TERMINAL 108 ––WESTERN PARCEL SOURCE CONTROL STRATEGY PLAN

FINAL

For submittal to:

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October 30, 2009

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List of Acronyms

BBP	butyl benzyl phthalate
BEHP	bis(2-ethylhexyl) phthalate
BMP	best management practice
BTEX	benzene, toluene, ethyl benzene, and xylene
City	City of Seattle
ConGlobal	ConGlobal Industries
County	King County
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CSL	cleanup screening level
CSM	conceptual site model
Ecology	Washington State Department of Ecology
ECR	environmental conditions report
EPA	US Environmental Protection Agency
HPAH	high-molecular-weight polycyclic aromatic hydrocarbon
LDW	Lower Duwamish Waterway
LPAH	low-molecular-weight polycyclic aromatic hydrocarbon
MLLW	mean lower low water
MTCA	Model Toxics Control Act
NPDES	National Pollutant Discharge Elimination System
PPE	personal protective equipment
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PGG	Pacific Groundwater Group
Port	Port of Seattle
RM	river mile
ROD	Record of Decision
SAP	sampling and analysis plan

SCSP	source control strategy plan
SMS	Washington State Sediment Management Standards
SQS	sediment quality standards
STP	sewage treatment plant
T-108	Terminal 108
TOC	total organic carbon
TPH	total petroleum hydrocarbons
WAC	Washington Administrative Code

Executive Summary

This source control strategy plan (SCSP) is being prepared for the Western Parcel of Terminal 108 (T-108) as part of the Washington State Department of Ecology's (Ecology) source control program for the Lower Duwamish Waterway (LDW). The primary goal of the source control strategy for the Western Parcel is to minimize and/or eliminate the potential for contaminants to reach the LDW from T-108 while also maintaining and enhancing the layout and condition of the property for continued commercial maritime use. A separate SCSP will be prepared for the Eastern Parcel of the property.

This SCSP builds on information provided in the T-108 environmental conditions report (ECR) (Windward 2009), which details the historical uses and environmental conditions of T-108 and identifies the potential pathways of pollutant migration to the LDW from T-108. A conceptual site model (CSM) has been prepared for the Western Parcel; the CSM and existing information, as provided in the ECR, are used to further assess the potential source control pathways and identify data gaps for each parcel. Based on this assessment, the following potential pathways have been identified at the Western Parcel and ranked as follows for source control consideration:

- Bank erosion along the unarmored portion of the shoreline (central shoreline)
- Bank erosion along the armored portion of the shoreline (northern shoreline)
- Stormwater network discharges (southern upland area)
- Uncontrolled upland soil erosion (northern upland area)
- Bank erosion along the vegetated, restored shoreline (southern shoreline)
- Atmospheric deposition
- Groundwater migration

In general, the tools and alternatives available to control potential sources and pathways are numerous. In particular to the Western Parcel of T-108, some of these include interim remedial actions, infrastructure and capital improvements, engineered controls, implementation of best management practices , permit compliance, tenant lease agreements, good housekeeping practices, tenant education and outreach, and environmental monitoring. All of these tools are considered for the potential pathways present on the Western Parcel in this SCSP and recommendations are made regarding which tools should be employed to address each pathway and achieve an effective level of source control attainable for the site. Table 5 provides information on the source control tools recommended to address each of the potential pathways on the Western Parcel.

Many of the recommended source control actions and tools will be implemented in concert to address multiple potential pathways simultaneously and to take advantage of timing efficiencies and economies of scale. Other source control tools and alternatives will be implemented in a sequential manner, with the achievement of one

component of the strategy leading into initiation of the next. Additional details of the expected implementation coordination are included in this SCSP.

The Port of Seattle (Port) intends to work closely with Ecology during planning and implementation of the programs outlined in the SCSPs. The SCSPs are intended to be highly adaptive and will likely be modified in response to new information, changing site uses at T-108, changes in the regulatory environment, and other factors as the T-108 source control program progresses. As subsequent work plans are developed to implement the recommended alternatives, the Port will provide semi-annual status updates to Ecology, including results of additional sampling efforts and engineering analyses, to ensure that the program is implemented in line with Ecology's expectations and the overarching requirements of the LDW superfund program.

1 Introduction

This source control strategy plan (SCSP) is being prepared as part of the Washington State Department of Ecology's (Ecology) source control program for the Lower Duwamish Waterway (LDW). Terminal 108 (T-108) is located on the eastern shoreline of the LDW approximately between River Mile (RM) 0.5 and RM 0.7, as measured from the southern tip of Harbor Island (see Figure 1 for site location). The LDW source control program, under Ecology's lead, is designed to identify and manage sources of contamination to LDW sediments in coordination with sediment remediation activities. The ultimate focus of Ecology's source control strategy is to prevent recontamination of surface sediments to levels that exceed the Washington State Sediment Management Standards (SMS) (per Washington Administrative Code [WAC] 173-204) and to meet the ultimate goals for LDW sediment cleanup.

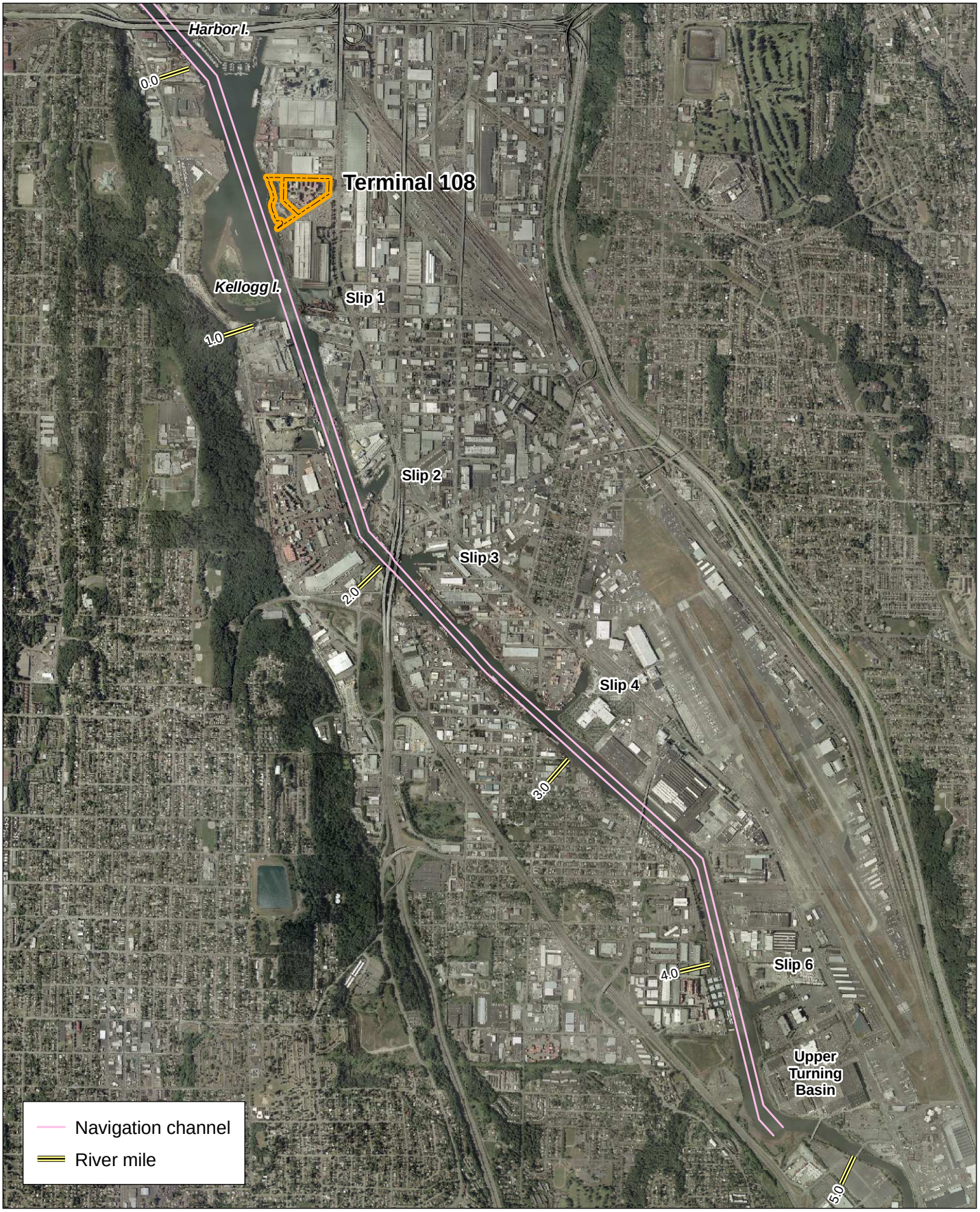
As indicated in Ecology's LDW source control program strategy report (Ecology 2004) and other program documentation, the Port of Seattle (Port) is supporting the goals of the LDW source control program by implementing source control practices at Port-owned properties, including those either operated by the Port or leased to various tenants. In line with this support, the Port is working with Ecology to independently develop SCSPs for T-108 as part of the Voluntary Cleanup Program. Separate SCSPs are being produced for the Western and Eastern Parcels of T-108 because of the unique operational histories and environmental features of each parcel. An environmental conditions report (ECR) (Windward 2009) detailing the historical uses and environmental conditions of T-108 was prepared in order to help inform source control strategy planning at T-108.

The organization of this SCSP is as follows:

- Section 2, Western Parcel Features and Use
- Section 3, Pathway Dynamics and the Conceptual Site Model
- Section 4, Source Control Strategy for the Western Parcel
- Section 5, Data Gap Identification
- Section 6, Source Control Strategy Implementation
- Section 7, Summary

1.1 Purpose and Scope of the Source Control Strategy Plan

As established in the T-108 Source Control Strategy Work Plan (Windward 2008), the SCSPs that are being prepared for the Eastern and Western Parcels of T-108 will provide the framework that will be used to identify and assess source control issues on each parcel, determine the most appropriate and effective implementation and control



Prepared by CEH, 05/26/09, revised by MTY, 05/27/09; MAP #3120; W:\Projects\06-08-14-01 Marine Environmental Source Control\Data\GIS\T-108

WindWard environmental LLC

N

0 0.25 0.5 Miles

0 0.5 1 Kilometers

Figure 1. Terminal 108 site location map

systems (e.g., best management practices [BMPs], independent remedial actions), and establish long-term monitoring procedures to assess the performance of the SCSPs and ongoing environmental conditions.

This SCSP produces a conceptual site model (CSM) for the Western Parcel and integrates existing information, as provided in the ECR, with the CSM to further assess the potential source control pathways and identify data gaps for the parcel. The SCSP then develops specific options for filling data gaps and for prioritizing and addressing (i.e. controlling) potential pathways of contamination to the LDW. The goals and components, responsible parties, schedule, performance monitoring criteria, and adaptive management strategies of the plan will be established in the subsequent work plans developed to implement the various components of the strategy.

This SCSP is intended to be highly adaptive. The focus of the strategies will likely be revised in response to additional information provided by source control-related assessments, integration of the program's requirements with property tenants and changing land use, changes to site configuration because of infrastructure improvements or independent remedial activities, integration of the program's requirements with remediation and source control efforts for the larger LDW site, and coordination and discussion with Ecology representatives, among other factors. The strategy will be designed to comply with appropriate federal, state, King County (County), and City of Seattle (City) source control requirements and, therefore, may be adjusted in response to changes in regulations.

1.2 Summary of Environmental Quality and Potential Sources

Historical land uses of the Western Parcel included a sewage treatment plant (STP) (1938-1969), bulk cement transshipment facility (1989-1998), marshalling of container-cargo-trailer chassis associated with the cargo yard located on the Eastern Parcel of T-108. The parcel is currently used for storing empty container-cargo-trailer chassis.

Several environmental investigations conducted on the Western Parcel between 1981 and 2007 produced soil and groundwater data that were presented in the ECR (Windward 2009). Polychlorinated biphenyls (PCBs); total petroleum hydrocarbons (TPH) (gasoline- and diesel-range); benzene, toluene, ethylbenzene, and xylene (BTEX); polycyclic aromatic hydrocarbons (PAHs); and several metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, thallium, and zinc) have historically been the most commonly detected chemicals in environmental media at T-108. Recent studies of soil and groundwater conditions at the property were conducted in 2006 and 2007 (Pacific Groundwater Group 2006a, 2007). More information on the environmental conditions of bank soil, upland soil, and groundwater, including the most recent data, are provided in the following subsections.

1.2.1 Bank soil conditions

In 2005, the County collected two bank soil samples from the northern portion of the T-108 shoreline (Anchor 2007). At present, information on T-108 bank soil environmental quality is limited to these two grab samples. The environmental quality of the remainder of the bank area will need to be assessed during future data gap efforts. Additional samples will also likely be collected from the northern portion of the bank to provide more information for use in source control planning. No information was provided regarding the tidal elevation at the time of sampling, or the condition of the bank where samples were collected. PCBs (Aroclors 1248, 1254, and 1260) were detected in both samples; however, the dry weight concentrations were below the Model Toxics Control Act (MTCA) Method A cleanup level for unrestricted land use. The total organic carbon (TOC)-normalized concentration of total PCBs was greater than the cleanup screening level (CSL) in one of the samples. The TOC content of this sample was 1.05%.

One individual low-molecular-weight PAH (LPAH) (i.e., phenanthrene) and all ten individual high-molecular-weight PAHs (HPAHs) (i.e., fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, and benzo(g,h,i)perylene) analyzed for were detected in the samples; however, individual and total LPAH and HPAH concentrations were all below the sediment quality standards (SQS) criteria. Arsenic, cadmium, chromium, copper, lead, mercury, silver, and zinc were detected in bank soil; however, only mercury was detected above the SQS (in one sample). Bis(2-ethylhexyl) phthalate, butyl benzyl phthalate, and di-n-butylphthalate were detected but were below the SQS. Phenol and benzoic acid were both detected above the CSL, and 1,2-dichlorobenzene was detected in one of the two bank samples at a concentration below the SQS.

1.2.2 Upland soil quality

Historically, PCBs, TPH (gasoline- and diesel-range), toluene, ethylbenzene, xylenes, thirteen individual PAHs, and several metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, thallium, and zinc) have been detected in soils at T-108. Of these chemicals, only cadmium was detected above MTCA Method A industrial cleanup levels, as reported by Pacific Groundwater Group (PGG) (2006a).

