site contig 0400 0395
3331500280	HILLMAN CITY DIV NO 3	0.01	TAX TITLE	E side 47 Ave S & S Brandon	-	NO	-	NO	NO	10' X 103' STRIP
3348400990	HILLMANS MEADOW GARDENS DIV #2	0.37	TAX TITLE	50xx S 114th St	-	NO	-	NO	Sched 2015	
3348401022	HILLMANS MEADOW GARDENS #2	0.39	TAX TITLE	51XX S AUGUSTA ST	-	NO	-	NO	Sched 2015	
3348401681	HILLMANS MDW. GARDS #2	0.06	TAX TITLE	50xx S 114th St	-	NO	-	NO	NO	NO ACCESS
3348401790	HILLMANS MEADOW GARDENS 2	0.22	TAX TITLE	11100 47TH AV S	-	NO	-	NO	NO	NO ACCESS
3352400840	HILLMANS MEADOW GARDENS 4	0.06	TAX TITLE	56xx S Leo St.	-	NO	-	NO	NO	7' X 60' Strip adj to Seattle FFD 0842
3352401984	HILLMANS MEADOW GRDN DV#4	0.01	TAX TITLE	1122x 57th Ave S	-	NO	-	NO	NO	3' X 160' Strip betwn lots
3352402192	HILLMANS CD MDW GARDENS 4	0.01	TAX TITLE	118xx 57th Ave S	-	NO	-	NO	NO	1.5' X 51' STRIP
3361401020	HILLMANS GARDEN TRS	0.01	TAX TITLE	12xx S 116 St	-	NO	-	NO	NO	5' X 102' Strip betwn lots

PIN	DESCRIPTION	ACREAGE	USE TYPE	ADDRESS	CURRENT TENANT	REQUIRES SWPPP	SEWER SERVICE	ON CSCL LIST	KC INSPECTION	OTHER_DESC
3361402031	HILLMANS GARDEN TRS	0.03	TAX TITLE	118XX 8TH AVE SO	-	NO	-	NO	NO	
3424049048	TAX LOT 48	0.02	TAX TITLE	865x Beacon Ave S	-	NO	-	NO	NO	5' X 193' STRIP
3438500465	HOMECROFT ADD	0.25	TAX TITLE	564x 23rd Ave SW	-	NO	-	NO	Sched 2015	
3438500993	HOMECROFT ADD PARCEL B	0.15	TAX TITLE	600x 18th Ave SW	-	NO	-	NO	Sched 2015	
3438501685	HOMECROFT ADD LOT 5, BLK 30	0.21	TAX TITLE	650x 21st Ave SW	-	NO	-	NO	Sched 2015	
3438501743	HOMECROFT ADD LOT 3 BL 31	0.16	TAX TITLE	634x 18th Ave SW	-	NO	-	NO	2011	Back Lot undeveloped
3438503179	HOMECROFT ADD	0.01	TAX TITLE	733x 16th Ave SW	-	NO	-	NO	NO	76 SQ FT
3438503198	HOMECROFT ADD'N	0.01	TAX TITLE	160x SW Webster St	-	NO	-	NO	NO	strip betwn lots
3624039148	TAX LOT 148	0.01	TAX TITLE	25 AVE SW	-	NO	-	NO	NO	strip betwn lots
3723800408	JOHNS & HANFORDS FIVE AC	0.04	TAX TITLE	551x 56th Ave S	-	NO	-	NO	NO	PART OF 56 AVE S
3812400722	KELSEYS BRIGHTON BEACH ACRE	0.01	TAX TITLE	680x 45th Ave S	-	NO	-	NO	NO	2' STRIP
3812400745	KELSEYS BRIGHTON BEACH	0.01	TAX TITLE	681x 46th Ave S	-	NO	-	NO	NO	ACRE TRACTS
3826000848	KENSINGTON HEIGHTS REPLAT	0.02	TAX TITLE	Military & S 120 St	-	NO	-	NO	NO	corner
3869401065	KING COUNTY 2ND ADDITION	0.31	TAX TITLE	I-5 & S Lucille St	-	NO	-	NO	2012	50'X 272' SLOPE BELOW I-5
3869401235	KING COUNTY 2ND ADDITION	0.25	TAX TITLE	AIRPORT WAY S	-	NO	-	NO	2014	
3904100148	KITTINGERS ADDITION	0.01	TAX TITLE	43xx S Holden St.	-	NO	-	NO	NO	10' X 47' STRIP
3959400765	LADDS 2ND ADD TO S SEATTL	0.03	TAX TITLE	S. Snoqualmie St. at Corson Ave	-	NO	-	NO	NO	TRIANGLE adj to CITY LIGHT R/W
3959400975	LADDS 2ND ADD TO SEATTLE	0.06	TAX TITLE	45xx 12 Ave S	-	NO	-	NO	NO	TRIANGLE adj to CITY LIGHT R/W
3959401680	LADDS 2ND ADD TO S SEATTL	0.03	TAX TITLE	45xx 11 Ave S	-	NO	-	NO	NO	TRIANGLE adj to CITY LIGHT R/W
3959401891	LADDS 2ND ADD TO S.SEATTL	0.01	TAX TITLE	east of I-5 near S Oregon St.	-	NO	-	NO	NO	adj to City FFD owned 1892
4006000275	LAKE DELL SMITHS ADDITION	0.02	TAX TITLE	42 S & S Rose St.	-	NO	-	NO	NO	
4006000371	LAKE DELL LOT 18	0.01	TAX TITLE	794x MLK Jr Way S	-	NO	-	NO	NO	

