COLUMBIA SLOUGH OUTFALL INVESTIGATION AND BASIN CLOSURE WORK PLAN

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Prepared for

Oregon Department of Environmental Quality

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Abbreviations and Acronyms

µg/L	micrograms per liter
AOI	area of interest
AOPC	area of potential concern
BEHP	bis(2-ethylhexyl)phthalate
BES	City of Portland Bureau of Environmental Services
BMP	best management practice
CIP	Capital Improvement Program
City	City of Portland
COPC	contaminant of potential concern
CSO	Combined Sewer Overflow
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DEQ	Oregon Department of Environmental Quality
ECSI	Environmental Cleanup Site Information
FOE	factor of exceedance
IGA	Intergovernmental Agreement
mg/L	milligrams per liter
MS4	Municipal Separate Storm Sewer System
NFA	No Further Action
ng/L	nanograms per liter
NPDES	National Pollutant Discharge Elimination System
PAH	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
pg/L	picograms per liter
ROD	Record of Decision
ROW	right-of-way
SAP	Sampling and Analysis Plan
SCD	Source Control Decision
SCE	source control evaluation
SCM	source control measure
SIC	standard industrial code
SLV	Screening Level Value
SPCR	Spill Prevention and Citizen Compliant Response
SWMM	Stormwater Management Manual
SWPCP	stormwater pollution control plan
TIP	TMDL Implementation Plan
TMDL	total maximum daily load

TSS	total suspended solids
UIC	underground injection control
WOE	weight-of-evidence
Work Plan	Outfall Investigation and Basin Closure Work Plan
WPCL	Water Pollution Control Facility

SECTION 1

Introduction

In 2005, the Oregon Department of Environmental Quality (DEQ) issued a Remedial Action Record of Decision (ROD) for the Columbia Slough to address contaminated sediments posing unacceptable risk to human health and various ecological receptors (DEQ, 2005). The overall goal of the ROD is to reduce contaminant concentrations in Columbia Slough sediment to levels that are protective of human health and the environment. The ROD describes the DEQ selected remedial action approach for the Columbia Slough, which includes source control, sediment hot spot cleanup, alternative remedial measures, natural recovery, institutional controls, and long-term monitoring. This *Interim Columbia Slough Outfall Investigation and Basin Closure Work Plan* (Interim Work Plan) was prepared by the City of Portland (City) in conformance with the Consent Judgment Statement of Work (DEQ v City, 2024) and supersedes the 2011 *Columbia Slough Sediment Program Watershed Action Plan* (DEQ and BES, 2011). The Interim Work Plan was approved by the Oregon Department of Environmental Quality (DEQ) on October 30, 2023 and becomes final upon entry of the Consent Judgment. The Interim Plan noted that if the Scope of Work for this task was modified pursuant to the Consent Judgment's public comment or judicial process, then the City would submit an amendment to the Workplan to DEQ for approval within 45 days of the entry of the Consent Judgment to incorporate the relevant changes. The Consent Judgment was entered on May 8th, 2024, and the changes to the Interim Work Plan are provided in this final document.

The City owns or operates approximately 209 outfalls (BES, 2023a) discharging stormwater to the Columbia Slough in an approximately 19-mile reach between Fairview Lake and Kelly Point Park and 12 miles of side channels. The City owns or operates outfalls discharging stormwater from 13 percent of the watershed to the Columbia Slough (DEQ and BES, 2011). Stormwater discharges from City outfalls are authorized and regulated by a National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit issued to the City by DEQ. In addition, over 500 private outfalls discharge stormwater to the Columbia Slough. Source identification and control within private third-party outfall basins are not covered by the Consent Judgment or this Work Plan. Figures 1 through 3 show the locations of City and private outfall basins discharging to the Columbia Slough.

1.1 Purpose

This Work Plan provides the process for achieving regulatory closure via DEQ issued Source Control Decision (SCD) and Certification of Completion (i.e., regulatory basin closure) determinations for City-owned outfall basins discharging to the Columbia Slough in satisfaction of DEQ Environmental Cleanup Regulations and the Consent Judgment.

This Work Plan presents the scope of work the City will complete to demonstrate DEQ basin SCDs and basin closure Certificates of Completion are warranted under the DEQ Cleanup Program for City outfalls discharging to the Columbia Slough.

1.2 Objectives

The City will apply the following objectives to complete the source control evaluation (SCE) of City outfall basins, implement source control actions, and achieve basin closure:

1) Identify potential ongoing significant sources of contaminants of potential concern (COPCs) to the City stormwater conveyance systems discharging to the Columbia Slough via stormwater outfalls.
2) Collaborate with DEQ to ensure that identified sources are in or referred to an appropriate regulatory program that will perform SCEs or enforce source control measures (SCMs) where needed and minimize or prevent the potential for future sediment recontamination from those sources.
3) In priority City outfall basins, facilitate site referrals for source control actions at potential ongoing significant upland sources for DEQ-required SCE or SCMs. The goal is to have upland source identification completed and implementation of source control activities underway before the City initiates final stormwater treatment system design or stormwater treatment system construction in selected outfall basins defined in the *Columbia Slough Basin Stormwater Treatment Projects Work Plan* (BES, 2024) developed in accordance with the Consent Judgment.
4) Evaluate the potential for upland sources to the City outfalls to be a significant future contaminant migration pathway to Slough sediment and contribute to Columbia Slough sediment recontamination.
5) Apply the process described in this Work Plan to achieve SCDs for City stormwater outfall basins and to demonstrate that source control actions will minimize discharge of contaminants from City outfalls to the Columbia Slough at levels that are not reasonably likely to result in 1) recontamination of completed and future in-water sediment remedies or 2) unacceptable risk to in-water receptors.
6) Document the City's ongoing stormwater source control programs and regulations being implemented citywide that will continue to provide current and future protection of the waterways and water resources citywide, including the Columbia Slough.

1.3 DEQ and City Roles and Responsibilities

Under this agreement, the City and DEQ agree to the following roles and responsibilities for upland source identification and regulatory closure of City outfall basins under DEQ's Cleanup Program:

- The City will assist DEQ in identifying potential upland sources by performing upland source tracing investigations and basin characterization monitoring.

Monitoring data will be used by the City and DEQ to provide recommendations, perform additional investigations, or make referrals to an appropriate regulatory program(s) for source control.

- The City will coordinate upland site recommendations and referrals with DEQ.
- The City will provide written comments, as appropriate, on DEQ required documents: preliminary site assessments, source control investigations, or other DEQ cleanup activities for upland sites discharging to the City's collection systems.
- The City will review and provide input on DEQ upland site discovery efforts and coordinate NPDES 1200Z permit inspections with DEQ cleanup project managers to the extent practicable.
- The City will implement or require appropriate SCMs at upland sources to the extent practicable using their City Code authority.
- The City will request DEQ use their authority to implement or require appropriate SCEs and SCMs to achieve upland SCDs for upland sites discharging to the City outfall basins with planned or constructed stormwater treatment. The goal is to complete the SCE and SCM activities before the City completes the final design or construction of the planned stormwater treatment systems and before DEQ completes any subsequent in-water sediment remediation.
- The City requests DEQ prioritize their review and SCDs for 1) upland sites in the City's stormwater outfall basins that discharge near a DEQ-defined sediment area of potential concern (AOPC) that requires in-water sediment remedial action and 2) City outfall basins selected for stormwater treatment of selected public rights-of-way (ROWs) constructed under the City's Capital Improvement Program (CIP).

SECTION 2

City Outfall Basin Closure Process

This section describes the methodology for determining where additional City SCE (e.g., source identification, source tracing, basin monitoring) or upland source control is needed at upland facilities and provides the weight-of-evidence (WOE) the City will use to support SCE Reports for City outfalls discharging to the Columbia Slough.