In 2006, upland soil was sampled from four boreholes on the Western Parcel by PGG (2006a). The study identified PCBs (Aroclors 1248, 1254, and 1260), petroleum hydrocarbons (gasoline, diesel, and lube oil), 17 individual PAHs, arsenic, cadmium, chromium, copper, lead, nickel, and zinc in site soils (Pacific Groundwater Group 2006a). Of these, only diesel-range hydrocarbons, lube oil-range hydrocarbons, and cadmium were detected above MTCA Method A industrial soil cleanup levels, as reported by PGG (2006a). For more information, see the T-108 ECR (Windward 2009).

Historical operations at the site have contributed to existing contamination that remains in the upland and bank soil. Large portions of the site have been filled over time using native and non-native materials. The origin of these fill materials likely includes both undocumented and documented sources. Areas of the parcel have been filled in with STP-related material and PCB-contaminated dredged material from the LDW. These historical waste materials remain buried in place beneath unpaved and paved portions of the site (Windward 2009).

Table 1 presents the range of all soil data from T-108 included in the ECR (Windward 2009) compared to various criteria for reference. The data in Table 1 include upland soil and bank soil from both the Western and Eastern Parcels.

Table 1. Comparison of soil criteria for chemicals detected in T-108

Chemical	T-108 Concentration or Range (mg/kg)[a]	Criteria (mg/kg)					
		TSCA	MTCA Method A Unrestricted Table	MTCA Method A Industrial Table	MTCA Method B Standard Formula[b]	MTCA Method C Standard Formula[b]	Lowest Apparent Effect Threshold[c]
PCBs (total)	0.013 – 100.8	1	1	10	0.5	66	nc
Arsenic	0.0641 – 19	na	20	20	0.67	88	57
Cadmium	0.19 – 15	na	2	2	80	3,500	5.1
Chromium[d]	3.9 – 1,260	na	19/2,000	19/2,000	240/120,000	11,000/5,300,000	260
Copper	3.3 – 594	na	nc	nc	3,000	130,000	390
Lead	0.8 – 625	na	250	1000	nc	nc	450
Mercury	0.03 – 0.97	na	2	2	24	1,100	0.41
Nickel	4.16 – 84.5	na	nc	nc	id	id	nc
Silver	4.7 – 11	na	nc	nc	400	18000	6.1
Thallium	10 – 26.0	na	nc	nc	id	id	nc
Zinc	14 – 2,500	na	nc	nc	24,000	1,100,000	410
TPH – diesel	12.7 – 4,120	na	2,000	2,000	nc	nc	nc
TPH – gasoline[e]	10.0 – 94	na	30/100	30/100	nc	nc	nc
TPH – lube oil	57.5 – 4,910	na	2,000	2,000	nc	nc	nc
1-Methylnaphthalene	0.118	na	eq[f]	eq[f]	id	id	nc
2-Methylnaphthalene	0.169	na	eq[f]	eq[f]	320	14,000	0.67
Naphthalene	0.0155 – 0.0788	na	eq[f]	eq[f]	1,200	70,000	2.1
Acenaphthene	0.0235 – 0.064	na	nc	nc	4,800	210,000	0.5
Anthracene	0.0136 – 0.0487	na	nc	nc	24,000	1,100,000	0.96
Benzo(g,h,i)perylene	0.0132 – 0.155	na	nc	nc	id	id	0.67
Fluoranthene	0.0225 – 0.493	na	nc	nc	3,200	140,000	1.7
Fluorene	0.0186 – 0.134	na	nc	nc	3,200	140,000	0.54
Phenanthrene	0.00884 – 0.28	na	nc	nc	id	id	1.5
Pyrene	0.018 – 1.06	na	nc	nc	2,400	110,000	2.6
Benzo(a)anthracene	0.00836 – 0.202	na	eq[f]	eq[f]	eq[f]	eq[f]	1.3

Table 1. Comparison of soil criteria for chemicals detected in T-108 soil (cont.)

Chemical	T-108 Concentration or Range (mg/kg)[a]	Criteria (mg/kg)					
		TSCA	MTCA Method A Unrestricted Table	MTCA Method A Industrial Table	MTCA Method B Standard Formula[b]	MTCA Method C Standard Formula[b]	Lowest Apparent Effect Threshold[c]
Benzo(a)pyrene	0.0137 – 0.4	na	0.1	2	0.14	18	1.6
Benzo(b)fluoranthene	0.0136 – 0.305	na	eq[f]	eq[f]	eq[f]	eq[f]	3.2
Benzo(k)fluoranthene	0.014 – 0.25	na	eq[f]	eq[f]	eq[f]	eq[f]	3.2
Chrysene	0.01 – 0.478	na	eq[f]	eq[f]	eq[f]	eq[f]	1.4
Dibenzo(a,h)anthracene	0.0033 – 0.162	na	eq[f]	eq[f]	eq[f]	eq[f]	0.23
Indeno(1,2,3-cd)perylene	0.0109 – 0.0389	na	eq[f]	eq[f]	eq[f]	eq[f]	0.6
cPAHs (total)	0.011 – 0.5	na	0.1	2	0.14	18	nc
Benzoic acid	0.116 – 0.846	na	nc	nc	320,000	14,000,000	0.65
Phenol	0.0147 – 1.3	na	nc	nc	48,000	2,100,000	0.42
BBP	0.0611	na	nc	nc	16,000	700,000	0.063
BEHP	0.0393 – 0.138	na	nc	nc	71	9,400	1.3
di-n-butylphthalate	0.0091	na	nc	nc	id	id	1.4
Toluene	0.006 – 0.01	na	7	7	6,400	280,000	nc
Ethylbenzene	0.006 – 0.048	na	6	6	8,000	350,000	0.01
Xylenes (total)	0.011 – 1.2	na	9	9	160,000	7,000,000	0.04
1,2-dichlorobenzene	0.00721	na	nc	nc	7,200	320,000	0.035

[a] Includes only detected concentrations.
[b] Includes only ingestion pathway.
[c] Source: Barrick et al. (1988).
[d] Chromium criteria with two values are for chromium VI/chromium III.
[e] Higher MTCA Method A values are for gasoline mixtures without benzene and less than 1% toluene, ethylbenzene, and xylene. Lower values are for all other gasoline mixtures.
[f] See relevant equation for calculation criteria

BBP– butyl benzyl phthalate
BEHP – bis(2-ethylhexyl) phthalate
cPAH – carcinogenic polycyclic aromatic hydrocarbon
id – insufficient data for calculation
MTCA – Model Toxics Control Act
na – not applicable
nc – no criteria
PCB – polychlorinated biphenyl
T-108 – Terminal 108
TPH – total petroleum hydrocarbons
TSCA – Toxic Substances Control Act

1.2.3 Groundwater conditions

Chemicals historically detected in groundwater at T-108 included PCBs (Aroclor 1242), petroleum hydrocarbons (diesel and gasoline), BTEX constituents, PAHs, and several metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc). Diesel-range hydrocarbons, total carcinogenic PAH (cPAH) toxic equivalents, arsenic, and cadmium exceeded MTCA Method C cleanup levels in historical groundwater samples, as reported by PGG (2006a).

In 2006 and 2007, PGG installed five new monitoring wells on the Western Parcel and sampled groundwater during four monitoring rounds. PCBs were not detected in any of the wells during the four sampling rounds with the exception of Aroclor 1016, which was detected above the MTCA Method A cleanup level in one well in the second sampling round, as reported by PGG. This sample result was rejected because of poor sample quality (Pacific Groundwater Group 2006a). Ecology recently acknowledged that groundwater at the subject property was not considered a potential source of PCB contamination to LDW sediments (Pacific Groundwater Group 2007).

Petroleum hydrocarbons and BTEX constituents were not detected in any of the wells sampled during the four sampling rounds. Non-carcinogenic PAHs (1-methylnaphthalene, acenaphthene, fluorene, naphthalene) were detected in two wells in the first round of sampling but were not detected in the following three rounds. cPAHs were detected in two wells during the second round of sampling. The results from one of the wells were rejected because of poor sample quality. The results from the other well were below MTCA Method A criteria for groundwater, and above LDW surface water criteria, as reported by PGG (2006a).

Total and dissolved arsenic, chromium, copper, nickel, and zinc were detected in multiple monitoring wells during all four sampling rounds, and total lead was detected in one well during the first two sampling rounds. Total arsenic was detected above MTCA Method A criteria for groundwater in one well in the first sampling round, as reported by PGG. Total and dissolved arsenic were detected above MTCA Method A in another well during the second round of sampling, as reported by PGG (2006a). Dissolved zinc was detected above LDW surface water criteria in one well in the first sampling round and dissolved arsenic was detected above LDW surface water criteria in several wells in all four sampling rounds. All detected metals concentrations in rounds three and four were below both MTCA Method A cleanup levels and the groundwater screening levels developed by Ecology for the protection of LDW sediments, as reported by PGG (2007).

Table 2 presents the range of groundwater data collected by PGG from T-108 in 2006 and 2007 as included in the ECR (Windward 2009) compared to various criteria for reference. The data in Table 2 include groundwater data from both the Western and Eastern Parcels.

Table 2. Comparison of groundwater and surface water criteria for chemicals detected in T-108 groundwater

Chemical	T-108 Concentration Range (µg/L)[a]	Detection Frequency	Groundwater Criteria (µg/L)				Surface Water (Marine) Criteria (µg/L)					
			MTCA Method A Table	MTCA Method B Standard Formula	MTCA Method C Standard Formula	WAC 173-200	MTCA Method B Standard Formula	MTCA Method C Standard Formula	EPA-Recommended Water Quality Criteria – Human Health[b]	40 CFR 131 Human Health[c]	WAC 173-201A Aquatic Life – Chronic[b]	EPA-Recommended Water Quality Criteria – Aquatic Life – Chronic[b]
PCBs (total)	na	0/17	0.1	0.044	0.44	0.01	0.00011	0.0026	0.000064	0.00017	0.03	0.03
Arsenic	1.15 – 10.7	16/18	5	0.058	0.58	0.05	0.098	2.5	0.14	0.14	36	36
Chromium	1.27 – 13.5	10/18	50	48/24,000	110/53,000	50	490/ 240,000	1,200/ 610,000	nc	nc	50/nc	50/nc
Copper	1.04 – 11	13/18	nc	590	1,300	1,000	2700	6,700	nc	nc	3.1	3.1
Lead	2.49 – 16.8	4/18	15	id	id	50	id	id	nc	nc	8.1	8.1
Nickel	1.19 – 38.1	16/18	nc	id	id	nc	id	id	4,600	4,600	8.2	8.2
Zinc	10.1 – 360	8/18	nc	4,800	11,000	5,000	17,000	41,000	26,000	nc	81	81
Acenaphthene	0.115 – 0.138	2/18	nc	960	2,100	nc	640	1,600	990	nc	nc	nc
Fluorene	0.111	1/18	nc	640	1,400	nc	3,500	8,600	5,300	14,000	nc	nc
1 Methylnaphthalene	0.286	1/18	eq[e]	id	id	nc	id	id	nc	nc	nc	nc
Naphthalene	0.136	1/18	160	160	350	nc	4,900	12,000	nc	nc	nc	nc
Dibenzo(a,h)-anthracene	0.156	1/18	eq[e]	eq[e]	eq[e]	eq[e]	eq[e]	eq[e]	0.018	0.031	nc	nc
Indeno(1,2,3-cd)-perylene	0.132	1/18	eq[e]	eq[e]	eq[e]	eq[e]	eq[e]	eq[e]	0.018	0.031	nc	nc
cPAHs (total)	0.0756	1/18	0.1	0.012	0.12	nc	0.03	0.74	nc	nc	nc	nc

[a] Includes only detected concentrations.
[b] Values as of August 2009.
[c] Human health based only on fish consumption and recreation, not drinking.
[d] Chromium criteria with two values are for chromium VI/chromium III.
[e] See relevant equation for calculation criteria

CFR – Code of Federal Regulations
cPAH – carcinogenic polycyclic aromatic hydrocarbon
EPA – US Environmental Protection Agency
id – insufficient data for calculation
MTCA – Model Toxics Control Act
na – not applicable
nc – no criteria
PCB – polychlorinated biphenyl
T-108 – Terminal 108
WAC – Washington Administrative Code

1.2.4 Potential pathways identified in the environmental conditions report

Based on historical environmental data and other information reviewed, and based on an assessment of current site conditions, the ECR (Windward 2009) identified the following potential pathways by which chemicals could migrate from T-108 to the LDW:

- **Bank Soil Erosion –** Contaminants present in bank soil could erode directly to the LDW or be washed into the LDW by stormwater overland flow or tidal exchange/groundwater interactions.
- **Stormwater Discharge –** Spills or other accidental discharges, onsite dust and debris, and subsurface contaminants could enter the stormwater network and be discharged to the LDW via storm drain outfalls; these potential pollutant sources can also be washed into the LDW via stormwater overland flow in unpaved portions of the property where drainage networks are not currently installed.
- **Atmospheric Deposition –** Pollutants contained in air emissions generated from operation of both onsite and offsite vehicles and other equipment and from offsite industrial area facilities could be deposited onto the terminal (to the ground or the surfaces of cargo containers, chassis, and other equipment) and carried in T-108 stormwater to the LDW via both piped and overland stormwater flow.
- **Groundwater Migration –** Groundwater could become contaminated by future spills (either at T-108 or on offsite properties and streets). Based on recent groundwater investigations at T-108 (Pacific Groundwater Group 2007), Ecology has determined that groundwater is not currently a pathway of concern for PCB recontamination of LDW sediment; however, groundwater was not evaluated for its potential impact on surface water quality.

All of these potential pathways are applicable to the Western Parcel and will be considered further in this SCSP, as well as additional pathways (or details about pathways) that have been identified as relevant to the Western Parcel through development of the CSM.

2 Western Parcel Features and Use

The Western Parcel of T-108 (Assessor's Parcel Number 7666700510) is approximately 9 acres in size. The property, including the bank and near-shore intertidal area, is owned by the Port, and a portion of it is leased to ConGlobal Industries (ConGlobal). ConGlobal uses the majority of the parcel as a chassis marshalling area associated with their container terminal located on the Eastern Parcel. A Port public shoreline access area and a habitat restoration area, both constructed in the 1980s, are located on the southwestern portion of the Western Parcel. With the exception of the public shoreline access area and the shoreline, chain link fencing borders the majority of the Western Parcel to restrict access. Figure 2 presents the general layout of the Western Parcel of T-108.

For the purpose of discussion in this SCSP document, the Western Parcel has been subdivided into six areas for source control implementation to help organize the evaluation, based on various considerations including existing environmental conditions, operational constraints, observations during site visits, and preliminary evaluation of source control concerns based on information provided in the ECR. The six implementation areas comprising the Western Parcel are described in Table 3.