PIN	DESCRIPTION	ACREAGE	USE TYPE	ADDRESS	CURRENT TENANT	REQUIRES SWPPP	SEWER SERVICE	ON CSCL LIST	KC INSPECTION	OTHER_DESC
4006000555	LAKE DELL SMITHS ADDN	0.01	TAX TITLE	S. Thistle St	-	NO	-	NO	NO	
4006000564	LAKE DELL SMITHS ADD	0.05	TAX TITLE	S Rose St Extension	-	NO	-	NO	NO	
4058802348	LAKE RIDGE DIV.#2 Lot B	0.15	TAX TITLE	1105x Lakeridge Dr S	-	NO	-	NO	2013	
4174600014	LAMPE FW HOMESTEAD ADD	0.05	TAX TITLE	POR OF COLUMBIAN WAY	-	NO	-	NO	NO	
5312100035	MCELWAINS WP 1ST ADD	0.06	TAX TITLE	341x 20th Ave S	-	NO	-	NO	NO	2' X 14' STRIP
5388600045	MC NATTS 1ST TO S PARK HEIGHTS	0.04	TAX TITLE	14XX HENDERSON ST	-	NO	-	NO	NO	
5392600080	MC NAUGHTS 3RD ADD.	0.02	TAX TITLE	east of I-5 near Massachusetts	-	NO	-	NO	NO	in R/W
5624200750	MOORES FIVE ACRES LOT 44	0.88	TAX TITLE	1004x Des Moines Mem Dr S	-	NO	-	NO	2011	
6083000073	NICHOLS GARDEN TRS DIV #2	0.02	TAX TITLE	1030x 24th Ave S	-	NO	-	NO	NO	
6083000144	NICHOLS GARDEN TRS DIV #2	0.08	TAX TITLE	S 128th St and 21st Ave S	-	NO	-	NO	NO	ACCESS EASEMENT
6620400820	PANORAMA HEIGHTSS ASSESORS PLAT	0.01	TAX TITLE	1001x Myers Way S	-	NO	-	NO	NO	
6840701709	PONCIN GAMMA ADDN.	0.01	TAX TITLE	25TH AV	-	NO	-	NO	NO	1' X 70' Strip betwn lots
6874200195	POTTERY WORKS ADD	0.08	TAX TITLE	1071x 49th Ave S	-	NO	-	NO	2014	
6874200200	POTTERY WORKS ADD	0.08	TAX TITLE	15848 47 Ave S	-	NO	-	NO	NO	EXIST ONLY ON PAPER?
6874200285	POTTERY WORKS ADD	0.08	TAX TITLE	108xx 48th Ave S	-	NO	-	NO	2014	
6874200290	POTTERY WORKS ADD	0.16	TAX TITLE	108xx 48th Ave S	-	NO	-	NO	2014	
6874200980	POTTERY WORKS ADD	0.28	TAX TITLE	109xx 49th Ave S	-	NO	-	NO	Sched 2015	
6874200985	POTTORY WORKS ADD	0.2	TAX TITLE	109xx 49th Ave S	-	NO	-	NO	Sched 2015	
7129305245	RAINIER BEACH	0.01	TAX TITLE	50 Ave S & Renton Ave S	-	NO	-	NO	NO	250 SQ FT Triangle at R/W
7129305250	RAINIER BEACH ADDN.	0.01	TAX TITLE	94xx Renton Ave S	-	NO	-	NO	NO	L250 SQ FT TRIANGLE
7217401090	RENGSTORFFS ADD	0.01	TAX TITLE	941 25th Ave	-	NO	-	NO	NO	2' X 25' Strip back yard no access
7228500421	RENTON HILL	0.07	TAX TITLE	92x 23rd Ave	-	NO	-	NO	NO	1' X 30' Strip no access