This process will consider the location and unique set of characteristics for each of the City's outfalls (e.g., size and configuration, land use, COPCs, number of upland pollutant sources, significance of sources, types and classifications of City roadways, existing or planned stormwater treatment, and other stormwater/pollutant source management measures).

The outcome of the process will indicate whether City outfall basins warrant the implementation of additional upland site SCMs or other actions. For example, some outfall basins may not warrant SCMs because ongoing significant upland pollutant sources are not present in the basin or upland sources are in compliance with a DEQ-issued industrial stormwater permit. In basins where additional source control actions may be warranted, potential source control responsibility will be identified as part of the process. Most measures are or will be implemented by other parties (i.e., third party property owners or operators) on upland sites within the basins. Parties that implement those measures are responsible for meeting DEQ source control requirements (DEQ, 2010) and the ROD (DEQ, 2005). The City is prioritizing meeting DEQ source control requirements in basins where the City has or will be implementing stormwater treatment, adjacent to planned or completed DEQ in-water actions, and demonstrating source control is not warranted in low-priority basins.

2.1 Approach

The City will use a two-tiered approach for determining whether additional SCEs or upland SCMs are needed in City outfall basins to achieve basin regulatory closure. The first step in the approach is to assess the likelihood that discharge from individual City basin outfalls might be a source of COPCs to the Columbia Slough by applying a standardized decision framework to each basin. This step will categorize City basins as either 1) non-contributing City outfalls, or 2) potentially contributing City outfalls, as described below. Categorization will be based on a WOE evaluation of the recontamination potential from the basin. This process is described below in Sections 2.2.1 and 2.2.2.

The second step in the approach is to evaluate each potentially contributing outfall basin using a WOE process to determine if additional source control actions are required and/or to support basin closure under the DEQ Cleanup Program. When basins in this category are proposed for closure, the WOE evaluation will be used to demonstrate that 1) sources in the basin are identified; 2) potential ongoing significant upland sources are controlled, in the process of being controlled, or have been referred to the appropriate regulatory program for control; 3) no additional source identification or referrals by the City are warranted; and 4) the

recontamination potential from the outfall is low. This WOE evaluation will provide the rationale to support a conclusion that no additional source control is required for each basin in this category, and the recontamination potential from the outfall is low. The WOE evaluation process is further described in Section 2.2.3.

2.2 Decision Framework

To identify basins for which regulatory closure (i.e., no SCMs needed) or additional City SCE/SCM actions are warranted, the decision framework described below uses a series of yes/no Decision Points to determine which of five different basin actions apply. Decision Points are shown in purple on Figure 4. Applying the decision framework to each basin results in an action or decision outcome, shown in blue on Figure 4. The decision framework is designed to evaluate the need for upland source identification and source control within the most recent outfall basin delineation. This process will be used to identify City basins as non-contributing outfalls or potentially contributing outfalls, as described below.

2.2.1 Step 1a: Identify Non-Contributing City Outfalls

No SCMs will be required in basins with a low likelihood of having ongoing significant sources of Columbia Slough COPCs. Basins categorized as non-contributing have a low likelihood of adversely impacting Slough sediments if the basin does not have documented ongoing significant pollutant sources and the basin exhibits one or more of the following criteria:

- There are no identified sources within the basin, or identified sources in the basin are limited to industrial stormwater permitted sites that are operating in compliance with their permit.
- The basin does not discharge to a DEQ-defined AOPC.
- The basin does not discharge to an area with sediment concentrations for one or more COPCs greater than 10 times Slough baseline concentrations in sediment samples collected within 250 feet of the outfall (see the sediment evaluation method described in Section 2.2.2).
- There is no reliable information that indicates that there are unidentified, uncontrolled sources of significant contamination.

New SCMs, in addition to any required by an existing, active NPDES 1200Z permit, will not be required in these non-contributing basins. Only if there is additional reliable information available from DEQ that indicates unidentified ongoing uncontrolled significant contaminant sources are present will the basin proceed to Step 2, WOE evaluation.

2.2.2 Step 1b: Identify Potentially Contributing Outfalls

City outfalls with identified upland sources or outfalls discharging to DEQ-defined sediment AOPCs (DEQ, 2022a, 2022b) are defined as potentially contributing outfalls. DEQ formally identified sediment priority areas (i.e., target areas) in the *Columbia Slough Feasibility Study* (DEQ and BES, 2005) and ROD (DEQ, 2005). DEQ modified the list of AOPCs during the implementation of the ROD. In 2011, five target areas were identified in the *Columbia Slough Watershed Action Plan* (DEQ and BES, 2011) and in 2022, DEQ identified 15 AOPCs (DEQ, 2022a, 2022b) where sediment remediation has been completed or is planned, based on review

of slough-wide sediment data collected post-ROD by the City (BES, 2009; GSI, 2013; BES and GSI, 2018a), DEQ (Apex, 2012, 2014, 2016a, 2016b, 2019, 2020; DEQ, 2012a, 2012b, 2012c, 2012d, 2016), and third parties. The DEQ identified AOPCs and their current remediation statuses are listed below:

- Rivergate Pond (Environmental Cleanup Site Information [ECSI] site identification number 5822) – investigation pending
- St Johns Landfill (two areas) (ECSI #164) – remediation complete
- Columbia Steel (ECSI #104) – remediation complete
- Pacific Carbide (ECSI #268) (aka Moore and Wright Island) – remediation underway and planned for 2024-2025
- Pacific Meat Co. (ECSI #145) – remediation complete
- Wastech Shoreline (ECSI #1271) – investigation and remediation pending
- Nuway Oil (ECSI #88) – remediation conducted, residual investigation and remediation pending
- Halton (West Whitaker Pond) (ECSI #1503) –investigation and remediation pending
- Metro Metals (East Whitaker Pond) (ECSI #5455) – remediation complete
- Portland Willamette Co. (ECSI #2767) – remediation complete
- Johnson Lake (ECSI #1311/2086) – remediation complete
- Elrod Ditch (ECSI #6392) – investigation in progress
- McBride Slough (ECSI #5676) – remediation complete
- Wagner Mining (ECSI #331) – remediation complete, residual investigation – schedule to be determined
- Marx-Whitaker Slough (ECSI #4166) – investigation and remediation schedule to be determined

In general, sediment AOPCs (i.e., historically referred to as target areas) have been used to prioritize and to direct upland source investigations and SCMs and as a conservative line of evidence for evaluating recontamination potential (Apex, 2016a, 2016b, 2019, 2020; DEQ and BES, 2011; BES, 1991, 1995a, 1995b, 1996, 1997a, 1997b, 2009, 2013a, 2013b, 2014a, 2014b, 2014c, 2014d; BES and GSI, 2016a, 2016b, 2016c, 2018b, 2019, 2020a, 2020b, 2020c, 2021a, 2021b, 2021c, 2022a, 2022b, 2023a, 2023b, 2023c; E&E, 1998; GSI, 2013; Parametrix, 1994).

The City and DEQ will cooperatively evaluate whether discharges from identified potential upland contaminant sources to sediment AOPCs are ongoing and significant (see Section 3.1). Available in-water post-ROD sediment data, available at the time basin closure is requested, will be used in basin WOE closure evaluations as discussed below.

Concentration trends will be evaluated for in-water sediment data at the time basin closure is requested for three indicator compounds, total polychlorinated biphenyls (PCBs) (total congener data will be used and supersede total PCB Aroclor results when available), total DDx [sum of dichlorodiphenyldichloroethane (DDD), dichlorodiphenyldichloroethylene (DDE) and dichlorodiphenyltrichloroethane (DDT)], and benzo(k)fluoranthene. The evaluation of these

indicator compounds will use the total summations calculated in accordance with the Data Management Plan (BES and GSI, 2023d). If no concentrations of the individual analytes within a group are detected, then the highest analyte MDL is used as the total concentration and a "U" qualifier is added to indicate the lack of detected values. If duplicate samples are present at one location, the average concentration of the samples will be considered. The resulting total concentrations will be compared to the Slough reach baseline concentrations (DEQ, 2014; DEQ, 2012a, 2012b) to assess if there are significant sediment exceedances (i.e., factor of exceedance [FOE][1] greater than 10 times baseline values) within 250 feet of the outfall. If an exceedance is present and/or a downward concentration trend is not observed, the area will be identified as a potential in-water area of interest (AOI) and referred to DEQ.