Table 3 Western parcel source control implementation areas

IMPLEMENTATION AREA	DEFINITION
1	**unpaved upland area** on the northern portion of the parcel and the areas unpaved in the southern portion of the parcel
2	**paved upland area** supported by the existing stormwater network on the southern portion of the parcel
3	**northern** armored (rip-rapped) **shoreline** and associated vegetated bank area
4	**central** unarmored **shoreline** and associated vegetated bank area
5	**habitat restoration area** which includes the southern portion of the shoreline and adjacent vegetated bank
6	**public shoreline access area**

Figure 3 presents the relative locations of these six areas. The boundaries for the areas have been established for general consideration of source control concerns and future planning efforts only. They are not meant to represent legal property boundaries (e.g., tenant lease or parcel boundaries) or to delineate areas of varying environmental quality (e.g., areas of contamination). Reference to these various areas will be used throughout this text to aid in the evaluation of source control strategy for the Western Parcel.

2.1 AREA 1: UNPAVED UPLAND AREA

The present topography of the Western Parcel is generally flat with an average ground surface elevation of approximately 19 ft above mean lower low water (MLLW). A relative high point (with an elevation of approximately 27 ft above MLLW) is located along the western side of the northern portion of the parcel where a vegetated bank area is located (see Figures 2 and 3); the land slopes gently to the northwest and to the south from this relative high point. The shoreline, discussed in Section 2.3, has a steeper topography.

The northern portion of the Western Parcel is unpaved. The majority of the unpaved area is used as a container-cargo-trailer chassis marshalling area by ConGlobal. The lease boundary currently negotiated between the Port and ConGlobal is presented on Figure 2. A thick layer of loose soil is present across much of this area. An unused railway spur extends northwest from the southern boundary of T-108 and crosses through the Western Parcel. Stormwater from the northern, unpaved portion of the Western Parcel flows via overland runoff to the north toward the Oregon Street right-of-way, discharges to the LDW via overland flow, or infiltrates into the ground.

The southeast portion of the Western Parcel is a mixture of both paved and unpaved areas (Figure 3). Many of the unpaved areas on this portion of the parcel were at one time covered with gravel when the site was used as a bulk cement transshipment facility (see Section 2.2). These unpaved areas are also largely covered by a thick layer of soil that has been tracked-on from the unpaved portion of the parcel (and from offsite) by trucks and other equipment used in terminal operations. This area is currently used for chassis marshalling. The southwest portion of the Western Parcel is also unpaved and consists of a habitat restoration area and public shoreline access park. These areas are discussed further in Sections 2.5 and 2.6, respectively.

2.2 AREA 2: PAVED UPLAND AREA

The majority of the southern half of the Western Parcel is paved. This area was formerly used by a Port tenant, LaFarge Corporation, for receiving and distributing of dry bulk cement, and as a parking lot associated with the former Diagonal Avenue S STP. Currently, a thick layer of soil covers much of the paved area making it difficult to observe the quality of the existing pavement. ConGlobal uses the area for chassis lay-down and marshalling. Much of the soil may have likely been tracked-on to the paved area from the unpaved portion of the parcel or from offsite by trucks and other equipment used in terminal operations.

A stormwater drainage network is present within the paved portion of the Western Parcel; however, it is difficult to locate the associated catch basins because of the accumulated soil throughout the area. The catch basins observed during site visits were completely filled with accumulated soil; the stormwater network (isolated portions of the entire system) may be plugged and no longer working as designed.

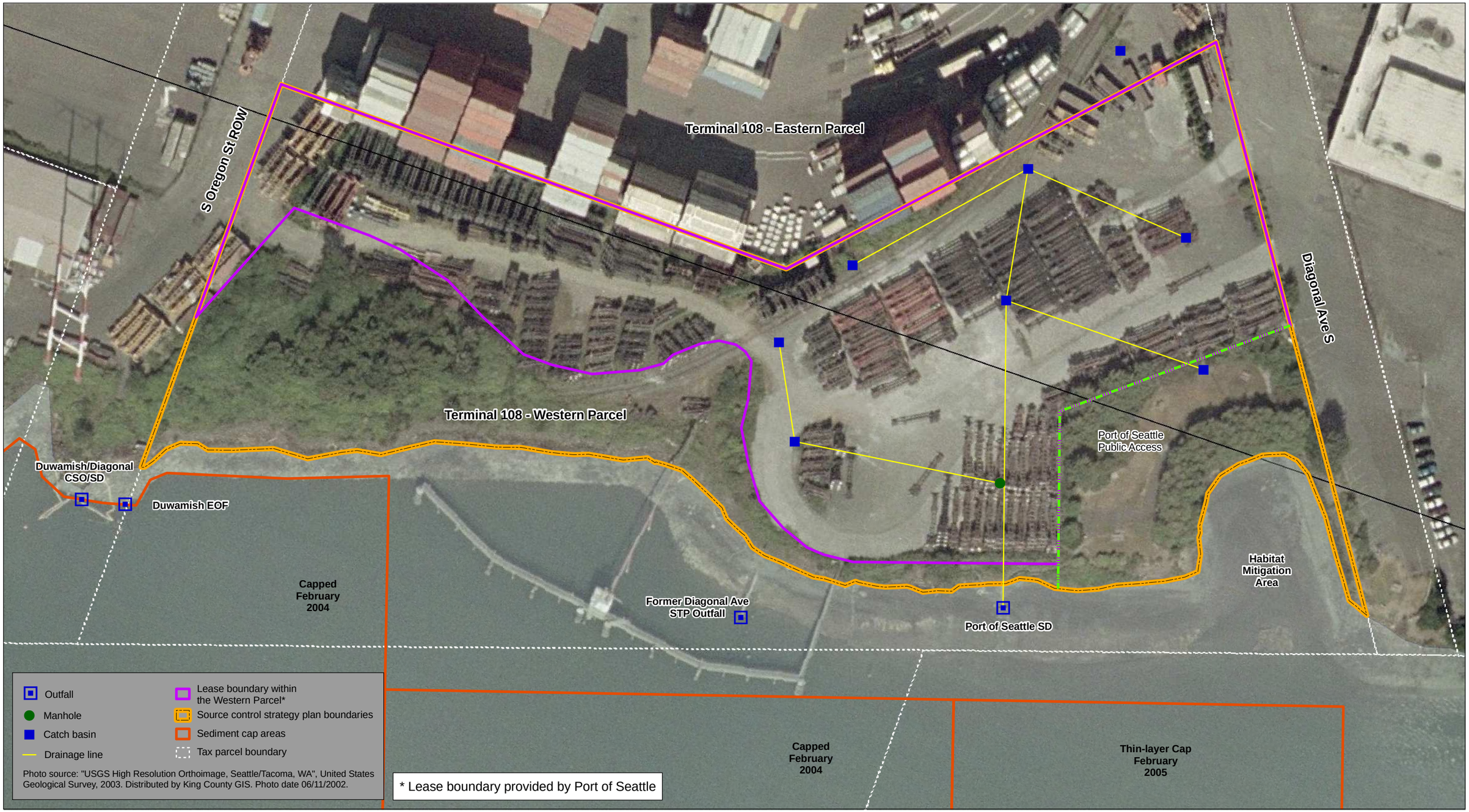


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Figure 2. T-108 Western Parcel general site features

Prepared by MTY, 05/26/09; CEH, 10/29/09; MAP #3791; W:\Projects\06-08-14-01 Marine Environmental Source Control\Data\GIS\T-108

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Legend

- Northern Shoreline
- Central Shoreline
- Habitat Restoration Area
- Public Shoreline Access Area
- Unpaved Upland Area (approximate)
- Paved Upland Area (approximate)

Note: aerial photo view with 80° heading and 18° tilt. North is thus approximately to the left, and locations of parcel boundaries and paved areas are approximate.

Figure 3. Source control implementation areas for the Western Parcel

The drainage network is presented on Figure 2 as delineated on existing Port engineering drawings. The network is designed to discharge to the LDW via a storm drain outfall located on the Western Parcel shoreline, just north of the habitat restoration area (Port outfall 2225 on Figure 2). The storm drainage network includes eight catch basins and one storm drain manhole.[1] Additional information about the drainage network is provided in the ECR (Windward 2009).

A railway spur extends northwest from the southern boundary of T-108 and runs along the eastern boundary of the paved portion of the Western Parcel. The railway spur is not currently in use. Remnants of a truck/wheel wash-down area, formerly associated with the Lafarge bulk cement terminal, are also located on the paved portion of the parcel. A catch basin was installed for the truck/wheel wash-down area; according to historical documentation, this catch basin was plumbed to the sanitary sewer (Port of Seattle 1988). This particular catch basin was not identified during a recent site visit because of the amount of soil accumulated in the area; connectivity of this catch basin to the sanitary sewer has not been confirmed to date.

2.3 AREA 3: NORTHERN SHORELINE

The total length of the T-108 shoreline is approximately 1,240 ft (or 0.23 mi). The northern armored shoreline extends from the southern end of the existing pier (used formerly to receive barge shipments of dry bulk cement) to the northern boundary of the parcel (Figure 3) and is approximately 640 ft long. The bank elevation of the northern portion of the shoreline varies from approximately 18 to 8 ft above MLLW (Figure 2). The northern portion of the T-108 shoreline is armored with large pieces of riprap. Debris including metal pipes, wires, and bricks, has been observed in the rip-rapped portion of the bank along the northern shoreline area. The armoring in this area appears to be helping control large-scale erosion; however, some exposed bank areas are evident within the rip-rapped areas and mild bank erosion is likely occurring.

Outcrops of tidal marsh deposits are visible in the intertidal area, which extends from approximately 8 to 2 ft above MLLW. The tidal marsh deposits are identified as compact silts intermixed with peaty grass and root materials (Pacific Groundwater Group 2006b). A strip of vegetation consisting primarily of trees and shrubs is present at the top of the northern shoreline bank. This band of vegetation is very narrow along the majority of the northern shoreline but increases in size toward the north end of the property (Figure 2). Tree species present include madrone, alder, and cottonwood and the shrub layer consists primarily of blackberry.

[1] One of the catch basins is located on the Eastern Parcel of T-108.

2.4 AREA 4: CENTRAL SHORELINE

The central portion of the T-108 shoreline extends from the north end of the habitat restoration area to the south end of the skeleton pier (Figure 3) and is approximately 300 ft long. This portion of the shoreline is unarmored (Figure 2). The bank elevation varies from approximately 16 to 12 ft above MLLW. The slope of the bank in the southern portion of the central shoreline area is nearly vertical and signs of significant erosion are evident. A wooden bulkhead paralleling the shoreline runs along most of the central shoreline area. The bulkhead is deteriorating, not well-anchored, and is leaning away from the shoreline. Bank material in this area is eroding from behind the bulkhead. Outcrops of original tidal marsh deposits are visible in the intertidal area, which extends from approximately 12 to 6 ft MLLW.

Thick bunches of grass and some smaller shrubs and trees also cover some of the shoreline in this area. The wooden bulkhead and vegetation may serve to reduce the pace of erosion to some degree. Debris including wood, metal, brick, plastic, glass, and wiring is visible in some areas of the central shoreline bank and in the mudflat area. Tidal marsh deposits (compact silts intermixed with peaty grass and root materials (Pacific Groundwater Group 2006b)) are also visible in the intertidal area along this portion of the shoreline. A thin strip of vegetation consisting primarily of shrubs and grasses is present at the top of the central shoreline bank. Some of the vegetation has been uprooted from the shoreline because of bank erosion.

2.5 AREA 5: HABITAT RESTORATION AREA

The southern portion of the T-108 shoreline includes a pocket fish and wildlife habitat restoration site consisting of approximately 0.4 acres of intertidal area and 0.2 acres of riparian vegetation (AHBL 2009) (Figure 2). It includes approximately 300 ft of shoreline with an elevation ranging from approximately 18 to 14 ft above MLLW. A buffer of riparian vegetation surrounds a U-shaped mudflat that extends into the LDW. The riparian plant community includes willow, cottonwood, red osier dogwood, red flowering currant, Oregon grape, blackberry, and osoberry. The vegetation is routinely maintained by Port maintenance crews and is in a healthy state. The intertidal area consists of sand, mud, and a small amount of gravel scattered throughout the area. The elevation of the intertidal area ranges from approximately 14 to 4 ft above MLLW. A buoy line is present along the mouth of the intertidal restoration area to prevent debris from washing into the site.

Within the fish and wildlife habitat restoration area the shoreline is primarily unarmored with the exception of gravel (habitat mix) scattered along the perimeter. The slope of the shoreline bank within the habitat area is more gradual than in the central and northern portions of the shoreline; more shoreline vegetation is also present in the habitat area. The degree of the slope and amount of vegetation helps to reduce the potential for bank erosion in this area. Inspections of the shoreline during site visits indicate no noticeable bank erosion within the habitat restoration area.

2.6 AREA 6: PUBLIC SHORELINE ACCESS AREA

The southwest portion of the Western Parcel includes a public shoreline access park. The public shoreline access area is located north and east of the riparian vegetation buffer of the habitat restoration area (as discussed in Section 2.5). It includes a paved path, a grassy area, and a line of trees and shrubs that serves as a border between the park and the portion of the parcel used by ConGlobal for chassis storage. Vegetation within the public access area is routinely maintained by Port maintenance crews and is in a healthy state. The public shoreline access area extends to a public parking area located at the end of Diagonal Avenue S which also includes a lawn area, picnic tables, a launch for hand-carried boats, and interpretive signage. Stormwater from the public shoreline access park either discharges directly to the LDW via overland stormwater flow or infiltrates into the ground. One catch basin is located within the public shoreline access area (Figure 2); however, it is used to collect stormwater from the ConGlobal lease area. A concrete berm prevents stormwater from the public shoreline access area from entering this catch basin.

3 Pathway Dynamics and the Conceptual Site Model

The potential sources of contamination and pathways for the Western Parcel of T-108 were evaluated and discussed in the ECR. This section expands upon that initial evaluation of environmental conditions and the pathways of potential concern with the development of a CSM.

The following sections highlight the key pathway and source dynamics used to develop the CSM. This specific pathway-source dynamic information is further used to prioritize the pathways at the site to aid in focusing the appropriate selection of source control tools and alternatives to be implemented.

3.1 Upland Soil and Material Erosion

Uncontrolled soil and other material on the paved and unpaved upland surfaces of the parcel have the potential to erode into the LDW. General information on upland soil quality is provided in section 1.2.2 and soil data are summarized in Table 1 and provided in the ECR (Windward 2009).