PIN	DESCRIPTION	ACREAGE	USE TYPE	ADDRESS	CURRENT TENANT	REQUIRES SWPPP	SEWER SERVICE	ON CSCL LIST	KC INSPECTION	OTHER_DESC
7319900284	RILEY'S ADD TO RILEY'S	0.01	TAX TITLE	29xx 19 Ave S	-	NO	-	NO	NO	no access, back yard
7327901195	DUWAMISH - RIVER PARK	1.27	PARK SITE	7900 10TH AVE S	-	NO	-	NO	2011	acquired as part of a Bond for a dock site
7376600737	Barclay Dean Building	0.73	BUILDING SITE	4623 7th Ave S	King County Sheriff	NO	COMBINED	NO	2011/12/13/14/15	
7689600185	SEELEYS ADDN.	0.02	TAX TITLE	7244 S 125TH ST	-	NO	-	NO	NO	L900 SQ FT TRIANGLE
7812500340	SKYWAY FARMS TR D	0.15	TAX TITLE	58TH PLS / S 122ND PL	-	NO	-	NO	2014	
7883602860	SOUTH PARK LOTS 38-39, BLK 14	0.06	TAX TITLE	71x S Donovan St	-	NO	-	NO	NO	
7883605975	SOUTH PARK	0.13	TAX TITLE	104x S Trenton St	-	NO	-	NO	2013	
7949300095	YOUTH SERVICES CENTER	2.71	BUILDING SITE	300 12th Ave	Parking Lot	NO	COMBINED	YES	2011/12/13/14/15	
7972602322	STATE ADDN. TO SEATTLE #4	0.06	TAX TITLE	84xx 12 Ave SW	-	NO	-	NO	NO	20' X 128' STRIP
7972603810	STATE ADD TO SEATTLE NO.4	0.01	TAX TITLE	920x 11th Ave SW	-	NO	-	NO	NO	5' X 47' STRIP
8013600043	STILES VIEW TRS	0.13	TAX TITLE	722x S 135th St	-	NO	-	NO	2013	
8019200601	STIMSON PARK DIV. NO. 02	0.04	TAX TITLE	82x S 124th St	-	NO	-	NO	NO	PART OF 10' ALLEY
8019200630	STIMSON PK DV#2 LOTS13&14	0.01	TAX TITLE	1243x 9th Pl S	-	NO	-	NO	NO	BK#7 - PART OF 10' ALLEY
8019200795	STIMSON PARK DIV #2 UNREC	0.02	TAX TITLE	124xx 9 Ave S	-	NO	-	NO	NO	PART OF 10' ALLEY
8019200820	STIMSON PARK DIV #2 UNREC	0.03	TAX TITLE	124xx 9th Pl S	-	NO	-	NO	NO	PART OF 10' ALLEY
8019201091	STIMPSON PARK # 2 UNREC	0.17	TAX TITLE	1203x 8th Ave S	-	NO	-	NO	Sched 2015	
8061000045	RECORDS/VOTING WAREHOUSE	1.73	BUILDING SITE	1215 E 1st	Records/Voting Warehouse	NO	COMBINED	NO	2011/12/13/14/15	
8113100311	SUNNYSIDE 5-ACRE TRACTS	0.01	TAX TITLE	38xx S Grahm St	-	NO	-	NO	NO	
8113600350	SUNNYSIDE 5 ACRES TRS	0.03	TAX TITLE	S SPENCER ST	-	NO	-	NO	NO	
8728100580	TWENTY SECOND ST ADD'N	0.01	TAX TITLE	xxx 20 Ave S	-	NO	-	NO	NO	triangle betwn several lots
9122000540	WALKERS ADD	0.01	TAX TITLE	236x 17th Ave S	-	NO	-	NO	NO	