The City and DEQ will cooperatively review the results of the in-water sediment evaluations to determine if there is need for additional information to support basin SCEs or SCDs. The City and DEQ will cooperatively refer potential ongoing significant sources to the appropriate regulatory program(s) for SCE/SCMs. Basins determined to be potentially contributing outfalls will proceed to a WOE evaluation process (Step 2) as detailed in Figure 4 and discussed in Section 2.2.3.

The source of the information used to apply the SCD framework (Figure 4) will be documented in basin evaluation and closure reports as discussed in Sections 3 and 4.

2.2.3 Step 2: Basin Stormwater Weight-of-Evidence Evaluations

As a second step in the approach, the City will identify potential upland stormwater sources, refer upland sources to appropriate regulatory programs, and document ongoing or completed source control actions in City basins that support regulatory closure (e.g., obtain a No Further Action [NFA] DEQ SCD and Certificate of Completion) using a phased basin WOE process. Relevant qualitative and quantitative WOE criteria that may be applied on an outfall-specific basis are listed below. Information to assess the qualitative and quantitative WOE criteria will be obtained from City reports submitted to DEQ or from readily available City and DEQ records, as described in Sections 3.1 through 3.4.

The City may employ a phased WOE approach using qualitative and quantitative WOE criteria to document the need for additional source control actions or to support closure of individual City outfall basins or groups of basins (e.g., by Slough reach, similar basin characteristics).

Qualitative WOE criteria may include:

- Presence or absence of potential ongoing significant upland sources discharging to the City system;
- Outfall discharge proximity to a DEQ-defined sediment AOPC;
- Basin size and configuration;
- Basin land use;
- City roadway class or road type;

[1] Factor of exceedance (FOE) equals sample sediment analyte concentration divided by baseline analyte concentration.

- Private outfall regulatory status;
- Applicability of other regulatory mechanisms (e.g., NPDES industrial stormwater permits) that are likely to have a controlling effect on current and future stormwater discharge quality from the outfall; or
- Other relevant information regarding the specific outfall basin characteristics, ongoing best management practices (BMPs), or discharge.

Quantitative WOE criteria may include:

- Outfall basin source tracing investigation data;
- Basin stormwater data;
- Stormwater contaminant concentration trends in City storm systems;
- Sediment quality, if available, within 250 feet of City outfall (see Section 2.2.2).
- Upland source SCM status and effectiveness data;
- Location(s) of City-owned structural stormwater controls for City ROW treatment (existing or planned);
- Location(s) of third-party structural stormwater treatment required by City development/redevelopment code;
- Proximity and location of City outfall to nearby non-City outfalls;
- Spatial distribution of in-water sediment data; or
- Other relevant investigation data.

WOE criteria are defined, and their application described in Section 4.

2.2.3.1 Phased Basin Closure Weight-of-Evidence Process

The City will employ a phased WOE approach using qualitative and quantitative WOE criteria to document the need for potential additional upland source control actions and to demonstrate if closure of City outfall basins is warranted.

2.2.3.1.1 Phase 1: Interim Basin Closure Decisions

The City will evaluate qualitative and quantitative WOE criteria, as relevant, to support the interim SCD points, shown on Figure 4, and listed below:

- *Identification of Non-contributing and Contributing City Outfalls*: The City will perform focused WOE evaluations, as appropriate, to categorize City outfalls as either non-contributing or potentially contributing sources of COPCs, as described in Sections 2.2.1 and 2.2.2.
- *Identification of Upland Sources is complete.*
- *Identification of potential ongoing significant upland sites and sites referred to an appropriate regulatory program(s)*: The City will perform focused WOE evaluations, as appropriate, to classify selected upland sources discharging to the City storm system as potential

ongoing significant sources and refer these sources to the appropriate regulatory program(s), as described in Section 3.4.

2.2.3.1.2 Phase 2: Basin Closure Source Control Decisions

Section 4 describes the scope of the WOE evaluations the City will perform to demonstrate basin SCMs are complete and adequate to support a SCD and regulatory basin closure. The specific WOE criteria used will be basin-specific or specific to a group of basins. WOE criteria may vary because each City outfall basin discharging to the Columbia Slough has a unique set of physical and source characteristics.

SECTION 3

Source Identification and Site Referrals

This section describes the process for source identification, source tracing and basin monitoring, identification of potential ongoing significant sources, and assessing whether upland source control may be needed at upland facilities.

3.1 Upland Source Identification

Pollutant sources in the Columbia Slough watershed are complex and varied. Significant pollutant sources include heavy commercial/industrial land use, recycling, salvage and manufacturing, high-traffic roadways, former agricultural land use, and known contaminated sites. DEQ and the City have actively pursued source investigation and source control work in City outfall basins since the early 1990s.

The City and DEQ will continue to collaborate on upland source identification and source control activities at upland facilities that are potential ongoing significant sources of COPCs discharging to the Slough via the City stormwater system. The City and DEQ will strive to control or reduce COPC releases to the City storm system at the pollutant source (i.e., the upland property).

The City will identify potential upland sources of COPCs in potentially contributing City outfall basins, to the extent practicable. Potential sources of stormwater COPCs discharging to the City storm system from commercial/industrial properties via piped connections, overland flow (e.g., erosion), or vehicular track out to City ROWs will be identified using readily available information in DEQ and City files, including:

- DEQ Records. ECSI database and upland cleanup reports; industrial stormwater quality discharge permits (e.g., NPDES 1200Z); air discharge permits; hazardous waste generators or conditionally exempt generators; leaking underground storage tank records; or upland facility reports.
- City Records. These include stormwater monitoring results, industrial stormwater permits and inspection records; third party property stormwater management facility records; enforcement actions; spill response records; City basin inspection files; or basin monitoring data and reports.

3.2 Preliminary Evaluation of Upland Sources

The City will perform a preliminary evaluation of potential upland sources of COPCs in potentially contributing City outfall basins to identify potential ongoing significant sources. The following types of activities will be performed as part of the evaluation:

- Perform an initial evaluation of identified potential commercial/industrial upland sources, using readily available information, to assess the likelihood an upland facility may be an ongoing significant source of COPCs to the Slough.
- Complete identification of upland sources discharging to the City's storm system by documenting sources in potential contributing basins and providing recommended upland source control actions to DEQ. These actions may include but are not limited to:
    - **Assigning Upland Source Priority**. The City will assign a priority to identified potential upland sources based on available information and data:
        - High-priority sources are expected to move forward with aggressive SCMs under DEQ Cleanup Program oversight.
        - Medium-priority sources require additional evaluation (e.g., additional research, site inspection, source tracing sampling) to determine if source control is needed to support regulatory referral(s), prioritize the implementation of potentially applicable SCMs, etc.
        - Low-priority sources will not require source investigation or additional SCMs unless determined necessary by DEQ based on reliable information. An NFA SCD to support a Certificate of Completion may be warranted for these outfall basins.