Because of the uncontrolled nature of these upland soils, various pathways exist that could transport potential source materials to the LDW. Some of these pathway dynamics include:

- Dry, windy conditions, that can result in soil (dust) being captured by the wind and deposited onto other areas of the parcel or into the LDW
- Rain events that can erode impacted soil into stormwater flows, which can transport surface soils around the site and potentially to the LDW
- Contaminants generated by historical activities that may remain in surface soils have the potential to reach the LDW through the processes discussed above
- Contaminants present in subsurface soils, fill materials, or historical waste disposal areas that may become exposed to the site surface because of site activities or other disturbances have the potential to reach the LDW through the processes discussed above
- Contaminants generated from onsite and offsite sources (trucks, equipment, manufacturing operations, etc.) can be deposited onto surface soil with the potential to reach the LDW through the processes discussed above or through atmospheric deposition
- Accidental spills and leaks have the potential to contaminate uncontrolled surface soil with the potential to reach the LDW through the processes discussed above

3.2 STORMWATER DRAINAGE NETWORK

The existing stormwater drainage network on the southern portion of the Western Parcel discharges into the LDW through the Port's outfall on the southern end of the shoreline (see Figure 2). Stormwater from the southern portion of the site collects in the catch basins comprising the system and discharges into the LDW during rain events. Potential dynamics of the stormwater network pathway include:

- Contaminated materials on upland paved surfaces could be washed into the drainage system and transported to the LDW. These materials can originate from accidental spills and leaks, direct atmospheric deposition, or can be tracked-on to the paved areas.
- Breaks within the underground components of the stormwater drainage network (i.e., piping and catch basin and manhole walls) could allow contaminated subsurface soil to infiltrate into the drainage system; breaks that occur below the groundwater table could also allow contaminated groundwater (a potential future source) to infiltrate the drainage system.

3.3 BANK SOIL

The Western Parcel's bank has varying types and amounts of armoring and vegetation and therefore is susceptible to erosion to varying degrees. Nevertheless, the same erosive processes have the potential to act on the entire length of the bank. General information on bank soil quality is provided in section 1.2.1 and bank soil data are provided in the ECR (Windward 2009). Potential dynamics affecting bank soil erosion include:

- Material may be eroded down the bank and into the intertidal areas via stormwater flow during rain events.
- In dry conditions, winds may capture contaminated bank soils (as fugitive dust) and transport it to the LDW.
- Foot traffic and other human activities along the shoreline can erode bank soil.
- Uncontrolled upland soils can migrate to the bank and erode to the LDW via the processes described above.
- Areas of unarmored bank have the potential to be eroded by tidal or groundwater interactions.
- Particulates can accumulate on the bank via direct atmospheric deposition and erode into the LDW via the processes described above.
- Suspended sediment in the LDW can be deposited onto the bank and be eroded back into the waterway.
- If erosion occurs, historical contaminants that may be present in subsurface soil beneath the bank may become exposed as the bank is eroded, creating a potential for the contaminated soils to be transported to the LDW via the processes discussed above.

3.4 GROUNDWATER

The net groundwater flux at the Western Parcel is toward the LDW. General information on groundwater quality is provided in section 1.2.3 and groundwater data are summarized in Table 2 and provided in the ECR (Windward 2009). Groundwater quality at T-108 is not currently considered a potential source of contamination to LDW sediments (Pacific Groundwater Group 2007); however, the groundwater pathway will be included in the SCSP for the Western Parcel as future conditions may change. Potential dynamics of the groundwater pathway at the site include:

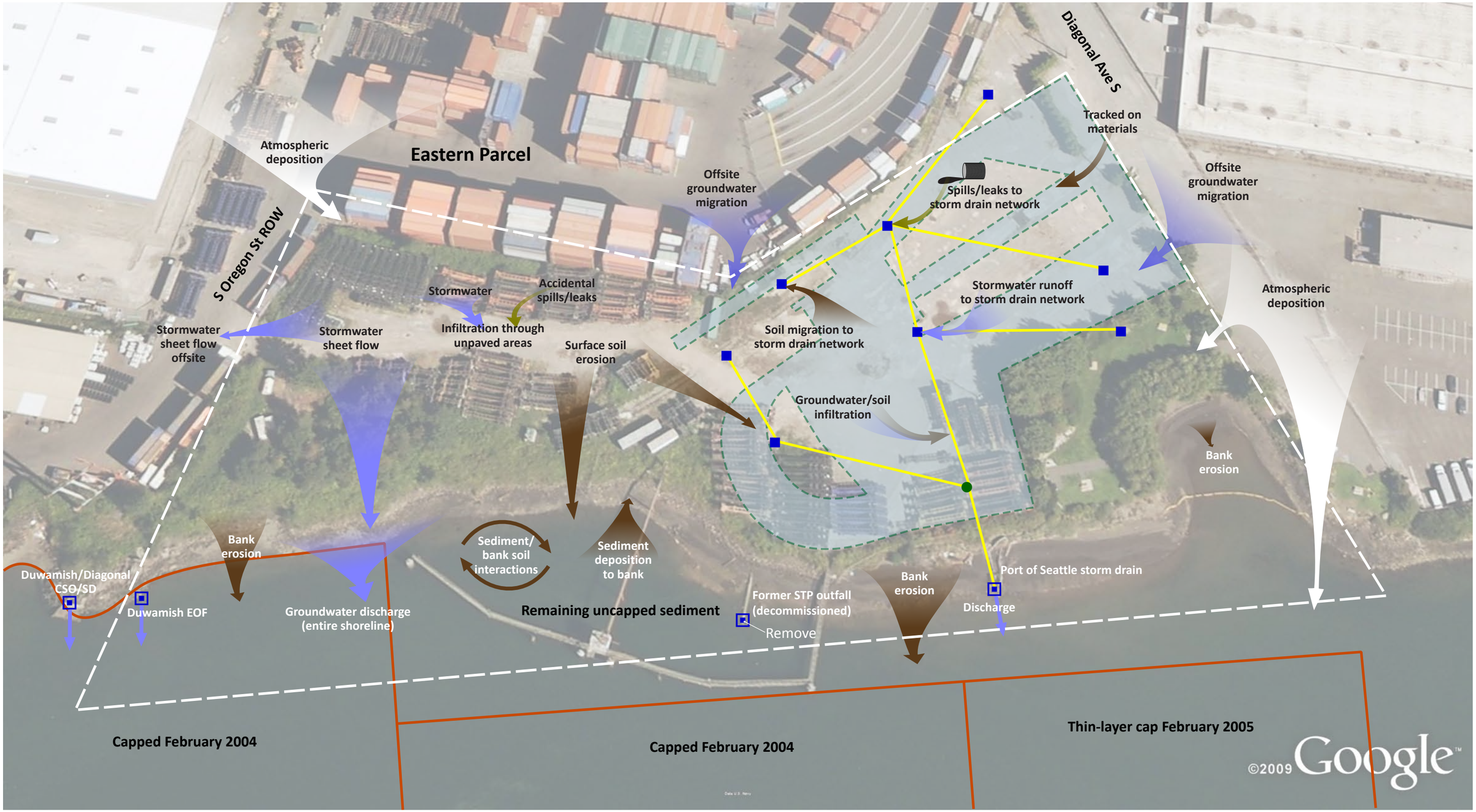
- Contaminants in the groundwater can be transported to the LDW through groundwater migration (presently not considered a pathway).
- Groundwater can enter breaks in the subsurface components of the stormwater network and discharge to the LDW.
- Contaminated groundwater from offsite can migrate through the site and potentially discharge to the LDW.
- Accidental spills or leaks, stormwater, and particulates from direct atmospheric deposition can infiltrate into unpaved areas, contaminate groundwater, and potentially discharge to the LDW via the processes discussed above.

3.5 CONCEPTUAL SITE MODEL AND PATHWAY PRIORITIZATION

The CSM is a visual representation of current or future potential pathway dynamics at the site; it illustrates the potential interactions of the various pathways with one another. In turn, the CSM works as a useful tool that allows further interpretation of ongoing environmental concerns and potential pathways at the site. The CSM developed for the Western Parcel, based on the evaluation performed in the ECR and the pathway dynamics discussion above, is presented as Figure 4.

The CSM demonstrates the complexities of the pathway dynamics at the site. In order to focus the evaluation of appropriate source control tools and alternatives for the Western Parcel, these pathways have been prioritized based on various parameters (known contaminant concerns, the amount/type of contamination historically present within a certain media type, site operations, source control implementation practicalities and constraints, etc.).

This prioritization scheme promotes consideration of source control tools and alternatives in those areas with the greatest potential to impact to the LDW, based on the current understanding of the site. Table 4 further summarizes the pathway dynamics at the site and provides the rationale for prioritization of each potential pathway. This pathway prioritization scheme will be carried through and be further developed in the remaining sections of this document as source control tools and alternatives are introduced and recommended for the site.



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Legend

- Manhole
- Catch basin
- Outfall
- Paved area (approximate)
- Drainage line
- Western Parcel boundary

Note: aerial photo view with 80° heading and 18° tilt. North is thus approximately to the left, and locations of parcel boundaries, paved areas, and storm drain network features are approximate.

Figure 4. Conceptual site model for the Western Parcel

Table 4. Potential pathways identified in the CSM for the Western Parcel

Potential Pathway	Source Control Implementation Area	Potential Sources Related to Pathway	Potential Pathway Prioritization	Rationale for Prioritization
Bank erosion (unarmored shoreline)	central shoreline (Area 4)	♦**Contaminants present in historical shoreline fill or other subsurface materials** ♦**Contaminated upland surface soils in unpaved areas** ♦**Direct atmospheric deposition** ♦**Deposition of suspended sediment from the LDW**	1	The bank erosion pathway along the unarmored shoreline (the central shoreline area) was ranked as the top priority for source control because large quantities of bank material are visibly eroding directly to the LDW, and bank soil data collected along the northern shoreline indicates that contaminants are likely present in some of the central shoreline soils, at least at low levels.
Bank erosion (armored shoreline)	northern shoreline (Area 3)	♦**Contaminants present in historical shoreline fill or other subsurface materials** ♦**Contaminated upland surface soils in unpaved areas** ♦**Direct atmospheric deposition** ♦**Deposition of suspended sediment from the LDW**	2	Limited data indicate that low levels of contamination exist in the bank soil of the northern shoreline. Some material on the armored shoreline has the potential to be eroded directly into the LDW, though the potential is less than in the unarmored central shoreline area.
Stormwater network discharges	paved upland area (Area 2)	♦**Spills, leaks, and accidental discharges** (originating from onsite or offsite) to paved surfaces ♦**Onsite dust, debris, and tracked-on material** from trucks and other equipment ♦**Contaminants in uncontrolled surface soils that migrate into catch basins** ♦**Contaminants in subsurface soil, fill material, or historical waste disposal areas entering breaks in system** ♦**Contaminants in groundwater entering breaks in the system** (potential future source) ♦**Indirect atmospheric deposition**	3	The stormwater system located on the southern, paved portion of the parcel is a potential pathway for contaminant migration; the potential exists for contaminants to migrate with storm drain solids and via stormwater flows. Given current conditions, it is assumed that the stormwater system is functioning at a limited capacity as most of the catch basins are plugged with soil. This likely reduces the flow of stormwater and the transport of solids to the LDW through the storm drain network (but likely increases overland stormwater flows).

Table 4. Potential pathways identified in the CSM for the Western Parcel (cont.)

Potential Pathway	Source Control Implementation Area	Potential Sources Related to Pathway	Potential Pathway Prioritization	Rationale for Prioritization
Uncontrolled upland soil erosion	unpaved upland area, paved upland area, shoreline access area (Areas 1, 2, and 6)	♦**Contaminated upland surface soils in unpaved areas** ♦**Contaminants in subsurface soil, fill material, or historical waste disposal areas** ♦**Onsite dust, debris, and tracked-on material** from trucks and other equipment ♦**Spills, leaks, and accidental discharges directly to ground surfaces** ♦**Direct atmospheric deposition**	4	Unpaved upland areas of the parcel are largely bare of vegetation and susceptible to erosion. Low levels of contamination have been measured in surface and subsurface soils from these areas. The current vegetation on the bank areas provides some protection from uncontrolled erosion. The public shoreline access area is included in association with this pathway since the ground surface is essentially uncontrolled; however, the healthy vegetation and grass cover in this area greatly reduces the potential for uncontrolled erosion concerns.
Bank erosion (vegetated restored shoreline)	habitat restoration area (Area 5)	♦**Contaminants present in historical shoreline fill or other subsurface materials** (this potential source is less likely to contribute contaminants in the restoration area due to the soil removal and sampling conducted here when the site was constructed in the 1980s) ♦**Contaminated upland surface soils in unpaved areas** ♦**Direct atmospheric deposition** ♦**Deposition of suspended sediment from the LDW**	5	Erosion of bank material in the restoration area is minimal due to the gentle grade of the shoreline slope and dense vegetation which provides bank stabilization in this area. However, the potential does exist for minor amounts of subsurface soil with low levels of contamination to erode into the LDW.
Atmospheric deposition	all areas	♦**Onsite emissions** from trucks, forklifts, and other mechanical equipment used onsite ♦**Offsite emissions** from point-sources related to industrial operations (e.g., smokestacks), non-point sources such as automobile traffic, and other activities in the Duwamish Valley and greater Puget Sound region	6	Particulates emitted from onsite and offsite sources have the potential to either be directly deposited into the LDW or be deposited to surfaces of the parcel and be transported to the LDW through other pathways. Onsite emissions are not expected to be elevated relative to other sites in the Duwamish Valley, and this pathway will be most directly addressed by controlling the stormwater network and soil erosion pathways which are expected to play the largest role in transporting these particles to the LDW.

Table 4. Potential pathways identified in the CSM for the Western Parcel (cont.)

Potential Pathway	Source Control Implementation Area	Potential Sources Related to Pathway	Potential Pathway Prioritization	Rationale for Prioritization
Groundwater migration	all areas	♦**Spills, leaks, and accidental discharges** (originating from onsite or offsite) to ground surfaces ♦**Stormwater infiltration** ♦**Infiltration of particulates from direct atmospheric deposition** ♦**Contaminated groundwater migration from offsite locations**	7	Though groundwater was determined not to be a potential pathway for recontamination of LDW sediments by Ecology, the potential does exist for future large accidental spills or offsite sources to infiltrate to the groundwater table.

CSM – conceptual site model
Ecology – Washington State Department of Ecology
LDW – Lower Duwamish Waterway

4 Source Control Strategy and Alternatives Analysis for the Western Parcel

The primary goal of the source control strategy for the Western Parcel is to minimize and/or eliminate the potential for contaminants to reach the LDW from T-108 while also maintaining and enhancing the layout and condition of the property for continued commercial maritime use. The strategy is intended to be adaptive to account for unexpected site conditions that may be discovered as the strategy is implemented, and to account for future changes to the site, surrounding properties, the applicable regulatory environment, or other factors affecting implementation of the strategy.

