APPENDIX 13 – Adaptive Management Requirements

Additional permit requirements in this appendix reflect approved adaptive management response plans in accordance with Special Condition S4.F.3. Affected Permittees shall comply with the specific requirements identified.

Name of Adaptive Management Response Plan	**Lower Duwamish Waterway (LDW) Source Control**
Reference Document(s)	*Seattle's Source Control Plan for the Lower Duwamish Waterway (2015-2020),* City of Seattle 2016. http://www.seattle.gov/util/forbusinesses/drainagesewerbusinesses/pollutioncontrol/lowerduwamishwaterway/ *Lower Duwamish Waterway Source Control Strategy,* Publication No. 16-09-339, Ecology 2016. *Pollutant Source Tracing in the Lower Duwamish Waterway, Sampling & Analysis Plan,* Prepared by Seattle Public Utilities and Pyron Environmental, June 2009.
Receiving Waterbody	Lower Duwamish Waterway in the Duwamish River estuary (from the southern tip of Harbor Island upriver approximately 5 river miles)
Applicable Area	Refer to Table 1 and Table 2 below.
Parameter(s)	Metals: arsenic, copper, lead, mercury, zinc Total polychlorinated biphenyls (PCBs) Semi-volatile organic compounds (SVOCs) including phthalate esters and polycyclic aromatic hydrocarbons (PAHs) Total petroleum hydrocarbons (TPH)
MS4 Permittee	Phase I Permit: City of Seattle

Actions Required

Source Tracing & Sampling Program: The Permittee shall implement a Source Tracing & Sampling Program to find and eliminate priority contaminant sources to the MS4. The Permittee shall implement the schedules and activities identified in S5.C.7 and S5.C.8 of the Phase I permit in response to identified sources.

The source tracing sampling program shall result in the collection of storm solids, via grab sampling from catch basins or inline pipes and via sediment traps, and associated chemical analyses. When applicable, source tracing sampling shall include resampling following line cleaning. Source tracing sampling shall be performed to fill data gaps in areas as noted in Tables

1 and 2. If feasible and effective based on the results of an ongoing pilot project, source tracing shall involve use of a canine trained in the identification of PCB sources.

The source tracing sampling program shall be implemented in accordance with an approved Quality Assurance Project Plan (QAPP). The existing QAPP, the Sampling and Analysis Plan dated June 20, 2009 and referenced above, is the current Ecology-approved QAPP. To reflect changes and additions in the sampling program, the Permittee, no later than June 30, 2017, shall submit a revised draft QAPP to Ecology for review and approval. If Ecology does not request changes within 90 days, the draft QAPP is considered approved. The Permittee may combine the source tracing sampling program QAPP with the effectiveness monitoring QAPP, referenced below. QAPP amendments, if necessary, must be submitted to Ecology for review and approval.

Effectiveness Monitoring Program: The Permittee shall implement an effectiveness monitoring program to track and evaluate contaminant concentration trends in MS4 discharges and to inform priorities for the implementation of Best Management Practices (BMPs) across the different MS4 drainage basins subject to this adaptive management response.

The effectiveness monitoring program shall result in the establishment of routine monitoring locations to measure contaminant concentrations in storm solids at the outfalls (or near-end-of-pipes) subject to this adaptive management response as noted in Tables 1 and 2.

The effectiveness monitoring program shall be implemented in accordance with an approved Quality Assurance Project Plan (QAPP). The existing QAPP, the Sampling and Analysis Plan dated June 20, 2009 and referenced above, is the current Ecology-approved QAPP. To reflect changes in the sampling program, including but not limited to additional locations and use of a smaller sediment trap based on the results of ongoing pilot testing, the Permittee, no later than June 30, 2017, shall submit a revised draft QAPP to Ecology for review and approval. If Ecology does not request changes within 90 days, the draft QAPP is considered approved. The Permittee may combine the effectiveness monitoring program QAPP with the source tracing sampling program QAPP, referenced above. QAPP amendments, if necessary, must be submitted to Ecology for review and approval.

At a minimum, the effectiveness monitoring program shall:

- Beginning in 2017, collect at least one sample per calendar year from each outfall/near-end-of-pipe location as noted in Tables 1 and 2.
- Submit available data to the Environmental Information Management (EIM) database by May 31 of each year.
- As of September 30, 2017, be documented in a QAPP consistent with *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies*, July 2004, Ecology Publication No. 04-03-030.

Business Inspection Program Enhancements: In addition to implementing the Source Control Program for Existing Development, Special Condition S5.C.7, the Permittee shall develop and implement the following enhancements no later than July 31, 2018:

1. A shortened business compliance period for businesses that have previously been inspected.

2. Revisions to the business inspection information gathering protocols to focus on key information necessary to assess and track compliance with the local code(s).
3. Transition to electronic information collection methods.
4. An effectiveness evaluation of the enhanced business inspection program.

Operations & Maintenance:

1. The Permittee shall implement a Line Cleaning Program in the area subject to this adaptive management response. The purpose of the Line Cleaning Program is to remove storm solids that have accumulated in the conveyance system, assess pipe condition, and provide a "clean slate" for source tracing. The Permittee shall prioritize conveyance lines for cleaning on an annual basis based on source tracing data, effectiveness monitoring data, and other considerations. The Permittee shall clean, on average, 4,000 linear feet each calendar year.
2. The Permittee shall develop an operations and maintenance program for MS4 infrastructure, including municipal streets, to ensure future MS4 infrastructure operations, maintenance, and capital projects address Duwamish source control needs. The Permittee shall evaluate programmatic strategies for assessing existing MS4 infrastructure conditions, and planning and implementing repair, replacement and rehabilitation projects to address LDW source control. No later than 180 days prior to the expiration date of this permit, the Permittee shall submit a report documenting the evaluation effort and its results, including proposed actions, implementation schedules and performance targets.
3. The Permittee shall identify and conduct priority capital projects to improve roadway surfaces in the MS4 drainage basins subject to this requirement in order to reduce pollutants in roadway runoff and/or improve the effectiveness of operational BMPs. No later than 180 days prior to the expiration date of this permit, the Permittee shall submit a detailed description of and schedule for planned relevant capital projects.
4. The Permittee shall continue to implement the following stormwater management operations and maintenance actions in the S. Myrtle Street basin until such time as this basin is identified as no longer a priority in accordance with the Annual Prioritization (described below):
    a. Weekly sweeping of S. Myrtle Street from 8th westward to street end.
    b. Quarterly maintenance inspection of S. Myrtle Street catch basins.
    c. Quarterly maintenance inspections of the S. Myrtle Street mainline maintenance holes.