      The City will use site priorities to support regulatory referrals and recommendations for source control actions or SCM implementation. Site priorities may change over time as additional information (e.g., source tracing data, site inspection, permit issued) becomes available or source control actions are implemented.
    - **Investigating Potential Sources**. The City will perform focused upland stormwater source investigations consistent with previous basin characterization and source tracing investigation sampling and analyses plans (e.g., BES and GSI, 2021b, 2022a, 2023a) as needed to develop WOE support for:
        - Upland source referral to an appropriate regulatory program (see Section 3.4.3).
        - Upland site inspection(s) by City, or joint City/DEQ staff, to assess and prioritize the need for source control investigations, evaluations, or source control actions.
        - DEQ requiring a potential ongoing significant upland source to perform a stormwater SCE under the DEQ Cleanup Program, or
        - City basin regulatory closure (see Section 4).
    - **Referring to an Appropriate Regulatory Program**. The City, to the extent practicable, will refer potential ongoing significant upland sources to appropriate regulatory authority (see Section 3.4.3).

3.3 Basin Source Identification Deliverables

The City will prepare brief technical memoranda as part of Phase 1 interim decision documentation, or will add appropriate information to future reports that will identify

potential sources discharging to potentially contributing City basins, and document site referrals, site regulatory status, and source tracing results or recommendations. Future reports with these updates may include the City's *Source Tracing Sampling and Analyses Plan* (example BES and GSI, 2023a), *Stormwater Basin Characterization and Source Tracing Report* (example BES and GSI, 2023b), or the *Columbia Slough Stormwater Basin Atlas* (example BES and GSI, 2023c). The memoranda or reports may include the following:

- A table summarizing upland site and source identification information by slough reach and potentially contributing outfall basin.
- A table summarizing source priority, regulatory referral(s) or source tracing sampling recommendations by source and potentially contributing outfall basin.
- Figures depicting basin delineations and locations of potential upland sources within and adjacent to the potentially contributing basin.
- Figures depicting basin delineations, City storm system features, previous City basin sampling locations.
- Figures depicting recommended or completed City source tracing sampling locations and selected analytical results in potentially contributing City basins.

3.4 Basin Characterization and Source Tracing Investigations

This section describes basin characterization and source tracing monitoring that will be performed to characterize basin stormwater discharge quality, identify potential upland sources, identify the need for additional control actions, and/or support basin closure.

The City will continue to perform focused source tracing and basin characterization investigations in prioritized potential contributing basins to assist DEQ in identifying and evaluating ongoing significant upland commercial/industrial sources that discharge to the City's storm system. The City will continue to perform whole-basin outfall (or representative sampling location) monitoring in the 15 basins where CIP stormwater treatment is planned. This priority basin characterization monitoring may be performed two to three times per year and include up to two years of monitoring after treatment system construction. Post-construction stormwater will be compared to applicable stormwater Screening Level Values (SLVs), NPDES benchmark concentrations, and historical basin data and used to support basin WOE evaluations and recommended SCDs[2].

The City will use results of this work to focus and prioritize additional source identification, support design of planned source control efforts (i.e., selected ROW stormwater treatment) in selected potentially contributing basins, and to support SCDs and regulatory closure for City outfall basins.

The goal of these investigations is to collect data and information to identify and support referral of pollutant sources to the appropriate regulatory program to control pollutants at the

[2] CIP stormwater treatment facilities will be designed in compliance with City of Portland SWMM requirements using DEQ-approved treatment technologies. SCDs will not be based upon performance monitoring results.

source (e.g., upland third party property stormwater, tracking) before pollutants enter the City's storm system. DEQ and City efforts will be prioritized to address sources in and around DEQ-defined in-water cleanup areas and basins where City CIP funds have been approved for construction of stormwater treatment facilities. In-line sediment sampling results, stormwater monitoring results, stormwater pathway evaluations, and other relevant information may be used as appropriate to identify potential ongoing significant sources discharging pollutants to the City system.

The scope of proposed basin investigations will be submitted to DEQ in a Sampling and Analysis Plan - Source Tracing and Stormwater Monitoring for Stormwater Outfall Basins Discharging to the Columbia Slough. Results of these investigations will be documented and submitted to DEQ in a Source Tracing Investigation and Basin Characterization report for review and comment for up to 15 years after the Consent Judgment Order is fully executed.

The City will continue to inform DEQ on a regular basis of basin-specific source tracing and basin characterization investigations and efforts to control potential ongoing significant pollutant sources discharging to the City storm system or public ROW in potentially contributing City outfall basins until the obligations of the Consent Judgment Order are fulfilled (see Section 3.3).

An objective of upland source identification is to obtain written DEQ approval that basin sources are sufficiently identified, and potential ongoing significant sources are in or referred to the appropriate regulatory program to support basin closure. Available information about upland sources is currently presented in the *Columbia Slough Stormwater Basin Atlas* (BES and GSI, 2023c). The City will prioritize site identification in basins with planned stormwater treatment to obtain written DEQ concurrence before the City completes final stormwater treatment system design documents and initiates system construction. The City will coordinate basin visits with DEQ Cleanup Program staff to perform a sidewalk reconnaissance of potential significant upland sources (i.e., observe current site activities, general housekeeping, trackout, spills, etc.) that may need to be referred to another regulatory program for additional source control. The City will submit appropriate information as part of the Phase 1 interim decision (Section 2.2.3.1.1), to document source identification is complete in selected potential contributing basins and DEQ will review and provide written response within 30 business days with approval or non-approval with explanation. The results of the investigations will be used along with other relevant basin information by the City to perform the following activities described in Sections 3.4.1 through 3.4.4, as appropriate.

3.4.1 Stormwater and Stormwater Solids Screening

The City has evaluated and will continue to evaluate stormwater and stormwater solids data collected from City outfall basins discharged to the Columbia Slough to support appropriate WOE evaluations and SCDs. The City will use past, current, and future basin data for screening and in quantitative WOE evaluations evidence as described below. Stormwater and stormwater solids data will be compared to various concentrations to identify screening level exceedances and the magnitude of the exceedance to assess the potential threat and/or likelihood of potential adverse impacts to Slough water and/or sediment quality. Comparison concentrations may include:

- DEQ Stormwater Guidance SLVs and Appendix D Non-Portland Harbor Sites (DEQ, 2010),
- DEQ Columbia Slough Record of Decision. Table 1 Columbia Slough Screening Levels. Informally updated in 2014,
- DEQ Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment (DEQ 2007),
- DEQ Internal Management Directive, Conducting Ecological Risk Assessments (Table 3) (DEQ, 2020a),
- former and current NPDES benchmark concentrations from the DEQ NPDES General Permit No. 1200Z (DEQ, 2021a),
- estimated knee of the curve concentrations for Columbia Slough outfalls. Knee-of-curve concentrations for selected COPCs have been identified each year starting in 2017–2018 using BES Columbia Slough stormwater data to provide an objective context for interpreting the potential significance of stormwater results. These concentrations are presented in annual City Source Tracing Investigation and Basin Characterization reports submitted to DEQ (BES and GSI, 2018b, 2019, 2020a, 2021b, 2022b, 2023b), and may be updated with additional data as gathered,
- DEQ Stormwater Guidance Curves developed for Portland Harbor (DEQ, 2010), and Oregon Water Quality Standards (DEQ, 2023).

Tables 1 and 2 provide preliminary values for COPC concentrations in upland stormwater and stormwater solids samples that may indicate a potentially ongoing significant source to the municipal conveyance system and ultimately the Columbia Slough. Justification for the derivation of these values is provided in more detail in Sections 3.4.1.1 through 3.4.1.6. These values are useful in screening upland stormwater and stormwater solids data to identify potential ongoing significant pollutant sources. However, the City will also continue to screen individual basin or source tracing data points against the DEQ stormwater and stormwater solids SLVs as comparison levels and will identify basins in which more than one sample exceeded the selected comparison level.