Numerous options are available to address the various pathways (and their potential associated sources and interactions) that have been identified as relevant to the Western Parcel in the CSM (Figure 4). In general, source control tools and alternatives can include remedial actions, infrastructure improvements, engineered controls, implementation of BMPs, activities conducted to comply with permits and tenant lease agreements, good housekeeping practices, tenant education and outreach, and environmental monitoring.

In order to focus the development of appropriate short- and long-term source control strategies for the Western Parcel, the potential pathways and sources evaluated in the ECR (and discussed in the previous sections of this document), were prioritized based on various considerations (Table 4). The text and tables that follow will continue to use this prioritization scheme to support further discussion and development of the SCSP.

After the potential pathways were prioritized for consideration, a comprehensive suite of source control tools and alternatives available to help address each pathway on the Western Parcel was identified. The suite of tools available for consideration was first identified in the ECR based on the current conditions and operational use of the Western Parcel, available environmental data, and consideration of the long-term goals for redevelopment and operations at the site. Information on the various source control tools available has been expanded in this SCSP to develop a perspective for how each would be applied to the specific potential pathways and sources identified for the Western Parcel (Table 5).

Table 5. Suite of source control tools and alternatives available to address potential pathways

Potential Pathway	Source Control Implementation Area	Source Control Tools and Alternatives	Associated Strategy Elements for the Western Parcel
Bank erosion (unarmored shoreline)	central shoreline (Area 4)	regulatory and compliance programs	**Port-Tenant Lease Arrangements:** The Port can coordinate and negotiate with the tenant (currently ConGlobal) to ensure that non-lease areas remain clear, appropriate spill prevention and other BMPs are implemented, and ensure that the facility remains in compliance with appropriate regulations.
		environmental investigation	♦Soil sampling can be conducted to characterize the quality of materials left in place after potential bank cut back or stabilization/armoring efforts are completed (based on feasibility evaluation).
		remediation program	♦The shoreline can be cut back to remove debris and contaminated soil to support infrastructure improvements (if present). ♦In-situ soil treatment can be used to address contaminants (if present). ♦Performance monitoring can be used to measure the success of remedial activities in controlling this potential pathway.
		operational/behavioral BMPs	**Public Involvement/Education:** The Port can work with the facility tenant and public users of the shoreline area to promote education regarding source control concerns and environmental stewardship.
		physical BMPs	**Construction BMPs:** Erosion and runoff controls can be used during shoreline earthworks.
		capital improvements	**Infrastructure Improvements:** ♦The bank can be cut back and graded to an optimal slope to reduce erosion, based on an engineering assessment. ♦Bank stabilization/armoring can be used to reduce erosion, based on the results of an engineering/feasibility evaluation. The use of geotextile fabrics to help control erosion can also be considered. **Restoration Opportunities:** ♦The shoreline can be graded to a slope of 3:1 to 4:1 and a marsh planting bench can be established, as evaluated for T-108 in the Port's Lower Duwamish River restoration plan (Port of Seattle 2009). ♦A riparian vegetation buffer already exists at the top of the bank; this buffer can be enhanced to serve the purposes of erosion control, stormwater filtration, and habitat enhancement. ♦Performance monitoring can be used to measure the success of capital improvements in controlling this potential pathway.
		institutional controls	**Tenant Restrictions:** The Port can enforce tenant lease lines to restrict activity along the shoreline. **Site Access Controls:** Fencing, signage, and designated pedestrian pathways can be used to restrict and/or limit access by the public and the tenant to the shoreline and vegetated buffer.

Table 5. Suite of source control tools and alternatives available to address potential pathways (cont.)

Potential Pathway	Source Control Implementation Area	Source Control Tools and Alternatives	Associated Strategy Elements for the Western Parcel
Bank erosion (armored shoreline)	northern shoreline (Area 3)	regulatory and compliance programs	**Port -Tenant Lease Arrangements:** The Port can coordinate and negotiate with the tenant (currently ConGlobal) to ensure that non-lease areas remain clear of chassis and other equipment, appropriate spill prevention and other BMPs are implemented, and to ensure that the facility remains in compliance with appropriate regulations.
		environmental investigation	♦Soil sampling can be conducted to characterize the quality of materials in this portion of the bank; this would provide information regarding the potential for contaminants to reach the LDW via bank erosion.
		remediation program	♦Soil can be excavated to remove low-level contamination present in the bank; riprap would have to be removed and replaced to allow for soil excavation. ♦Natural recovery (attenuation) can be monitored until contaminant levels are below cleanup levels if soil sampling indicates that contaminants are present. Sampling, modeling, and a feasibility evaluation would need to be conducted to implement this source control strategy element. ♦Performance monitoring can be used to measure the success of remedial activities in controlling this potential pathway.
		operational/behavioral BMPs	**Public Involvement/Education:** The Port can work with the facility tenant and public users of the shoreline area to promote education regarding source control concerns and environmental stewardship.
		physical BMPs	**Construction BMPs:** Erosion and runoff controls can be used during work along the shoreline.
		capital improvements	**Infrastructure Improvements:** Additional stabilization/armoring material can be installed and the use of geotextile fabrics can be considered in order to control erosion to the greatest extent possible. Effective use of armoring/stabilization would need to be determined through a feasibility evaluation and associated assessments. **Restoration Opportunities:** A riparian vegetation buffer already exists at the top of the bank; this buffer can be enhanced to serve the purposes of erosion control, stormwater filtration, and habitat enhancement. ♦Performance monitoring can be used to measure the success of capital improvements in controlling this potential pathway.
		institutional controls	**Tenant Restrictions:** The Port can enforce tenant lease lines to restrict activity along the shoreline. **Site Access Controls:** Fencing, signage, and designated pedestrian pathways can be used to restrict and/or limit access by the public and the tenant on portions of the property (e.g., the shoreline buffer).

Table 5. Suite of source control tools and alternatives available to address potential pathways (cont.)

Potential Pathway	Source Control Implementation Area	Source Control Tools and Alternatives	Associated Strategy Elements for the Western Parcel
Stormwater network discharge	paved upland area (Area 2)	regulatory and compliance programs	**NPDES Permit Programs:** With site improvements (paving and repair/replacement of the stormwater infrastructure), this parcel's stormwater system could be permitted and added to ConGlobal's existing NPDES permit (pending tenant contractual stipulations) or a new, independent NPDES permit could be established for the system.
		environmental investigation	**Multi-media Characterization:** Storm drain solids and stormwater discharge can be sampled (after the system has been returned to functioning condition).
		Operational/behavioral BMPs	**Good Housekeeping Practices:** ♦ Storm drain lines and catch basins can be cleaned out and video-inspected to check the integrity of lines and catch basins. ♦ The paved area serviced by this stormwater network can be cleaned (e.g., pavement sweeping) to remove accumulated soils that can enter, and potentially clog, the stormwater drainage network. ♦ The Port can promote the use of BMPs such as catch basin socks, spill prevention and control plans, and routine maintenance of the yard serviced by the stormwater system.
		capital improvements	♦ Repair work can be conducted if inspections of the stormwater system identify damaged areas (e.g., breaks in the line). Complete replacement of the system is a consideration pending results of system inspection and the upgrade/installation of a system to support the northern portion of the parcel. ♦ Performance monitoring can be used to measure the success of capital improvements in controlling this potential pathway.
		engineering controls	**Operation and Maintenance Programs:** Routine maintenance of the drainage system can be implemented; periodic cleanout of the system can also be employed to ensure proper operation and to achieve source control goals.

Table 5. Suite of source control tools and alternatives available to address potential pathways (cont.)

Potential Pathway	Source Control Implementation Area	Source Control Tools and Alternatives	Associated Strategy Elements for the Western Parcel
Uncontrolled upland soil erosion	unpaved upland area (Area 1)	regulatory and compliance programs	**Port of Seattle Tenant Lease Arrangements:** The Port can coordinate with the tenant (currently ConGlobal) to ensure activities conducted at the property are in compliance with their lease agreements, other compliance programs, and with this SCSP.
		environmental investigation	♦The nature and extent of potential contamination in upland surface and subsurface soil can be further characterized to determine whether contaminants are present that could migrate to the LDW via upland soil erosion.
		remediation programs	**Containment:** The uncontrolled soil areas can be controlled using one of several options (including but not limited to traditional paving, permeable paving, planting additional vegetation, etc.) or using a combination of options to isolate any potential low-level soil contamination, control soil migration, and reduce the amount of loose soil material tracked on to the paved portion of the parcel and migrating to the stormwater drainage network. ♦Performance monitoring can be used to measure the ability of the soil stabilization/isolation method selected to control this potential pathway.
		physical BMPs	**Construction BMPs:** Erosion and runoff controls, sediment controls, and grading improvements can be employed to reduce migration of uncontrolled soil during construction activities.
		capital improvements	**Utility Improvements:** A stormwater drainage network can be installed after paving to service the newly paved area and to reduce overland stormwater flow. **Infrastructure Improvements:** Uncontrolled upland soil can be isolated/stabilized through a variety of engineering controls including paving or other forms of physical isolation. Any one of a number of soil stabilizing techniques could be employed to help control soil migration/erosion; appropriate options will be determined through engineering/feasibility evaluations. If paving were selected as the method of soil stabilization/isolation, the usability of these portions of the parcel for industrial maritime purposes would be enhanced. ♦Performance monitoring can be used to measure the success of capital improvements in controlling this potential pathway.
		engineering controls	**Operation and Maintenance Programs:** Proper operation and maintenance of equipment used on this portion of the property can reduce the potential for spills, leaks, and other accidental releases of contaminants.
		institutional controls	**Tenant Restrictions:** The operational use of the tenant lease area can be restricted to reduce the potential for contaminant releases/migration. The boundary of the lease area can be demarcated using fencing, signage, or some other physical boundary.

Table 5. Suite of source control tools and alternatives available to address potential pathways (cont.)

Potential Pathway	Source Control Implementation Area	Source Control Tools and Alternatives	Associated Strategy Elements for the Western Parcel
Bank erosion (vegetated shoreline)	restoration area (Area 5)	environmental investigation	**Monitoring:** The restoration area can be monitored (using visual assessment) for its effectiveness in controlling bank erosion and providing fish and wildlife habitat.
		operational/behavioral BMPs	**Public Involvement/Education:** Education and communication of source control concerns can be imparted to both the public users of the property and the tenant to support compliance and environmental stewardship. This can include the use of signs around the restoration area and public shoreline access area, and Port assistance to the tenant in establishing stormwater BMPs and spill control plans, for example.
		capital improvements	**Infrastructure Improvements:** Designated pedestrian pathways can be used to reduce traffic along the restored shoreline area and educational signs can be installed to explain the importance of source control in reducing water and sediment pollution and providing healthy habitat for plants and animals. Signs can be used to remind the public to pick up after their pets, not to dump or spill hazardous materials or waste, and can also be used to explain the ecology of the LDW and promote other types of environmental stewardship. **Restoration opportunities:** The restored riparian and mudflat areas can be assessed and enhanced if necessary. Dense, healthy vegetation can restrict public access to the shoreline, reduce shoreline erosion, filter stormwater, and provide important fish and wildlife habitat. ♦Performance monitoring can be used to measure the success of capital improvements in controlling this potential pathway.
		engineering controls	**Operation and Maintenance Programs:** ♦To reduce the potential for contaminant releases in this area, the Port can implement proper operation and maintenance programs for all Port equipment used to maintain the restoration area. ♦The Port can continue routine maintenance (e.g., invasive species removal) of the vegetation in the restoration area to reduce bank erosion and provide viable fish and wildlife habitat. Organic, pesticide/herbicide-free, and other sustainable landscaping practices are employed at present to promote the highest level of source control and environmental stewardship.
		institutional controls	**Property Deed Restrictions:** Long-term use of the property can be restricted to ensure preservation of the restoration area and ongoing environmental stewardship in this area. **Tenant Restrictions:** The Port can enforce tenant lease lines to restrict activity in the restoration area.

Table 5. Suite of source control tools and alternatives available to address potential pathways (cont.)

Potential Pathway	Source Control Implementation Area	Source Control Tools and Alternatives	Associated Strategy Elements for the Western Parcel
Atmospheric deposition	all areas	environmental investigation	♦Catch basin solids sampling can be used to help establish whether contaminants are migrating to T-108 via atmospheric deposition at significant levels that will require additional consideration in the SCSPs. ♦Atmospheric deposition data can be collected specifically at T-108 to provide information about the significance of atmospheric deposition to source control at the property. ♦Atmospheric deposition data collected in the Duwamish Valley can be modeled to better understand the significance of atmospheric deposition to source control at T-108.
		operational/behavioral BMPs	**Good Housekeeping Practices:** Environmentally-friendly operational practices can help reduce emissions of contaminants at T-108. Proper operation and maintenance of existing equipment can greatly reduce the potential for accidental spills and leaks at the property.
		capital improvements	♦The installation of paving and a stormwater network on the unpaved portions of the parcel, as well as the maintenance of and upgrades to the existing stormwater network, can allow for additional assessment and management of this potential pathway of concern. ♦Performance monitoring can be used to measure the success of the selected capital improvements (e.g., paving and storm drainage network installation) in controlling this potential pathway.
		engineering controls	**Equipment Upgrades:** Upgrade to use of lower-emission (greener) equipment or fuels can be used to reduce atmospheric pollutants originating onsite.

Table 5. Suite of source control tools and alternatives available to address potential pathways (cont.)

Potential Pathway	Source Control Implementation Area	Source Control Tools and Alternatives	Associated Strategy Elements for the Western Parcel
Groundwater migration	all areas	regulatory and compliance programs	**Port-Tenant Lease Arrangements:** As the property owner, the Port can inspect the parcel for environmental compliance concerns, based on environmental regulations and lease agreements, to ensure no activities that can potentially contaminate groundwater are being conducted on the property and appropriate safeguards are in place.
		environmental investigation	**Groundwater Monitoring:** Groundwater monitoring can be conducted in the future if a spill, leak, or other hazardous material release occurs and has the potential to migrate to the groundwater table.
		remediation programs	**Containment:** Isolating (e.g., paving) of uncontrolled soil areas can prevent stormwater intrusion, reducing the potential for contaminants present in soil to impact groundwater in the future. ♦Performance monitoring can be used to measure the success of remedial activities in controlling this potential pathway.
		operational/behavioral BMPs	**Public Involvement/Education:** Education and communication of source control concerns with both the tenant and the public can be used to reduce the risk of future groundwater contamination via spills, leaks, waste dumping, or other hazardous materials releases. **Good Housekeeping Practices:** Good housekeeping practices can be used to reduce the risk of future spills, leaks, or other hazardous materials releases that can contaminate groundwater.
		capital improvements	**Infrastructure and Utility Improvements:** Paving and stormwater infrastructure upgrades can reduce the potential for stormwater intrusion or infiltration of future spills/leaks to result in groundwater contamination. ♦Performance monitoring can be used to measure the success of capital improvements in controlling this potential pathway.
		engineering controls	**Operation and Maintenance Programs:** Proper operation and maintenance of equipment used on the property can greatly reduce the potential for accidental spills/leaks that could result in groundwater contamination.