PIN	DESCRIPTION	ACREAGE	USE TYPE	ADDRESS	CURRENT TENANT	REQUIRES SWPPP	SEWER SERVICE	ON CSCL LIST	KC INSPECTION	OTHER_DESC
9188201086	WASHINGTON VIEW ADD	0.01	TAX TITLE	942x 49th Ave S	-	NO	-	NO	NO	4' X 100' STRIP
9368700268	WHITES RAINIER BCH GAR AD	0.01	TAX TITLE	56xx S Fountain St.	-	NO	-	NO	NO	
9368700269	WHITES RAINIER BCH GAR	0.04	TAX TITLE	56xx S Fountain St.	-	NO	-	NO	NO	990SQ FT.LESS TRANSP LINE
9368700290	WHITES RAINIER BCH GARD ADD	0.02	TAX TITLE	56xx S Fountain St.	-	NO	-	NO	NO	Triangle ajd to R/W
9368700336	WHITES RAINEIR BCH GARD ADD	0.1	TAX TITLE	1071x 59th Ave S	-	NO	-	NO	2012	
9368700340	WHITES RAINIER BEACH GARDENS ADD	0.07	TAX TITLE	1073x 59th Ave S	-	NO	-	NO	2012	
9368700345	WHITES RAINEIR BCH GARD ADD	0.53	TAX TITLE	1074x 59th Ave S	-	NO	-	NO	2012	

Appendix E

Source Tracing Threshold Levels, Sample Types, and Parameters in Support of the Lower Duwamish Waterway Source Control Actions

This appendix describes how King County will set and update source tracing threshold levels and prioritize tracing efforts. It also specifies sample types, parameters to be analyzed, and when results from source characterization efforts will trigger source tracing up-basin. The general approach is presented first, followed by variations from the general approach where appropriate.

Source Tracing Thresholds

Because there are no regulatory standards for inline solids, sediment trap, catch basin solids, or sump samples collected in combined sewer or stormwater sewer systems, four lines of evidence will be considered before tracing is triggered. A "weight of evidence" approach is used to set target levels that trigger source tracing activities.

First-Line of Evidence

Results are typically compared to Washington State Sediment Management Standards (SMS) and Model Toxics Control Act (MTCA) Method A cleanup standards as the first line of evidence.[1] Although these standards do not apply to these types of solids samples, members of the LDW Source Control Work Group (SCWG) commonly use the SMS as screening levels to provide a rough indication of solids quality. The SMS establish marine sediment quality standards and cleanup standards. The following screening levels are considered in source tracing:

- Sediment Quality Standards (SQS)[2]: establish sediment quality that will result in no adverse effects, including no acute or chronic adverse effects on biological resources
- Cleanup Screening Level (CSL)[3]: establishes minor adverse effects to benthic organisms as the maximum chemical contaminant concentration

Because these samples typically contain fairly high concentrations of total organic carbon (TOC), the dry-weight equivalent SMS values (low apparent effects threshold [LAET] and second lowest LAET [2LAET]) are used for the organic compounds where SQS/CSL values are based on TOC-normalized concentrations.

Second-Line of Evidence

The second line of evidence is the magnitude of elevation above the range of concentrations typically seen in the drain type (combined sewer or stormwater sewer). Tracing works best when contaminants associated with a site are significantly elevated or all the subsequent tracing samples look similar.