Structural Controls: The Permittee shall implement the compliance schedule provided below associated with the following approved Integrated Plan projects: South Park Water Quality Stormwater Treatment Facility and Street Sweeping Expansion-Arterials.

A. South Park Water Quality Stormwater Treatment Facility		
1.	Submit a report documenting the protocols used and results of the treatment technology pilot testing.	December 31, 2017

B. Street Sweeping Expansion-Arterials		
1.	Provide the following details for the MS4 drainage basins subject to this adaptive management response: routes swept, road miles swept, frequency of sweeping, and any problems encountered that would hinder the effectiveness of this BMP in the LDW.	Each Annual Report

Annual Prioritization: In addition to the annual reporting required under S4.F.3.d, the Permittee shall provide, with each annual report, an assessment of priorities (planned actions and target locations) for the following year. This annual prioritization update shall affirm previous priorities or identify and justify changed priorities. Analytical results from source tracing sampling and effectiveness monitoring will be presented to inform the annual prioritization of program activities across the area subject to this adaptive management response.

Table 1: Seattle-Owned Applicable Outfalls

Storm Drain (SD) Outfall Name	Separated Stormwater Drainage Basin Area (acres)	Outfall Diameter (inches)	Effectiveness Monitoring Location	Sample to Fill Data Gap
East side of waterway				
S Nevada St	23	18		
Diagonal Ave S[a]	2,664	144	Yes	
1st Ave S (east)	15	36	Yes	
S River St	6.5	8	Yes	
S Brighton St	17	30	Yes	
S Myrtle St	6.2	30	Yes	
North Boeing Field	c	24		
Georgetown	5.9	24	Yes	
West side of waterway				
SW Dakota St	54[d]	30	Yes	
SW Idaho St	423	72	Yes	
SW Kenny St[b]	154	48	Yes	
Highland Park Wy SW	289[e]	72	Yes	
S Webster St	f	6		Yes
7th Ave S	238	72	Yes	
17th Ave S	2.9	18	Yes	
Duwamish substation SD#1	0.6	8		

Storm Drain (SD) Outfall Name	Separated Stormwater Drainage Basin Area (acres)	Outfall Diameter (inches)	Effectiveness Monitoring Location	Sample to Fill Data Gap
Duwamish substation SD#2	1.3	8		
Duwamish substation SD#3	1.9	8		

Note: outfalls are listed in order from downstream end of waterway to upstream end of waterway starting with outfalls located on the east side followed by those on the west side of the waterway

a. SPU's CSO #111 and King County's Hanford #1 CSO also discharge to this outfall.
b. King County's T115 CSO discharges to this outfall (100 acres)
c. Based on recent video inspection findings, there are no longer active connections to this system.
d. 44.8 acres drains to the Seattle-owned SW Dakota St SD system. An additional 9 acres drains to the constructed channel that discharges to the LDW downstream (i.e., east) of Seattle's outfall.
e. Does not include the approximately 7.3 acre overlap within the 1st Ave S drainage basin.
f. A single catch basin in S Riverside Dr is connected to this outfall.

Table 2: Applicable Outfalls Owned or Installed by Others to which Seattle MS4 Discharges

Storm Drain (SD) Outfall Location	Owned or Installed by	Separated Stormwater Drainage Basin Area (acres)	Outfall Diameter (inches)	Effectiveness Monitoring Location	Sample to Fill Data Gap
East side of waterway					
Head of Slip 2	Private	12	24	Yes	Yes
S Garden St[a]	Private	12	30	Yes	
I5 SD at Slip 4	WSDOT	150[d]	72	Yes	
16th Ave S, east	Tukwila	12	12		
KCIA #1	King County	192[e]	30		Yes
S Norfolk St[b]	Tukwila	676[b]	84	Yes	
I5 SD at S Ryan St[c]	WSDOT	617[c]	60		
West side of waterway					
1st Ave S (west)	WSDOT	603	open channel	Yes	
2nd Ave S	Private	38	24		
S 96th St	Unknown	1,050[f]	72		
W Marginal Pl SW	Unknown	4.6[g]	36		

Note: outfalls are listed in order from downstream end of waterway to upstream end of waterway starting with outfalls located on the east side followed by those on the west side of the waterway.

a. Outfall ownership transferred to Seattle Iron and Metals Company in 2012.
b. King County's S. Norfolk CSO discharges to this outfall.

c. Seattle installed a high flow bypass to the S Ryan St system in 1992, to divert excess stormwater flow from the S Norfolk St drainage system to prevent flooding during large storm events.
d. Approximately 65 acres are served by Seattle-owned storm drains. The remainder is I-5 and railroad right-of-way drainage.
e. Approximately 86 acres are served by Seattle-owned storm drains. The remainder is I-5 right-of-way and King County Airport property.
f. Approximately 83 acres are served by Seattle-owned storm drains. The remainder is in unincorporated King County.
g. Seattle-owned drainage only.