BMP – best management practice
ConGlobal – ConGlobal Industries
LDW – Lower Duwamish Waterway
NPDES – National Pollutant Discharge Elimination System
Port – Port of Seattle
T-108 – Terminal 108

After identification and consideration of the suite of source control tools available for use at the property, an alternatives analysis was conducted to evaluate which tools (or combination of tools) would be the most appropriate and effective in addressing the identified potential pathways. The alternatives analysis accounted for a variety of parameters, including current environmental conditions, current and anticipated future uses of the property, potential for long-term source control effectiveness, among others. Most importantly, cost-benefit and economies of scale considerations were a major component of the overall analysis. The analysis showed that simultaneous implementation of a variety of tools across the site's implementation areas was often determined to be the most cost-effective way to address potential pathways in the short term while establishing the basis for source control strategy components to be implemented over the long term (i.e., performance monitoring).

Based on the results of this alternatives analysis, Table 6 presents the package of source control tools recommended for implementation at the Western Parcel to address each potential pathway. Table 6 also provides the general rationale for why the specific package of tools was selected for each pathway through the alternatives analysis process.

The package of tools selected for each potential pathway is referred to as the source control strategy for that pathway (Table 6). This terminology will be used throughout the remainder of this SCSP when referring to the specific set of alternatives (tools) that will be applied to address the potential pathways on the Western Parcel.

Through the course of this analysis, it became clear that the planning and implementation of potentially preferred alternative approaches would require filling various data gaps, depending on the unique aspects of each area of the Western Parcel and the tools chosen. These data gaps (based on alternative scenarios and other factors) were taken into consideration when completing the alternatives analyses. Additional information on data gaps, as well as information on how they may be filled, based on the recommended tools and overall source control strategy is included in Section 5 of this report.

It is important to note that the work recommended for a particular pathway or implementation area often interacts with recommendations made for other pathways/areas (Table 6). A goal of implementation of both the short- and long-term strategies for the Western Parcel will take advantage of the economies of scale (data gap investigations, site construction/mobilization, etc.) to the greatest extent practicable, in order to effectively address as many pathways of concern and potential source areas as possible. Section 6 provides additional information on how the overall source strategy approaches recommended in Table 5 could be implemented.

Table 6. Source control tools recommended to address potential pathways

Package of Tools Recommended for Implementation	Rationale for Recommended Source Control Strategy	Plan for Implementation and Integration
Bank Erosion in Unarmored Shoreline Area (central shoreline – Area 4)		
Regulatory and Compliance Program: ♦ Tenant access/use of the shoreline and riparian buffer areas not included in the lease area will be restricted **Environmental Investigation:** ♦ Soil materials to be left in place after shoreline cut back/stabilization will be sampled **Remediation:** ♦ Debris and contaminated bank soils will be removed **Operational/Behavioral BMPs:** ♦ BMP programs will be developed for both the tenant and the public-accessible areas **Physical BMPs:** ♦ Erosion and runoff controls will be used during shoreline earthworks ♦ Site access controls will be implemented after capital improvements are completed **Capital Improvements:** ♦ Shoreline will be cut back and graded to an optimal slope for shoreline stability ♦ The shoreline will be stabilized using one of a number of options, including but not limited to placement of armoring materials, incorporation of a geotextile fabric, planting of new vegetation, or a combination of these as determined most appropriate through a feasibility evaluation. ♦ The existing riparian vegetation buffer will be enhanced	Effective bank stabilization/isolation is the most effective way to reduce erosion and control this pathway. Several options for achieving bank stabilization are available, including but not limited to armoring, use of geotextile fabric, installation of additional vegetation, or a combination of these options. The bank stabilization method for the central shoreline will be selected in later planning stages, after completion of appropriate engineering evaluations and other assessments. Contaminated soil and debris (if identified during bank work) will be removed, which will reduce or eliminate this potential source of contamination. The riparian vegetation buffer will be enhanced to further control erosion and increase habitat quality along the shoreline. Bank stabilization can greatly reduce the potential for any residual low-level contaminated materials from entering the LDW and will prevent additional upland area losses from erosion. The Port will work with the tenant to ensure lease agreements and regulatory requirements are followed, and with the public to promote environmental stewardship along the central shoreline.	It is anticipated that work in the central shoreline source control implementation area will be conducted in concert with work in the northern shoreline area. The existing outfall along the central shoreline may be replaced or repaired pending upgrades to stormwater infrastructure in the upland areas.

Table 6. Source control strategy (i.e., package of tools) recommended to address potential pathways (cont.)

Package of Tools Recommended for Implementation	Rationale for Recommended Source Control Strategy	Plan for Implementation and Integration
Bank Erosion in Armored Shoreline Area (northern shoreline – Area 3)		
Regulatory and Compliance Program: ♦ Tenant access/use of the shoreline and riparian buffer areas not included in the lease area will be restricted **Operational/Behavioral BMPs:** ♦ BMP programs will be developed for both the tenant and the public **Physical BMPs:** ♦ Erosion and runoff controls will be used during shoreline earthworks ♦ Site access controls will be implemented after capital improvements are completed **Capital Improvements:** ♦ The existing armored bank will be enhanced to better control erosion using one of a number of stabilization options/materials available. ♦ The existing riparian vegetation buffer will be enhanced	Bank stabilization/armoring in this area will be required to prevent bank materials that potentially contain low-level PCB contamination from entering the LDW and to prevent additional upland area losses from erosion. Several options are available for achieving bank stabilization, including but not limited to armoring, use of geotextile fabric, installation of vegetation, or a combination of these options. The bank stabilization method for the northern shoreline will be selected in later planning stages, after completion of engineering evaluations and other assessments. The riparian vegetation buffer will be enhanced to further control erosion and increase habitat quality along the shoreline. The Port will work with the tenant to ensure lease agreements and regulatory requirements are followed, and the public to promote environmental stewardship along the northern shoreline.	It is anticipated that work in the northern shoreline source control implementation area will be conducted in concert with work in the central shoreline area. The abandoned STP outfall will need to be properly decommissioned (sealed and/or removed) during work along the northern shoreline. Special consideration will have to be given to the existing over-water conveyor structure and its potential for use in the future. A new outfall may be required along the northern shoreline pending upgrades to stormwater infrastructure in the upland areas.

Table 6. Source control strategy (i.e., package of tools) recommended to address potential pathways (cont.)

Package of Tools Recommended for Implementation	Rationale for Recommended Source Control Strategy	Plan for Implementation and Integration
Stormwater Network Discharges (paved upland area – Area 2)		
Regulatory and Compliance Program: ♦NPDES permit compliance **Environmental Investigation:** ♦Storm drain solids and stormwater discharge will be sampled after the system has been returned to functioning condition **Operational/Behavioral BMPs:** ♦Drain lines and catch basins will be cleaned and video-inspected ♦The paved area serviced by this system will be cleaned to remove accumulated soil ♦BMPs such as the use of catch basin socks, spill prevention and control plans, and routine maintenance of the area serviced by the system will be implemented **Capital Improvements:** ♦Stormwater network connectivity to off-site drainage areas (e.g. Diagonal Ave S ROW) will be determined and appropriate efforts taken to manage and assess any potential impact from off-site inputs. Consideration of complete isolation of T-108's stormwater system may be considered.	A combination of inspection and cleaning with implementation of effective BMP controls is the best option for ongoing evaluation and management of the existing stormwater system. In addition, the Port or the tenant, based on permitting requirements, will obtain NPDES coverage for the existing stormwater network within the lease area after it has been returned to functioning condition.	The stormwater network will need to be cleaned to expose catch basins (many of which are currently completely covered with soil) and unplug drainage lines. Work within the stormwater network will need to be conducted after the accumulated soil is removed. Storm drain solids and stormwater samples will be collected after the system has been cleaned and restored to a functioning condition. Video inspections of the lines and BMPs (such as the installation of catch basin socks) will be implemented after the system has been cleaned and restored to working order. NPDES coverage will be sought after cleaning/repair/replacement of the system and the surrounding upland area. The Port will work with the tenant to determine appropriate permit coverage for the system and to promote the goals of this SCSP.

Table 6. Source control strategy (i.e., package of tools) recommended to address potential pathways (cont.)

Package of Tools Recommended for Implementation	Rationale for Recommended Source Control Strategy	Plan for Implementation and Integration
Uncontrolled Upland Soil Erosion (unpaved upland area – Area 1)		
Regulatory and Compliance Program: ♦The Port will work with the tenant to ensure compliance with lease agreements, applicable regulatory programs and the SCSP, which will reduce the potential for contaminants to migrate from the upland to the LDW **Remediation Program (containment):** ♦Area will be controlled with paving or other appropriate stabilization/isolation methods to eliminate or control potential contaminated soil migration (including tracked-on material migration to paved areas) **Physical BMPs** ♦Construction BMPs will be employed to reduce migration of uncontrolled soil **Capital Improvements:** ♦A stormwater network will be installed (if paving is conducted) to reduce soil erosion via overland stormwater flow ♦Controlling soil in the unpaved upland area will reduce erosion and enhance usability of the property **Engineering Controls:** ♦Equipment will be properly operated and maintained to reduce the potential for contaminant releases **Institutional Controls:** ♦Tenant operations will be restricted to the lease area to reduce the potential for contaminant releases/migration and to protect the vegetative buffer	A combination of infrastructure upgrades to control soil erosion, , and a vegetative barrier represents the best alternative to control upland soil erosion in the unpaved upland area. The Port will coordinate with the tenant to regulate uses of this portion of the Western Parcel and minimize the potential for contaminant migration to the LDW.	Control/isolation of soil in this area should be conducted in concert with cleaning of the paved upland area. Surface/sub-surface soils not suitable for supporting selected capital improvements and anticipated future uses of the area (e.g., truck traffic), or soils suspected of being contaminated will be removed from the site for appropriate offsite disposal. New, clean fill will be brought to the site to support installation of selected capital improvements (such as paving and stormwater system installation). A new stormwater network will be installed in coordination with paving to service the newly paved area, if paving is selected as appropriate for the upland soil control strategy. The tenant lease line boundary will be demarcated, as applicable and necessary. After the area is controlled/isolated and tenant operations are restarted in this area, the Port will work with the tenant to achieve regulatory and lease compliance, and to promote the goals of this SCSP.

Table 6. Source control strategy (i.e., package of tools) recommended to address potential pathways (cont.)

Package of Tools Recommended for Implementation	Rationale for Recommended Source Control Strategy	Plan for Implementation and Integration
Bank Erosion in Vegetated Shoreline Area (habitat restoration area – Area 5)		
Environmental Investigation: ♦Monitoring (visual assessments) will be conducted to gauge the effectiveness of the habitat restoration area in controlling bank erosion and providing fish and wildlife habitat **Operational/Behavioral BMPs:** ♦Source control issues will be communicated to the public and the tenant to promote compliance with the SCSP and environmental stewardship **Capital Improvements:** ♦Designated pedestrian pathways and educational signage will be used as necessary to reduce traffic along the restored shoreline area and reduce the possibility of contaminant releases (e.g., dumping waste materials) ♦The restored riparian and mudflat areas will be assessed; additional restoration opportunities may be identified and implemented **Engineering Controls:** ♦Operation and maintenance programs will be followed for use of Port maintenance equipment **Institutional Controls:** ♦The Port will enforce tenant lease lines to restrict activity in the habitat restoration area	Monitoring the restoration area and habitat features will allow for an ongoing measurement of the restoration area's effectiveness and provide useful information if other areas of the property are considered for habitat restoration in the future. Capital improvements, BMPs, and other controls will also be used to ensure site use in this area will not cause impact to the shoreline restoration area and to promote source control and environmental stewardship.	Monitoring of the restoration area should be initiated after all work in the upland area is completed to allow a determination of whether the shoreline vegetation present is sufficient to control bank erosion under the current/long-term conditions of the site. The use of BMPs and engineering and institutional controls should be implemented as soon as possible as these activities do not rely on other work to be completed in this area. Capital improvements such as pedestrian pathways should be installed after work along the northern and central shoreline is completed if these improvements are designed to extend north of the restoration area.

Table 6. Source control strategy (i.e., package of tools) recommended to address potential pathways (cont.)

Package of Tools Recommended for Implementation	Rationale for Recommended Source Control Strategy	Plan for Implementation and Integration
Atmospheric Deposition (all source control implementation areas)		
Environmental Investigation:' ♦Catch basin solids data will be collected and used to help gauge the significance of this pathway at T-108 ♦Existing atmospheric deposition data (collected in the Duwamish Valley) will be modeled to provide more information if catch basin solids data suggest a significant contribution of contaminants from this pathway **Operational/Behavioral BMPs:** ♦General good housekeeping practices will be followed to reduce the potential for emission of contaminants **Capital Improvements:** ♦Paving and a stormwater network maintenance/upgrades will allow for additional assessment and management of this pathway	The use of catch basin solids data will provide the best option for assessing this pathway in relation to the larger picture of source control at T-108. The implementation of BMPs and good housekeeping procedures combined with paving and stormwater upgrades in the northern portion of the western parcel will provide the best option for potential management of contaminants from this pathway.	Catch basin solids data will be collected from the existing stormwater network after it has been cleaned out and restored to a functioning condition. Catch basin solids data should be collected from any new drainage system after sufficient solids have accumulated post-installation. If catch basin solids sampling suggests there are significant inputs of contamination from the atmospheric deposition pathway, the atmospheric deposition data from the Duwamish Valley should be modeled to provide additional information about this pathway. Good housekeeping practices to reduce the potential for onsite contaminant emissions should be instated as soon as possible if they are not already being followed.

Table 6. Source control strategy (i.e., package of tools) recommended to address potential pathways (cont.)