[1] MTCA Method A cleanup standards are used only to evaluate contaminants such as total petroleum hydrocarbons for which there are no Sediment Management Standards.
[2] WAC 173-204-320
[3] WAC 173-204-562

Third-Line of Evidence

The third line of evidence is the accumulation of the elevated chemical above LDW remedial action levels at the discharge location (if this information is available). Regardless of the in-line concentrations, the source will not warrant tracing if no evidence of accumulation above concern exists at the discharge location.

Forth-Line of Evidence

The fourth line of evidence considered is the volume of the discharge. Because any sediment discharged disperses in the receiving environment and because of a general background sedimentation rate, the volume of the discharge is proportional to the resulting sediment concentration.

Consideration of Other Factors

King County uses the CSL/2LAET to screen for source tracing activities in storm drains. The other lines of evidence are weighed on a site-specific basis to determine when tracing is triggered. As the general concentrations in the drains are reduced over time, screening levels will be revised lower. The same principles will apply and the target levels will still need to be significantly elevated over the general concentrations in the drains for tracing efforts to be successful. The SCWG will be directly involved in these discussions.

For combined sewer lines, higher screening levels (i.e., two times the CSL/2LAET) will be used because the majority of the flows are treated before being discharged from a wastewater treatment plant or, for some basins, a CSO treatment facility. In addition, higher concentrations of chemicals are routinely found in the sewer system because many chemicals are discharged for treatment and thus can be found at higher concentrations in the system. Other chemicals are not typically screened because they can degrade in the environment or can form in the system based on chemical/physical/biological processes occurring in the system; examples include 1,4-dichlorophenol and 4-methylphenol.

The other lines of evidence are also weighed on a site-specific basis to determine when tracing is triggered. Completion of the County's CSO control plan in accordance with the consent decree will be the most effective source control actions for CSO discharges.

Prioritizing Tracing Efforts

To date, the County has focused on looking for sources of metals, PAHs, and PCBs because they exceed the CSL/2LAET screening levels more often than other chemicals.[4] Source tracing screening levels are used to focus activities on areas where the highest levels of contaminants are present. Coordination and discussions with the City of Seattle indicate that these levels have been effective in informing actions. Screening levels may change over time to reflect overall improvements in source concentrations and/or regulatory requirements.

In certain instances, lower priorities will be considered. Some contaminants with ongoing signatures such as phthalates, benzyl alcohol, and phenolic compounds have frequent transitory SQS exceedances in LDW sediments and occur in localized areas near large outfalls. Other

[4] The one exception is BEHP, which is frequently above the 2LAET in in-line solids samples in both storm drains and combined sewers.

contaminants, such as benzoic acid and some phenolic compounds (2,4-dimethylphenol and 4-methylphenol), can form naturally from biotic activity and degradation of natural products. For these urban-related non-point source chemicals, mixed results (some increasing concentrations and some decreasing concentrations) over time are generally observed. It appears that a state of equilibrium is reached when the concentrations tend to go up or down in equal measure. These compounds can cause recontamination; however, their transient or ubiquitous nature does not often lend itself to useful source tracing. The six transient or ubiquitous chemicals (benzyl alcohol, benzoic acid, BEHP, phenol, 2,4-dimethylphenol, and 4-methylphenol) are not considered priorities unless a significantly elevated sample is found that would warrant source control. In addition, depending on the type of discharge being sampled, specific factors will be weighed as described below.

Stormwater Runoff

Comparison of storm drain sediment collected from catch basins, maintenance holes, and sediment traps to SMS is considered conservative in regard to the average concentration entering the receiving water. If storm drain solids samples are below the SQS, there is little, if any chance, of stormwater recontaminating sediment offshore of the outfalls above these levels. Even if a concentration is above the SQS, it does not necessarily indicate that the sediment offshore of the outfall will exceed standards because sediment discharged from storm drains disperses in the receiving environment and mixes with sediment from other sources before depositing.