Mean concentrations and geometric mean concentrations (geomeans) will be calculated and plotted with individual sampling event results as an indicator of central tendency to help account for the inherent variability in stormwater quality and to allow for a streamlined evaluation of basin COPC concentrations and selected comparison levels. Geometric mean concentrations are required in the implementation of DEQ's NPDES industrial stormwater 1200Z permits (DEQ, 2021a, 2021b) and the DEQ Water Pollution Control Facility (WPCF) permit (DEQ, 2015) issued to the City of Portland for management of the City's underground injection control (UIC) stormwater facilities (i.e., dry wells, infiltration sumps) to document permit compliance. Geometric mean concentrations were also used to support DEQ's SCD for the City's Portland Harbor Outfalls (DEQ, 2021c).

The City will continue to use and update ranked concentration curves developed using Slough outfall data to assess stormwater discharged from potentially contributing City outfalls for selected COPCs. The estimated knee of curve concentrations derived from the ranked plots

will be used to identify basins with a relative likelihood of having potential ongoing significant uncontrolled sources. COPCs will continue to be the focus of City stormwater evaluations, with the understanding that addressing these priority pollutants will address the majority of contaminants in stormwater within the Slough.

DEQ's source control SLVs were established to be protective of receptors in the Columbia Slough and, therefore, are conservative for in-pipe media (e.g., stormwater and stormwater solids before mixing within Slough water or sediments). It is recognized in DEQ Guidance (EPA and DEQ, 2005; DEQ, 2010) that the exceedance of an SLV does not necessarily indicate that a source poses an increased risk or an unacceptable risk to human health or the environment. However, the in-line data are useful for identifying possible uncontrolled sources of contaminants that warrant additional investigation and for evaluating which outfalls may serve as a pathway for contaminant discharges. Significant SLV exceedances will continue to be defined as concentrations detected at levels more than 10 times the DEQ SLV concentration or NPDES 1200Z benchmark concentrations. Significant exceedances, knee of the curve concentrations, NPDES benchmark concentrations and upland source information will be used, as appropriate, to:

- Assess whether analytes are being discharged at concentrations that are reasonably likely to result in recontamination above sediment baseline concentrations.
- Identify potential areas with uncontrolled sources and analytes for future source tracing investigations to identify potential ongoing significant upland sources.
- Identify the need for source tracing and/or source control activities.

Analytes concentrations less than 10 times (i.e., within 1 order of magnitude) the current applicable SLV or NPDES benchmark are considered unlikely to indicate a potential ongoing significant uncontrolled contaminant source and are a low priority for source tracing and source control.

The rationale for comparison levels to be used is further described below.

3.4.1.1 Metals

For evaluating stormwater concentrations, the City selected screening values reflecting 10 times the DEQ 2010 Stormwater Guidance SLV as the comparison level for metals, with the exception of lead, which is covered under the NPDES 1200Z stormwater permit. Municipal drainage areas include industrial sites that discharge stormwater under NPDES permits issued by DEQ. These permits allow for copper, lead, and zinc concentrations in industrial stormwater discharges up to established benchmark concentrations, which will be used as reference values. Table 3 presents a summary of historical and current benchmark values. Where current 1200Z permit benchmarks are greater than 10 times the 2010 DEQ stormwater SLVs, the benchmark value (i.e., for lead) will be used as the comparison level.

Some of the stormwater data collected from City outfall basins were collected during time periods in which older (higher) benchmarks were in place. Now that lower benchmarks are in place, along with a permit provision to minimize off-site tracking of raw, final, or waste materials, concentrations of copper, lead, and zinc in stormwater discharged from City outfalls are anticipated to decrease to lower concentrations over time. This premise is supported by the *Portland Harbor Basin 19 Stormwater Quality Trend Analyses, Effectiveness of City Stormwater*

Source Control Efforts technical memorandum prepared for the City's MS4 program (BES, 2011, 2014e) and submitted to DEQ's Water Quality Program in the City's annual MS4 report for fiscal year 2020–2021 (BES, 2021), which found that metals concentrations in basin stormwater are decreasing and are likely to decrease further as individual industrial stormwater dischargers are subject to current and future NPDES 1200Z permit requirements.

Although concentrations in the City data set reflect permitted discharges under the higher benchmarks, the City will use the current NPDES benchmark concentrations for total copper, total lead, and total zinc as a conservative comparison level for stormwater (DEQ, 2022).

Arsenic, a Columbia Slough COPC, will continue to be compared to a value 10 times the DEQ 2010 stormwater SLV (1.4 micrograms per liter[µg/L]) and the knee of the curve concentration of 1.6 µg/L.

For evaluating metals in stormwater solids, the City selected the 2013 DEQ Cleanup Program background concentration for metals (Portland Basin), which are the values used in the 2014 Columbia Slough Source Control SLVs (DEQ, 2013, DEQ, 2014). The comparison levels used for screening will reflect 10 times these SLVs.

Stormwater and stormwater solids SLVs are presented in Tables 1 and 2.

3.4.1.2 Polycyclic Aromatic Hydrocarbons

For evaluating stormwater concentrations, there is no SLV or specific reference concentration for total polycyclic aromatic hydrocarbons (PAHs). Therefore, the City utilized and will continue to use 10 times the DEQ 2010 Stormwater Guidance SLV as the appropriate comparison levels for identified COPCs. benzo(b)fluoranthene (0.18 µg/L) and chrysene (0.18 µg/L).

For evaluating PAHs in stormwater solids, the City selected the 2014 Columbia Slough Source Control SLVs (DEQ, 2014). Since there is no 2014 SLV for benzo(b)fluoranthene, the comparison levels used for screening will reflect 10 times the Total PAH SLV (16.1 mg/kg) cited in DEQ's Ecological Risk Assessment guidance (DEQ, 2020a).

Stormwater and stormwater solids SLVs are presented in Tables 1 and 2.

3.4.1.3 Polychlorinated Biphenyls

The Oregon Aquatic Life Water Quality Criteria [i.e., also former DEQ NPDES impairment pollutant reference concentration (Apex, 2019)] for total PCB Aroclors or congeners is 2.0 µg/L (2,000,000 picograms per liter [pg/L]) (DEQ, 2023), which is higher than all detections in Columbia Slough basin stormwater data, and the 2010 DEQ Stormwater Guidance SLV is 0.000064 µg/L (0.064 nanograms per liter [ng/L], 64 pg/L) which is lower than all detections in basin stormwater data. Therefore, for evaluating total PCBs in stormwater, the City selected the lowest knee of the curve concentration of 40 ng/L (0.04 µg/L, 40,000 pg/L) from the ranked curves developed or used for Columbia Slough outfalls as the appropriate comparison level. These knee of curve values and associated ranked curves are provided for most COPCs in BES annual data reports (BES and GSI, 2018, 2019, 2020a, 2021b, 2022b). For reference, total PCB knee of curve concentration presented in DEQ's Stormwater Guidance for Portland Harbor outfalls is 100 ng/L (0.1 µg/L, 100,000 pg/L). Significantly elevated stormwater concentrations

of total PCBs will be defined as detected concentrations greater than the knee of curve concentration for Columbia Slough and Portland Harbor.

For evaluating PCBs in stormwater solids, the City selected the 2014 Columbia Slough Source Control SLVs (DEQ, 2014) and Total Aroclor SLV developed as part of DEQ's Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment (DEQ, 2007). The comparison level used for screening Total PCBs will reflect 10 times the Total Aroclor SLV of 0.01 mg/kg, or 100 ug/kg.

Stormwater and stormwater solids SLVs are presented in Tables 1 and 2.

3.4.1.4 Pesticides

For evaluating stormwater concentrations, the City selected the lowest knee of the curve concentration for 4,4-DDE (4 ng/L) and dieldrin (3 ng/L) from the ranked curves developed or used for Columbia Slough outfalls (BES and GSI, 2018, 2019, 2020a, 2021b, 2022b, 2023b) as the appropriate comparison level.

Additional Columbia Slough stormwater COPCs, heptachlor and heptachlor epoxide, will be evaluated using a value 10 times the DEQ 2010 SLV, or 0.79 and 0.39 ng/L respectively.