Package of Tools Recommended for Implementation	Rationale for Recommended Source Control Strategy	Plan for Implementation and Integration
Groundwater Migration (potential future pathway; all source control implementation areas)		
Regulatory and Compliance Programs: ♦The Port will inspect tenant operations, based on lease arrangements, for activities that could potentially impact groundwater **Environmental Investigation:** ♦Groundwater monitoring will be conducted in the future only if an accidental release with potential impact to groundwater occurs **Remediation Programs:** ♦Soil stabilization through paving or another appropriate method (determined through a feasibility evaluation) will help protect groundwater quality by isolating soil contaminants **Operational/Behavioral BMPs:** ♦Public outreach and tenant education will communicate source control concerns and promote the use of BMPs ♦Good housekeeping practices will be used to reduce the risk of hazardous materials releases that could contaminate groundwater in the future **Capital Improvements:** ♦Paving and stormwater network upgrades/maintenance will reduce the potential for infiltration of stormwater and future spills/leaks **Engineering Controls:** ♦Proper operation and maintenance procedures will reduce the potential for accidental spills/leaks that could result in groundwater contamination	In addition to the affects of BMPs and operational controls, paving and stormwater infrastructure will help eliminate the potential for groundwater and stormwater intrusion into the subsurface and potential migration of contamination, if these are selected as upland soil control methods. Site operations will be conducted following procedures to reduce the risk of spills, leaks, and other hazardous materials releases. Groundwater monitoring will be conducted only if a future hazardous materials release occurs (either from onsite or offsite sources) with the potential to contaminate groundwater.	Remediation programs and capital improvements being conducted in the paved and unpaved upland areas will contribute to the control of the groundwater migration pathway by reducing stormwater infiltration, the risk of hazardous material infiltration, and by isolating potentially contaminated soils. BMPs and engineering controls should be implemented as soon as possible if they are not already in place. Groundwater monitoring will be conducted in the future if a hazardous materials release occurs that could contaminate groundwater.

BMP – best management practice
LDW – Lower Duwamish Waterway
NPDES – National Pollutant Discharge Elimination System
PCB – polychlorinated biphenyl
Port – Port of Seattle
SCSP – source control strategy plan
STP – sewage treatment plant
T-108 – Terminal 108

5 Data Gap Identification

Data gaps have been identified for the Western Parcel through development of this SCSP and the alternatives analysis process. Data will be collected to fill these gaps as the SCSP is implemented, based on the requirements of the individual tools and alternatives to be completed. Because of the adaptive and long-term strategic nature of this overall effort, these data gaps may be most appropriately filled prior to and/or during the course of implementation of the various alternatives under consideration.

5.1 Considerations for Data Gaps

The primary purpose of the ECR was to summarize the available environmental quality data for T-108 (Windward 2009). A summary of environmental conditions on the Western Parcel T-108 was provided in Section 1.2. Several soil and groundwater investigations have been conducted in the past on the property; however, evaluation of the site has indicated that some data gaps will need to be filled in association with implementation of the recommended source control strategy elements for the Western Parcel. Table 7 presents information on those data gaps that to be filled specific to the tools under consideration. Specific information on the methods to be utilized and schedule to be followed to fill the data gaps will be provided in subsequent work plans. These work plans will be developed to support planning, investigation, design, installation, and associated monitoring of the recommended alternatives, as appropriate.

Table 7. Data gaps for each potential pathway and source control tool scenario

Potential Pathway	Source Control Implementation Area	Available Data	Data Gaps to be Filled to Implement Recommended Source Control Strategy
Bank erosion (unarmored shoreline)	central shoreline (area 4)	no data currently available	♦ Conduct a bank-stability geotechnical assessment (for shoreline cut back and armoring/stabilization design purposes, as determined appropriate through feasibility evaluation) and determine existing profile elevations ♦ Collect soil samples to determine bank soil quality, disposal profile, and worker health and safety requirements ♦ These and other assessment and characterization efforts will be coordinated for the central and northern shorelines.
Bank erosion (armored shoreline)	northern shoreline (area 5)	data available from two bank soil samples collected in 2005	♦ Conduct a bank-stability geotechnical assessment (for shoreline cut back and armoring/stabilization design purposes, as determined appropriate through feasibility evaluation). ♦ Collect soil samples to determine bank soil quality, disposal profile, and worker health and safety requirements. ♦ These and other assessment and characterization efforts will be coordinated for the central and northern shorelines.
Stormwater network discharges	paved upland area (area 2)	no data currently available	♦ Inspect the integrity and function of the stormwater network to determine whether repairs are needed ♦ Sample materials removed from system during cleanout to determine proper disposal methods ♦ Determine existing connectivity to the sanitary sewer of the former sump and catch basin associated with the former truck washing area ♦ Determine existing connectivity to the stormwater network in the Diagonal Avenue S ROW ♦ Conduct future monitoring (including NPDES-required stormwater monitoring and storm drain solids monitoring) to measure the success of implemented source control measures, monitor control of this potential pathway, and help in the identification of potential future impacts to the system (materials tracked in from offsite, atmospheric deposition, soil or groundwater infiltration of broken drainage lines, etc.).

Table 7. Data gaps for each potential pathway (cont.)

Potential Pathway	Source Control Implementation Area	Available Data	Data Gaps to be Filled to Implement Recommended Source Control Strategy
Uncontrolled upland soil erosion	unpaved upland area (area 1)	historical surface and subsurface data, recent borehole samples collected in 2006	♦ Conduct a geotechnical assessment to support the design of recommended soil control/isolation and stormwater drainage upgrades. This study can likely be performed simultaneously with the work required for the shoreline bank. ♦ Sample soils to ensure worker health and safety and provide information for property soil disposal, as needed. ♦ If subsurface areas of contamination (e.g., waste disposal) are discovered during earthwork activities, they will be sampled to protect worker health and safety and to understand the conditions of materials that may be left after soil stabilization/isolation.
Bank erosion (vegetated shoreline)	habitat restoration area	no data available (but area reportedly sampled in mid-1980s prior to construction of the restoration area)	♦ No data needs to be collected prior to implementing the recommended source control action (monitoring/visual assessment). ♦ Implementing the recommended source control strategy will allow the determination of whether or not existing vegetation and bank conditions are effectively controlling erosion.
Atmospheric deposition	all areas	data collected from five stations within the LDW air-shed between 2005 and 2007	♦ This pathway will be further evaluated based on a source control strategy for the storm drainage network(s) on the parcel. Ongoing monitoring of the network(s) (after restored to functioning conditions) will assist in the ongoing determination of whether atmospheric deposition is potentially a significant pathway at T-108. ♦ If it is determined that atmospheric deposition is likely a significant source of contamination to storm drain solids or other on-site media, the need to collect site-specific atmospheric deposition data at T-108 will be reevaluated. ♦ Alternatively, existing LDW atmospheric deposition data could be used to conduct an assessment of potential concerns at T-108.
Groundwater migration	all areas	historical and recent groundwater data (2006 and 2007)	♦ Currently, no additional groundwater data needs to be collected prior to implementing the recommended alternatives for the Western Parcel (including uncontrolled soil and bank stabilization, stormwater infrastructure maintenance/upgrades, and implementation of BMPs to reduce the potential for groundwater contamination). ♦ Recent groundwater investigations have allowed Ecology to determine that groundwater is not currently a pathway for recontamination of LDW sediment. ♦ Groundwater monitoring may be necessary in the future to characterize potential impacts from offsite migration of contaminated groundwater or site activities (accidental spills, etc.) that could result in groundwater contamination.

Table 7. Data gaps for each potential pathway (cont.)

LDW – Lower Duwamish Waterway
NPDES – National Pollutant Discharge Elimination System
PCB – polychlorinated biphenyl
Port – Port of Seattle
ROW – right-of-way
SCSP – source control strategy plan
T-108 – Terminal 108

5.2 GENERAL APPROACH TO ADDRESSING DATA GAPS

Numerous methods can be employed to address the identified data gaps. The approaches could include collection of additional data through multi-media sampling programs (surface and sub-surface soil, bank sediment, etc.), completion of geotechnical assessments (bank stabilization, soil quality for construction, etc.) and stormwater network integrity evaluations (pressure and/or video testing, outfall integrity, overall collection system efficiency and performance) (Table 7), to name a few.

In general, data gaps will be filled to support the design and implementation of the various source control tools and alternatives recommended for the site. The data-gathering programs that will be implemented are not intended to gather additional data for the sole purpose of blanket characterization of the site, but rather to fill specific data gaps to allow implementation of the source control strategy to move forward. Specific details on sampling programs (number of samples, locations, etc.) are not provided in this documentation. This type of information will be provided in subsequent work plans specific to the planning, investigation, and design requirements of the program being implemented.

As the strategy is implemented over time, the availability of new data may result in the re-evaluation of site conditions and the potential to use other approaches of data analysis (e.g., data modeling). The sections that follow expand on the discussion of filling data gaps and integrating data gap investigations into the larger source control strategy specific to each potential pathway, as introduced in Table 7.

5.2.1 Bank sampling and evaluations at the northern and central shoreline areas (Areas 3 and 4)

Bank sampling and evaluation will need to be designed to sufficiently characterize both the northern armored section (rip-rap) and the central unarmored section of the shoreline (mixture of failed rip-rap and vegetated areas). A different sampling scheme may be necessary for each segment of the shoreline based on the unique current conditions of each.

A geotechnical assessment/engineering evaluation of the bank soil structural stability and quality will need to be completed for various reasons, including identifying cut back and grading locations sufficient to support the structural requirements of the new stabilization and erosion control features to be installed/upgraded.

In order to characterize the nature and extent of potential contamination in bank soils in line with future work activities, both surface and subsurface soil samples will need to be collected at multiple locations and depths. The sampling program will be designed to support the identification of bank soil conditions and potential cut back locations. The ideal cut-back locations should include areas of no or minimal chemical contamination to minimize to the greatest extent practicable future potential impact to

LDW sediments after the preferred alternative is established. Portions of the bank where debris is visible should be targeted for sampling and analysis. Bank soil samples will likely be analyzed for the suite of SMS chemicals and those non-SMS chemicals that were detected in either of the two bank soil samples collected from the northern shoreline area in 2006.

A better understanding of soil conditions along the shoreline is also needed prior to the beginning of site work so that workers can be prepared with the appropriate personal protective equipment (PPE) and procedures to ensure protection from any potential hazardous materials that might be present in the bank. Data from the bank sampling program and geotechnical assessment will also be used for this purpose.

It is anticipated that bank cut back activities in the northern and central shoreline areas will produce some volume of stockpiled soil that will need to be disposed offsite. Soil samples will be collected from the stockpile and composited for analysis in order to characterize the stockpile for proper disposal. At a minimum, soil stockpiles will be analyzed for any chemical detected in the soil samples collected as part of the bank cut-back design, and petroleum-related products (even if these have not been analyzed for or detected in other soil samples).

It is also anticipated that the former STP drainage outfall will need to be formally decommissions (plugged) and that the portion extending from the bank (after cut-back) to the LDW will be removed, to the greatest extent practical, during re-grading and stabilization of the central bank area. This will remove a potential conduit for contaminated site soil and groundwater to reach the LDW sediment. It will help ensure that stormwater leaving the site is managed by the upgraded/new Western Parcel-specific stormwater improvements and that performance monitoring efforts can effectively assess the pathway.

5.2.2 Soil erosion from upland unpaved areas (Areas 1 and 2)

Soil conditions on the northern unpaved portion of the Western Parcel need to be characterized prior to implementing the selected source control tools for this area. A geotechnical assessment will be required to ensure that soil stability is sufficient to support a paved yard and associated vehicle traffic and to provide useful information for the design of a new stormwater drainage network. This assessment will need to be conducted prior to the development of final design plans for paving and stormwater infrastructure installation; this assessment could likely be implemented with the geotechnical assessments recommended along the shoreline bank.

Analytical characterization is also required in this area so that site workers can be prepared with the appropriate PPE and follow other precautions to protect from any hazardous materials that might be present in the soil. Soil characterization will also provide the necessary information to ensure proper management/disposal of soil, as necessary. Surface soil sampling results will also be useful in establishing the baseline level of potential chemical inputs to the existing (and future) stormwater network

related to surface soil (including materials that may be tracked onsite from offsite sources).

Surface and subsurface soil samples will likely need to be collected at multiple locations and depths to fill data gaps. The sampling program will be designed with the goal of identifying any potentially buried waste disposal areas that may be exposed during implementation of the design for paving and upgrading the area.

At a minimum, samples will be analyzed for the chemicals that have historically been detected in soil samples from this portion of the Western Parcel, based on a review of existing data presented in the ECR (Windward 2009). If subsurface waste disposal areas are discovered during earthwork activities, and if these areas have not previously been characterized, a delay may occur during implementing the recommended alternative so that proper characterization of the exposed material can be completed. It is important to understand the potential sources of contamination that may be left in place once the paving/regrading project is complete and the stormwater network is in operation so that effective performance and system monitoring programs can be implemented.

Any soil produced for disposal will need to be stockpiled and sampled. Composite samples will be collected from each stockpile in order to characterize the number of potential contaminants present and the general concentrations of those contaminants so that the stockpile can be properly disposed. Depending on the source of the stockpiled materials (surface vs. subsurface), analytical results of the composited samples may provide important information regarding potential inputs to the stormwater system (both current and future). They will also provide additional data points that can be used to establish the baseline conditions of the stormwater network. At a minimum, soil stockpiles will be analyzed for any chemicals detected in the surface or subsurface soil samples previously collected, and petroleum-related products (even if these have not been analyzed for or detected in other soil samples).

5.2.3 Stormwater drainage network and storm drain solids (Area 2)

To date, stormwater and storm drain solids sampling has not been conducted within the drainage network that serves the paved areas on the southern portion of the parcel. Samples should be collected prior to cleaning and inspecting the system to help establish the baseline conditions of the existing drainage system. This information will also be useful over the long-term to interpret potential future impacts from materials originating from offsite and transported to T-108 via trucks and other mobile equipment, or deposited on the paved surfaces from the atmosphere.

If possible, storm drain solids grab samples will be collected from all of the catch basins (currently seven have been identified for this system; one is located on the Eastern Parcel of T-108) and from the storm drain manhole. At a minimum, samples will be analyzed for the suite of SMS chemicals. Sampling of storm drain solids prior to cleanout will also ensure proper disposal of waste materials generated (solids and wastewater), as appropriate. However, the existing stormwater system is severely

clogged and the catch basins that have been identified are full of soil and sediment. Some preliminary cleaning of the system may be required before representatives samples can be collected.

If possible, stormwater samples (both filtered and unfiltered) will be collected at the mouth of the outfall during low tide while the outfall is flowing (likely during a storm event). These sampling parameters will be followed in order to collect a sample that most likely represents discharge from the storm drain system rather than backflow from the LDW. Stormwater samples will also be collected from within the system if suitable sampling locations can be identified. At a minimum, the stormwater samples will be analyzed for analytes required by the general industrial National Pollutant Discharge Elimination System (NPDES) permit (copper, zinc, oil and grease, pH, and turbidity). As with the concerns for representative catch basin solids samples, it may not be feasible to collect stormwater samples until some initial cleanout of the system is completed in order to ensure that what is being sampled is representative to the overall system.