Combined Sewer Overflows

Comparison of combined sewer sediment collected from catch basins, maintenance holes, and sediment traps to CSL is considered conservative in regard to the average concentration entering the receiving water. If combined sewer solids samples are below the SQS, there is little chance of CSO discharges recontaminating sediment offshore of the outfalls above these levels. Even though releases can occur over the course of a year, their volumes are often smaller than volumes from relatively small storm drains.

Some businesses discharge process wastewater to the combined sewers under the Industrial Pretreatment Program and solids in the system may have much higher concentrations of certain COCs than the CSL, particularly near the process source. However, the discharged solids would not recontaminate a site because most of the solids are conveyed to the wastewater treatment plant, a large dilution process takes place during CSO events, and the CSOs disperse in the receiving environment and mix with sediment from other sources before depositing. Therefore, tracing is typically not triggered in the combined sewer system until data is much higher than the CSL/2LAET. All data is assessed on a sample-by-sample basis to determine when tracing is appropriate.

Source Tracing Sample Types

A variety of sampling methods can be used for source tracing. It is generally understood that no single method is most effective in tracing sources and each has its limitations. The most common types of samples used by the County to trace sources are as follows:

- **In-line solids grab samples**. The County has or will establish sampling and analysis plans (SAPs) specific to the collection and analysis of in-line solids grab samples from stormwater and combined sewer lines (Figure E-1). The City of Seattle uses the same or equivalent sampling procedure. Using standardized procedures helps in comparing data

across basins, over time, and between jurisdictions. In-line solid grab samples can be collected at various access points in the system (if there are enough solids in the lines to collect) to help narrow the area of interest affected by a source. The samples tend to represent the heavier materials such as sand and gravel-size particles that accumulate over time at the bottom of the pipe and can often include historical material.

- **In-line sediment traps.** The County has or will established SAPs specific to the collection and analysis of in-line sediment trap samples from stormwater and combined sewer lines (Figure E-1). Traps are designed to collect suspended solids from stormwater flows or combined sewage and stormwater flows during moderate-to-high flows and provide useful information about possible ongoing sources. Sediment traps are typically deployed over a period of time (for example, six to twelve months) to allow for the accumulation of sufficient material to conduct a larger suite of analyses. Similar to in-line solids grab samples, data from sediment traps enables the County to narrow the areas of interest. However, sediment traps cannot be installed in all locations.

  Sediment traps compared to solids grab samples provide different information for a number of reasons, including the following:

  - Sediment traps collect more of the suspended material, which has finer-sized particles or lighter material, where contaminants are typically found in higher concentrations. The data provides the County with another line of evidence to identify sources of COCs.
  - They provide an estimate of the average particulate chemical concentrations passing through the system over time.
  - They can be more representative of current ongoing sources compared to accumulated sediments in the lines, which can often include historical contamination.

Figure E-1. Example of In-line Solids Grab Samples and In-line Sediment Traps

- **Catch basin grab samples.** Catch basin grab samples are used for characterizing stormwater-associated solids that have accumulated in the catch basins on or near a

specific property or right of way, as opposed to the bottom of a stormwater or combined sewer line that typically collects inputs from many properties. Catch basin samples are collected to provide information about the quality of stormwater runoff and, in some cases, could provide useful information about the contribution of a particular chemical from a narrow drainage area or a specific property.

- **Sump samples** (vaults, oil /water separators, etc): grab samples from structures that are designed to collect sediments/solids from drainage systems. These samples are similar to catch basin samples described above but are collected typically from vaults or oil/water separators.

General Parameters Analyzed in Source Tracing Samples

Source samples are routinely analyzed for the following parameters:

- Total solids
- TOC
- Metals (arsenic, copper, lead, mercury, and zinc)
- PCBs by Aroclor
- Semi-volatile organic compounds
- Grain size

Additional analyses for parameters such as other metals, dioxins/furans, petroleum hydrocarbons, diesel, and heavy oil, may be performed if warranted from observations made during sampling or information obtained during a business inspection, or for support of LDW sediment evaluations.

Sampling and analysis will be conducted in accordance with SAPs developed to date (King County 2011; Cardno 2014a; b) or one to be developed if existing SAPs are not sufficient.