For evaluating pesticides in stormwater solids, the City selected the 2014 Columbia Slough Source Control SLVs (DEQ, 2014). The comparison levels used for screening will reflect 10 times these SLVs.

Stormwater and stormwater solids SLVs are presented in Tables 1 and 2.

3.4.1.5 Bis(2-ethylhexyl)phthalate

The City will use the DEQ 2010 Stormwater Guidance SLV (i.e., 2.2 µg/L) as a reference level for bis(2-ethylhexyl)phthalate (BEHP) data. However, significantly elevated concentrations of BEHP will be defined as detected concentrations greater than the knee of the curve concentration for Portland Harbor, approximately 5 µg/L.

For evaluating BEHP in stormwater solids, the City selected the 2014 Columbia Slough Source Control SLVs (DEQ, 2014). The comparison level used for screening will reflect 10 times these SLV, or 7.5 mg/kg.

Stormwater and stormwater solids SLVs are presented in Tables 1 and 2.

3.4.1.6 Total Suspended Solids

The City will use the NPDES 1200Z benchmark concentration (30 milligrams per liter [mg/L]), the Columbia Slough knee of the curve concentration 75 mg/L, and 10 times the benchmark concentration (300 mg/L) for stormwater screening due to the observed variability in total suspended solids (TSS) concentrations. As detailed in DEQ's 2020 *Portland Harbor Stormwater Strategy Update* report (DEQ, 2020b), reductions in concentrations of multiple hydrophobic contaminants have been demonstrated in association with TSS reductions by a number of studies. DEQ expects the TSS reductions noted at City outfalls to be amplified by on-going implementation of the 1200Z permit at nearly 100 sites that discharge regulated stormwater to City conveyances within Portland Harbor. Similar reductions would be expected in the over

200 City basins discharging to the Columbia Slough. These reductions will also reflect reductions in concentrations and loads of hydrophobic contaminant concentrations, including the focused contaminants of concern for Portland Harbor sediment (DEQ, 2020b). These reductions are also anticipated at Columbia Slough outfalls including for the focused COPCs (e.g., metals, semivolatile organic compounds, PCBs, pesticides) in the Slough.

3.4.2 Stormwater Pathway Evaluation

The City will work with DEQ to identify upland facilities within City outfall basins that may have contaminant sources discharging to the Slough through the City's storm system. The City will assess whether identified potential sources are likely to have a complete pathway for contaminants to be transported from the upland source to the Columbia Slough (i.e., contaminant source – contaminant migration pathway – exposure to receptor). The City will also evaluate whether identified facilities are potential ongoing significant sources of pollutants to the Slough and if so, refer high and medium priority upland sites to the appropriate regulatory programs for source control.

For the purpose of this Work Plan and Consent Judgment a "potential ongoing significant source" is defined as a present-day release of COPCs from an upland facility via stormwater discharges, or ongoing or repeat vehicular track out or overland stormwater transport (i.e., erosion, overland flow) of stormwater solids (clay, silt, sand, gravel, suspended solids, grit, material, debris, etc.) to the Columbia Slough via the City storm system (i.e., a complete stormwater pathway). Characteristics of a potential ongoing significant source include but are not limited to:

- An identified ECSI site without a DEQ approved SCE and/or completed or approved SCD in accordance with DEQ's Stormwater Guidance (2010).
- A site identified through implementation of a City stormwater program (basin source tracing monitoring; spill response, citizen complaint response, enforcement; inspections; etc.).
- Reliable available information or observations (e.g., sheen, turbidity) that indicate that an uncontrolled release of COPCs to the City storm system exists or may exist based on limited lines of evidence evaluation.
- A site identified through implementation of a City stormwater program that has been referred to the DEQ Cleanup Program for site assessment, stormwater source control assessment, SCE, etc.
- A site identified through the Columbia Slough source tracing monitoring that suggests COPC discharges from an upland site exceed:
    - Stormwater COPC concentrations greater than 10 times the applicable DEQ stormwater SLV (DEQ, 2010), the NPDES 1200Z benchmark (DEQ, 2021a), or the knee of the curve concentration developed by DEQ for Portland Harbor (DEQ, 2010) or by the City for Columbia Slough outfall basins (BES and GSI, 2023a).
    - Stormwater solid COPC concentrations greater than 10 times the applicable DEQ SLV, knee of the curve concentration developed for stormwater solids by DEQ for Portland Harbor, or greater than 10 times the applicable DEQ-

defined Columbia Slough sediment baseline values (DEQ, 2014, 2012a, 2012b) or sediment source control values (DEQ, 2014).

- A site with recent or ongoing NPDES industrial stormwater permit violations or exceedances of permit benchmark concentrations of TSS, copper, lead, and zinc.

3.4.3 Upland Source Referrals and Recommendations

The City will refer potential ongoing significant upland sources to appropriate regulatory authority, to the extent practicable and appropriate, these currently include:

- City's Industrial Stormwater Program for site inspection, technical assistance, City Code compliance, or determination of whether a DEQ industrial stormwater permit (e.g., NPDES 1200Z), as appropriate.
- City's Spill Prevention and Citizen Compliant Response (SPCR) Program to investigate potential City Code violations, spills, turbid discharges, etc.;
- DEQ's Cleanup Program for upland site assessment, preliminary assessment, SCEs and/or SCMs, etc.
- DEQ's Hazardous Waste and Water Quality Programs for technical assistance, site inspection, regulatory compliance, or enforcement.

The City will submit a technical memorandum for the Phase 1 interim decision (Section 2.2.3.1.1) with appropriate information to document referral of ongoing significant sources is complete in selected potential contributing basins, and DEQ will review and provide written comments or approval within 30 business days. In addition, the City will provide recommendations to DEQ for upland sources where the City concludes upland SCMs are necessary, as appropriate, to reduce pollutants entering the City system from permitted and unpermitted sites in priority outfall basins. DEQ and the City will use their respective authorities to require implementation of SCMs, to the extent possible.

DEQ will determine the need for SCEs, source control actions, or cleanup actions at individual upland sites within City outfall basins, based on the results of outfall basin sediment and stormwater sampling, in-water sediment data, site inspections, NPDES 1200Z permit compliance status, or other relevant site information. For ECSI cleanup sites, DEQ will ensure that Source Investigation/SCE work plans are developed and implemented by responsible parties to control active discharges of site contaminants to the Slough.

3.4.4 Storm System Inspection and Clean-out

City stormwater pipes are designed to limit sediment accumulation; it is unknown whether there are areas where the stormwater system (catch basin and/or stormwater pipes) has accumulated sediment at concentrations that could contribute to recontamination of Slough sediment or would otherwise be harmful to the Slough. The City will inspect, review City maintenance records to inform the need for line cleaning or camera surveys in storm lines in potential contributing basins with potentially uncontrolled sources or basins with planned construction of City ROW stormwater treatment. The City will perform line cleaning and camera surveys in basins with planned stormwater treatment if needed to identify or confirm private property connections to the

City storm system, locate maintenance access holes, or assess the presence of uncontrolled pollutant sources in the lines. The City will provide reasonable access to the City system to third parties as necessary for source control or remedial purposes.

3.5 Basin Characterization and Source Tracing Investigation Deliverables

3.5.1 Sampling and Analysis Plan

The City will prepare and submit an annual Sampling and Analysis Plan (SAP), as appropriate and consistent with previous SAPs (e.g., BES and GSI, 2021a, 2022a, 2023a), to identify source tracing and basin characterization sampling locations needed to collect data to complete identification and referral of ongoing significant sources in potential contributing City basins for DEQ review and comment. The SAP will describe sample locations, general procedures for sample collection, sample analyses, as well as procedures for documenting data usability and data management, and screening analytical results. Annual SAPs will be prepared for up to 15 years after the Consent Judgment is fully executed.