Stormwater and storm drain solids sampling programs should also be designed to aid in the determination as to whether the existing system needs to be upgraded/repaired or replaced (i.e., to determine whether there are leaks or breaks in storm drain lines or catch basin walls). This could include monitoring of solids build-up within the system over designated periods of time, or video inspection of the integrity of the storm drain lines and catch basins. Additionally, this information will be useful for the design and installation of the stormwater network in the northern (currently unpaved) portion of the site. Depending on the results of the engineering, regrading, and stormwater system design efforts, it may be determined that the design and construction of one site-wide stormwater network to serve the entire Western Parcel is the most appropriate and efficient approach to long-term management and performance of the stormwater network. A new, site-wide stormwater network for the Western Parcel may require establishment of a new outfall, depending on grading, engineering concerns, and bank stabilization programs.

5.2.4 Bank evaluation at the southern shoreline area (Area 5 – habitat restoration area)

Observations made during recent site visits to the Western Parcel indicate that the habitat restoration area is functioning as designed. The vegetation appears to be in good health and the shoreline slope appears to provide viable intertidal habitat while reducing the potential for shoreline erosion. The restoration area, including the intertidal area, shoreline, and riparian vegetation, should be monitored regulatory to identify any potential issues with bank erosion or habitat health. Analytical sampling and geotechnical evaluations are not required on this portion of the shoreline as part of the recommended source control strategy. The recommended action alternative for the restoration area includes monitoring and potentially enhancing habitat features.

5.2.5 Atmospheric deposition

Ongoing assessment of the stormwater network will provide data points for the indirect assessment of the potential for atmospheric deposition to be a significant pathway of contamination to the Western Parcel of T-108. Once the tools of the SCSP have been implemented, the potential for contaminants to reach the stormwater network (whatever its eventual configuration) through soil erosion, accidental spills, or other poor housekeeping issues at the facility will be greatly reduced. If contaminants continue to be detected in the stormwater network above SMS screening criteria or water quality standards during performance monitoring, and if similar contaminants are known to be distributed through atmospheric deposition (e.g., PAHs), then the evaluation of atmospheric deposition as a potentially significant pathway may need to be further assessed.

If warranted, additional assessment of the atmospheric deposition pathway could include use of existing LDW atmospheric deposition data to model potential deposition scenarios at T-108 over a given period of time.[2] This would allow potential estimates of loading to the stormwater network to be calculated. Alternatively, onsite air sampling could be conducted to measure actual atmospheric deposition at T-108. The methodologies for appropriate assessment of chemicals deposited from the atmosphere would be selected in consultation with Ecology.

5.2.6 Groundwater

Based on the data currently available and characterization evaluations that have been completed to assess the groundwater pathway at T-108, no additional data gaps need to be filled prior to implementing the recommended tools for groundwater source control. The recommended tools include paving, stormwater infrastructure design/upgrades, and implementation of BMPs to reduce the potential for contaminants to enter site groundwater. Groundwater is not currently considered to be a potential pathway for recontamination of LDW sediment based on available data and conclusions made by Ecology. However, groundwater monitoring may be necessary in the future if conditions at the property or surrounding properties change.

A scenario in which additional groundwater monitoring would be necessary at T-108 would include an accidental chemical spill on the subject property or a neighboring property. In this case, the spill could infiltrate the ground surface and contaminate groundwater on or migrating toward T-108. Existing groundwater wells on T-108 (and potential new wells given the specifics of the spill event) would need to be sampled for the chemicals known to have been released or, if the chemicals released are unknown, groundwater would likely be sampled for the suite of SMS chemicals and petroleum-related products.

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[2] One of the King County LDW atmospheric deposition monitoring stations is located in close proximity to T-108 and was sited by the Puget Sound Clean Air Agency to be representative of the industrial neighborhood-scale conditions in the Duwamish Valley.

6 Source Control Strategy Implementation

As discussed previously, the source control strategy for the Western Parcel of T-108 will be designed to promote continued use of the parcel for commercial maritime operations, similar to the current tenant's management of cargo containers, chassis, and associated maintenance. Implementation of the SCSP will be a timely and complex process involving coordination and planning with numerous parties. The strategy will be adaptive and iterative; many of the design details will be fleshed-out after completing assessments and investigations. The goals and methodologies to be used in these assessments will be provided in subsequent work plans.

Because of the complexity of the project and these various constraints, exact milestones for completion of the recommended tools and alternatives are difficult to identify at this time; however, the remainder of this section discusses the general approach to coordination and implementation of the effort. At present, it is anticipated that individual work plans, with more specific milestones, performance requirements, sampling programs, etc., will be prepared as the overall strategy is implemented.

6.1 Roles and Responsibilities

The Port, as the property's owner, will be the party chiefly responsible for the ultimate implementation of the source control program for the Western Parcel of T-108. However, proactive coordination and planning with the terminal's tenant is going to be paramount if the tools of this source control strategy are to be successful. The considerations outlined in this document, especially concerning accidental spills/leaks, and stormwater management, are directly linked to ongoing operational procedures performed by the tenant.

As part of the source control strategy for the Western Parcel, the Port intends to integrate, to the greatest extent possible, the existing monitoring and BMP requirements specific to ConGlobal's individual NPDES permit with the Port's more focused monitoring and assessment programs. This integration will need to be adaptive in nature as assessment and performance concerns will likely change as the source control strategy is implemented. The Port intends to initiate regular outreach and coordination discussions with the tenant's representatives to help reduce program implementation issues while simultaneously keeping the tenant apprised to and educated about the environmental concerns at the property.

An important part of the tenant considerations will be continued use of and access to the Western Parcel during the implementation of the longer-term tools and alternatives of the strategy (e.g., paving, stormwater upgrades). Some of the tools outlined in the strategy, especially paving upgrades, will actually enhance the tenant's ability to use the parcel for container/chassis storage. The use of the parcel is currently limited by the large quantity of soil accumulated on both the paved and unpaved areas, which makes it difficult to operate forklifts, vehicles, and other equipment.

The other key players vital to the success of implementing the source control strategy are the members of the regulatory community, especially Ecology. As this program will be implemented over the long term in an iterative fashion, the Port anticipates working very closely with Ecology throughout all aspects of the program's implementation. As additional data are obtained for the site and the recommended tools and alternatives are implemented, the Port will work with Ecology to focus follow-on efforts, including performance monitoring, to ensure that the data points needed to assess the program's overall success are being collected appropriately. As noted in the T-108 Source Control Strategy Work Plan (Windward 2008), the Port will inform Ecology of the status of source control strategy implementation with ongoing status reports These will be submitted on a semi-annual basis beginning with the results of initial data gap investigations, and information on the implementation of the engineering- and design-related components of the program as they evolve.

Coordination with other regulatory entities will also be important throughout the course of this program's management. Since the property is within the greater LDW superfund site, planning and permitting for many of the components of the program will likely need to be coordinated, to varying degrees, with the US Environmental Protection Agency, the US Army Corps of Engineers, and the City. Near water and shoreline work will also likely require coordination with the National Oceanic and Atmospheric Administration and other natural resource trustees. As the strategy program for the site evolves, the Port intends to be very proactive with outreach to these groups, to ensure that any potential conflicts in implementation can be identified early and resolved appropriately and efficiently. The Port will also coordinate with the LDW Source Control Work Group, as appropriate, throughout implementation of the SCSP.

6.2 Implementation of the Recommended Alternatives and Overall Source Control Strategy

As previously discussed, the adaptive nature of this source control strategy makes it difficult to identify exact milestones and time frames for some of the larger, more expensive components of the program. A targeted schedule for implementation of the recommended source control actions is presented in Figure 5. However, obtaining the necessary permits and concurrences required to initiate various aspects of the planned work (especially along the shoreline) could add up to a year of delay (and possibly even more). Therefore, at this stage of the program's implementation, it seems most appropriate to discuss milestones for those components necessary to start implementation at the site. Although the Western Parcel was subdivided into particular implementation areas for discussion in this document (see Figure 3), many of the investigations or early assessments that are required for the program span across these organizational boundaries. A logical place to begin with the source control strategy implementation is to initiate assessments that will be focused to provide information relevant to future aspects of the source control program.

Task or Phase	Timeframe/Milestone		2009		2010				2011				2012			
	Start	End	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Source Control Strategy Plans (West and East)																
Final West SCSP		10/30/09		X												
Draft and Final East SCSP	Ongoing	3/31/2010 – Final			X											
Data Gaps and Design Assessments																
Work Plans and SAPs/QAPPs	1Q – 2010	2Q – 2010														
Field Sampling and Lab Analysis	3Q – 2010	4Q – 2010														
Data Evaluation and Presentation	4Q – 2010	1Q – 2011														
Alternatives and Strategy Evaluation and Selection																
Internal Port Evaluations and Decisions	4Q – 2010	1Q – 2011														
Ecology and External Stakeholders Selections	4Q – 2010	1Q – 2011														
Implementation – Capital Projects (Including Cleanup)																
Permitting and Tenant Coordination	1Q – 2011	1Q – 2012														
Design and Contractor Award	1Q – 2011	1Q – 2012														
Construction	2Q – 2012	2012 – 2013														→
Operations and Regulatory BMPs																
Operational and Housekeeping BMPs	Ongoing	As needed														
SWPP and other Regulatory Improvements	Ongoing	As needed														
Performance Monitoring and Follow-Up																
Site Inspections and Monitoring		Semiannually						X		X		X		X		X
SCSP Status Reporting (Ecology only)		Semiannually			X		X		X		X		X		X	
Public Outreach and Participation Plan	4Q – 2009 Ongoing	Semiannually			X		X		X		X		X		X	

Proposed timeframe

X Deliverable/milestone

Figure 5. T-108 SCSP targeted implementation schedule

Table 7 provides a breakdown of each of the recommended tools and alternatives that were developed through the analysis completed in this document. The information in the table is based on the conclusions developed through this evaluation; some of the information on the table may be abbreviated for organizational purposes.

Although milestones are uncertain at this time for many of the larger components, providing information on the potential prioritization and order of the program's components does provide insight as to how the process will unfold and how the various components elements of the strategy will be integrated. Tables 6 and 7 provides insight on those components that can be completed in the short term (based on the pathway/source scenarios ranked through the prioritization exercise), and includes information on economies of scale, when applicable. The milestones for the larger, longer term components of the strategy will be determined as data gaps are filled and the overall approach to work at the site is negotiated between the Port and Ecology.

The tools and alternatives recommended for each area were derived through this evaluation process. Depending on a variety of potential constraints, including but not limited to changes in tenant occupancy or use at the site, internal capital improvement funding concerns at the Port, ramifications of the pending Record of Decision (ROD) for the LDW superfund site, or other unforeseen future concerns, the tools and alternatives recommended may have to be reevaluated, adjusted, or abandoned and replaced by new more appropriate tools and alternatives. However, if the program proceeds as evaluated in this SCSP, Figure 6 provides a rough, conceptual idea of how the Western Parcel may look once the longer-term strategy components are implemented.

Wind Ward environmental LLC

Legend

- Manhole
- Catch basin
- Outfall
- Curb
- Stabilized/controlled upland area
- Enhanced vegetation on vegetated bank area
- Stabilized/armored intertidal bank area

Note: aerial photo view with 80° heading and 18° tilt. North is thus approximately to the left, and locations of parcel boundaries, paved areas, and stormt drain network features are approximate.

Figure 6. Western Parcel after implementation of recommended alternatives

7 Summary

This SCSP is being prepared in association with Ecology's source control program for the LDW. The source control strategy recommended in this document was developed using existing environmental data as presented in the ECR (Windward 2009), conceptual site modeling, pathway prioritization, and an analysis of the suite of source control tools available to address the pathways identified. This SCSP, in combination with the ECR, provides the foundation needed to begin implementation of source control activities on the Western Parcel of T-108.

Because of the long history and ongoing use of the property for industrial activities, PCBs, TPH, BTEX, PAHs, and several metals have been identified in environmental media at T-108. In general, the presence of these chemicals has been widespread but the majority of detected concentrations have been below applicable cleanup standards (see Appendix D of the ECR (Windward 2009)). The existing environmental conditions of the site, along with observations made during site visits and a general understanding of chemical sources and pathways, were considered when identifying and ranking the potential pathways of contaminant migration on the Western Parcel to the LDW.

The ranking for source control prioritization also considered the tools available to address each pathway, and the degree to which each pathway could likely be controlled by implementing those tools. Pathways that had tools available to directly and efficiently provide a high level of source control were ranked with a higher prioritization. For example, the bank erosion pathway in the central, unarmored portion of the Western Parcel was ranked highest for source control prioritization because significant bank erosion has been observed in this area during site visits, bank soil contamination has been identified in another portion of the shoreline (the northern shoreline), and the bank erosion pathway along the central shoreline can be greatly reduced by armoring and other shoreline stabilization techniques that can feasibly be achieved in a relatively short period of time.

In general, this SCSP proposes to address pathways by employing capital improvement projects and physical BMPs in the short-term, followed by longer-term implementation of regulatory compliance, Port-tenant coordination, and public outreach programs. Many of the source control tools proposed in this SCSP must be managed sequentially; for example, NPDES-permitting of the existing storm drain network cannot be effectively implemented until the system has been restored to a functioning condition.

This SCSP is intended to be highly adaptive. The focus and timing of the strategy will likely shift in response to additional information provided as data gaps are filled, the integration of the program's requirements with the tenant's needs and changing land uses, changes to site configuration related to capital improvements or remedial

activities, integration of the program's requirements with remediation and source control efforts for the larger LDW site (e.g., ROD requirements), and coordination and discussion with Ecology representatives, among other factors. The strategy will be designed to comply with appropriate federal, state, County, and City regulations relevant to source control concerns; therefore, the SCSP may also be adapted in response to the changing regulatory environment.

Implementation of this SCSP is anticipated to be a highly coordinated effort. Many of the source control actions and tools recommended will be implemented in concert to address multiple potential pathways simultaneously and to take advantage of timing efficiencies and economies of scale. Other source control actions will be implemented in a sequential manner, with the achievement of one element of the strategy leading into initiation of the next.

Next Steps in the Source Control Strategy for the Western Parcel

The next stage of the source control strategy for T-108 will include development of focused work plans to design and implement necessary data gathering efforts, engineering evaluations, and stormwater system assessments in line with the tools and alternatives recommended through the evaluation completed in this documentation. The Port will work closely with Ecology and the site's tenant to ensure that the plans developed effectively gather the requisite information to begin implementation of the larger capital improvement and engineering components of the strategy, provide Ecology with information useful for source control assessment, and promote the tenant's ongoing daily use of the site for maritime commercial operations.

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