Target Schedule: August of each year

3.5.2 Source Tracing and Basin Characterization Data Report

The City will prepare an annual *Stormwater Basin Characterization and Source Tracing Report* to document City storm system sampling results for DEQ review and approval. The report will document sampling activities, screen analytical results, and will be used to identify potential ongoing significant upland sources and relevant regulatory referrals, and conditions in priority City basins. Future reports will be consistent with previous annual reports (e.g., BES and GSI, 2022b, 2023b). Annual stormwater reports will be prepared for up to 15 years after the Consent Judgment is fully executed.

Target Schedule: Spring of each year

3.5.3 Columbia Slough Data Management Tool Update

The City has uploaded source tracing, basin characterization, and long-term sediment and fish tissue monitoring data to the Columbia Slough Data Management Tool (i.e., database) to facilitate access, analysis, and mapping of historical data from over 30 years of environmental monitoring in the Columbia Slough.

The City will add additional data collected pursuant to the Consent Judgment. Procedures for uploading data, accessing, and using the database are provided in the Data Management Plan submitted to DEQ in 2016 and updated in 2023. These updates will be consistent with previous update reports (e.g., BES and GSI, 2022c, 2023d). At the completion of the City's required data collection activities pursuant to the Consent Judgment, the City will provide the final database to DEQ in a format that allows DEQ to continue to use the database.

SECTION 4

City Outfall Basin Closure Weight-of-Evidence Evaluation

4.1 Goal

The goal of this work is to achieve source control within City outfall basins discharging to the Columbia Slough by identifying ongoing significant sources of COPCs within potentially contributing outfall basins and referring these sources to appropriate regulatory enforcement programs. The City will submit appropriate information to document source identification and referral of ongoing significant sources is complete and DEQ will review and provide written concurrence within 30 business days.

Closure decisions will be achieved by the City documenting and supporting through a WOE evaluation that stormwater discharges from a City outfall to the Columbia Slough are reasonably unlikely to result in recontamination of an AOPC remedy above DEQ-defined baseline concentrations. WOE evaluations will include but not be limited to the following considerations: City and DEQ source control investigations, city-wide implementation of City's stormwater control programs and specific SCMs in selected City basins (i.e., completion of City ROW stormwater treatment projects described in the *Columbia Slough Basin Stormwater Treatment Projects Work Plan* [BES, 2024]), source tracing and basin characterization monitoring, and DEQ's oversight and completion of upland site-specific stormwater source control implementation and effectiveness demonstrations. Basin SCEs may lead to, but are not limited to, the following types of SCD recommendations:

- Additional source identification or upland site control actions (e.g., upland source referrals, storm line cleaning/video surveys, source tracing) may be needed.
- An outfall basin stormwater pathway to the Columbia Slough is likely insignificant and ongoing or future discharges are unlikely to result in adverse impacts to sediment quality above current sediment concentration levels.
- Additional upland site source control actions are not required and the recontamination potential from the outfall is low.
- Upland sources are identified in the appropriate regulatory program, and SCMs are underway by other parties, and additional actions in the City basin are not required.

4.2 Phased Basin Closure Evaluation Procedures

This section describes the general procedures that will be used to perform a WOE evaluation to support a DEQ basin SCD and regulatory closure under a DEQ-issued SCD and Certificate of Completion. The phased WOE evaluation approach for City outfall basins is described in

Section 2.2.3 and will be used to support the following types of key SCDs in the basin closure process including:

- Non-contributing and potentially contributing City outfalls are identified.
- Ongoing significant upland sites are identified and referred to an appropriate regulatory program.
- Appropriate basin SCMs are complete and adequate to support regulatory closure.

The specific WOE criteria used in a basin-specific WOE evaluation to demonstrate source control is complete will vary because each City outfall basin discharging to the Columbia Slough has a unique set of characteristics (e.g., size, land use, number of pollutant sources, significance of sources, types and classifications of City roadways, existing or planned stormwater treatment, location of discharge).

The City may perform basin closure WOE evaluations by groups of outfalls. Groups may be defined by basin characteristics, location of discharge, recommended type of SCD, etc. The following sections describe the approach for WOE evaluations for individual outfalls or groups of outfalls with similar characteristics to demonstrate that discharges from the outfall basins are unlikely to result in contamination or recontamination of Columbia Slough sediments. The City will identify potential groups of outfalls for WOE evaluations for SCD and Certificates of Completion in Semi-Annual Reports (see Section 4.3.1).

4.2.1 Basin Closure: Non-contributing City Outfalls

This section provides the general procedure for a WOE evaluation to demonstrate that discharges from the non-contributing basins are unlikely to result in contamination or recontamination of Columbia Slough sediments and that NFA SCDs are warranted to support Certificates of Completion for individual or groups of basins.

4.2.1.1 Primary Line of Evidence: No Contaminant Sources

Many City stormwater basins do not have identified documented contaminant sources. The City's source identification investigations focus on the evaluation of the stormwater pathway from upland facilities (e.g., third party commercial or industrial properties) draining through the City storm system to the Columbia Slough and potentially adversely impacting slough sediments. DEQ and the City have collaborated under a series of Intergovernmental Agreements (IGAs) (DEQ and BES, 2006, 2010, 2016, 2021) to identify potential current contaminant sources to the City conveyance system and recommend upland properties for SCEs and SCMs, with the intent of eliminating sources at the point of discharge into the storm system. In theory, stormwater discharges from outfall basins with no identified potential sources to the City conveyances will not contain pollutants at levels that could contaminate or recontaminate remediated Slough sediment.

The primary line of evidence supporting an NFA SCD to ultimately support a Certificate of Completion for non-contributing outfalls is the absence of a complete stormwater risk pathway from upland pollutant sources to Columbia Slough sediments. Identification of potential upland sources within the Columbia Slough watershed has been ongoing since the early 1990s before the remedial investigation was initiated. Potential significant upland sources were documented in the ROD (DEQ, 2005) and subsequent City outfall basin investigations

completed by the City. Information to support that potential ongoing documented upland sources are not present in the basin will be based on review of the following:

- *DEQ Cleanup Sites*: Upland properties identified as potential contaminant sources by DEQ are included in DEQ's ECSI database. Efforts to identify potential upland contaminant sources discharging directly to the Slough and/or to the City's storm system have been ongoing for over 30 years under both DEQ's Cleanup Program and the City's Columbia Slough Sediment Cleanup Program. Cleanup site locations are preliminarily identified by street address and verified with DEQ.
- *Industrial Stormwater Permits*: Upland industrial properties requiring an industrial stormwater discharge permit (NPDES 1200Z permit) are defined as businesses meeting certain standard industrial codes (SICs) or have identified exposure onsite to stormwater. Upland properties with a current permit are identified as potential ongoing contaminant sources.
- *Additional Lines of Evidence indicating Potential Source*: In a few occurrences, available information including stormwater and stormwater solids data may indicate the presence of an unidentified potential ongoing source of COPCs within a basin where no other sources have been identified. Groundwater contamination from heating oil tanks or leaking underground storage tanks is not an expected source to the City's stormwater conveyance system. However, this pathway may be evaluated in basins where dry weather flow has been observed in City outfalls.

City outfall basin discharges with no sources are unlikely to result in contamination or recontamination of Columbia Slough sediments and therefore do not warrant SCMs. Initially, this WOE evaluation will only include those basins where no DEQ ECSI site or no NPDES permit exists. Basins where additional lines of evidence indicate the presence of an unidentified source will not be included in this evaluation.

4.2.1.2 Additional Lines of Evidence

Additional lines of evidence discussed below may support that stormwater discharges from non-contributing City outfalls are reasonably unlikely to adversely impact Columbia Slough sediment quality and in-water receptors.

4.2.1.2.1 Proximity to DEQ-Defined Sediment AOPC

The proximity of a City outfall to current DEQ-defined sediment AOPCs will be considered. Current AOPCs are identified in Section 2.2.2. As with the Portland Harbor Superfund Site, AOPCs have been used to direct upland source investigations and SCMs and as a conservative line of evidence for evaluating recontamination potential (BES, 2014e; DEQ, 2021c) for the Columbia Slough. The presence of sediment contamination in the vicinity of an outfall may indicate that the outfall is a potential pathway for upland sources. In addition, available in-water sediment data will be reviewed in the vicinity of the outfall to determine if the basin discharges to an area with elevated sediment concentrations. The absence of sediment contamination indicates the outfall is an unlikely historical or current pathway.

Outfalls that do not have identified sources of COPCs and do not discharge to an AOPC and/or area of elevated sediment concentration are low priority and unlikely to result in contamination or recontamination of Columbia Slough sediments.

4.2.1.2.2 Other Criteria

Additional criteria may be developed during the evaluation of specific outfall basins and are intended to support NFA SCDs and ultimately a Certificate of Completion for each basin or group of basins.

4.2.1.3 Basin Closure Demonstrations: Non-Contributing Outfalls

The WOE evaluation criteria described above will be used to demonstrate that non-contributing basins where no DEQ ECSI site or active NPDES permit exist:

- Are low priority and are reasonably unlikely to have stormwater discharges that result in sediment contamination above DEQ-defined baseline or sediment knee of curve concentrations (BES and GSI, 2018).
- Will continue to be managed long-term under City-wide programmatic efforts that reduce pollution in stormwater runoff.
- Do not warrant additional source control investigation, evaluation, or implementation of SCMs.

The low-priority of these basins and continued long-term management of these basins under the DEQ issued MS4 permit, and City Code are anticipated to support NFA SCDs and ultimately a Certificate of Completion for each basin or group of basins.

4.2.2 Basin Closure: Low-Priority Potentially Contributing Outfalls

This section provides the general procedure for WOE evaluations to demonstrate that discharges from low-priority potentially contributing basins are unlikely to result in contamination or recontamination of Columbia Slough sediments and that NFA SCDs are warranted to support a Certificate of Completion.

The City will use the initial WOE evaluation process described in Sections 2 and 3 to identify and support SCDs and regulatory closure of basins that are a low-priority for consideration of risks to in-water receptors or for recontamination of remediated AOPCs. One or more of the following basin characteristics may be used to categorize basins as low priority:

- Basin does not discharge to a DEQ-defined sediment AOPC (see discussion in Section 4.2.1.2.1)
- Small total basin size or industrial land use of less than 1 acre (see discussion in Section 4.2.2.2.1)
- Land use predominately Residential or Open Space (see discussion in Section 4.2.2.2.2)
- No major roadway ROW within basin (see discussion in Section 4.2.2.2.3)
- Effectiveness of ongoing City Stormwater Programs (see discussion in Section 4.2.2.2.4)
- Stormwater treatment (see discussion in 4.2.2.2.5)
- Indirect discharge to the Slough (see discussion in 4.2.2.2.6)
- Upland source status and characteristics (see discussion in Sections 4.2.2.2.7 to .10)
- Proximity to non-City outfalls (see discussion in Section 4.2.2.2.11)

- Results of industrial stormwater basin inspection
- Basin-specific stormwater data (see discussion in Section 4.2.2.2.12)

4.2.2.1 Primary Line of Evidence: No AOPC

The primary line of evidence supporting an NFA SCD for low-priority contributing outfalls is the absence of a DEQ-defined sediment AOPC or area of elevated sediment concentrations near the outfall. Sections 2.2.2 and 4.2.1.2.1 describes considerations for applying this WOE criteria.

4.2.2.2 Additional Lines of Evidence

Additional lines of evidence based on outfall drainage basin characteristics are discussed in Section 4.2.1.1 and 4.2.1.2 above that may be used to support that stormwater discharges from low-priority contributing City outfalls pose a low or reasonably unlikely risk to adversely impacting Columbia Slough sediment quality and in-water receptors. The WOE evaluation will demonstrate that stormwater discharges from these low-priority basins are unlikely to result in contamination or recontamination of Columbia Slough sediments.

In addition to the lines of evidence discussed in Section 4.2.1 the following WOE factors may also be used.

4.2.2.2.1 Basin Size

For the initial WOE evaluations small basins will be defined as less than 1 acre. Small basins are anticipated to have minimal potential for generating contaminant loads at levels that would be reasonably likely to result in unacceptable in-water risk or sediment recontamination. Basin size will be used with other lines of evidence (e.g., sources, land use) to support this assumption. The DEQ Portland Harbor SCD states basins with small areas have minimal potential for contaminant loads at levels that would result in unacceptable in-water risk or sediment recontamination (DEQ, 2021c). The Portland Harbor SCD defines very small basins as being less than 5 acres, and small basins being between 5 -29 acres. However, regardless of basin size, basins with analytical stormwater results that indicate elevated COPCs are present will be recategorized and will be evaluated as a potentially contributing outfall (see Sections 4.2.2 and 4.2.3).

4.2.2.2.2 Basin Land Use

Basins that include a large percentage of residential or open space land use have a lower potential for discharging contaminant loads at levels that would result in unacceptable in-water risk or sediment recontamination.

4.2.2.2.3 City Roadways

Runoff from public roadways is not a significant contributor of contamination to Portland Harbor outfalls (DEQ, 2021c; BES, 2014e, 2015, 2018). Stormwater data characterizing stormwater quality from City roadways is also available from the City's UIC Program between 2005 and 2023 and the Columbia Slough Sediment Program between 2008 and 2023 that will be used as appropriate in the WOE evaluations (BES, 2023b). Slough sediment risk drivers are primarily PCBs and pesticides, none of which are typically associated with roads. The City

performs ongoing activities under its MS4 permit, administration of DEQ NPDES industrial stormwater permits, and City Code to reduce TSS loading to stormwater and to prevent offsite migration and tracking. Source control related to roadways focuses on addressing contaminants at the source and preventing contaminants from tracking onto roadways through source investigations and appropriate regulatory referrals.

It is notable that the City's stormwater conveyance system is not associated with hazardous substance releases in a manner typical of an identified contaminated site that would be addressed under DEQ's cleanup rules (DEQ, 2021c). Rather, potentially polluted discharges can enter the storm system from multiple sites and roadways, all of which can comingle during conveyance to the Slough. Therefore, investigating and controlling contaminant sources to the Slough via the City-owned stormwater infrastructure is rather atypical of the individual site-focused source control process. Consequently, DEQ and the City collaborated under a series of IGAs (DEQ and BES, 2006, 2010, 2016, 2021) to identify potential contaminant sources to the City conveyance system and targeted those sites for source controls, with the intention of eliminating sources at the point of discharge into the system. In theory, with all potential sources to the City conveyances identified, investigated, and controlled, the collective discharges at the outfalls would not be considered reasonably likely to contain pollutants at levels that could recontaminate remediated Slough sediment.

4.2.2.2.4 Effectiveness of Ongoing City Stormwater Programs

The City implements numerous stormwater programs throughout the City, including all basins discharging to the Columbia Slough to reduce pollutant discharges (i.e., source control). These programs include but are not limited to the following:

- MS4 permit and associated programs
    - Operations and Maintenance
    - Industrial and Commercial Controls
    - Illicit Discharge Detection and Elimination
    - Erosion Control
    - Pollution Prevention for Municipal Operations
    - Development/Redevelopment Standards
        - Implementation of Stormwater Management Manual (SWMM; BES, 2020a) requirements
        - Post-construction Long-term Operation and Maintenance of stormwater management facilities installed by the City to meet SWMM requirements.
    - Structural Controls
    - Natural Systems
    - Public Education and Outreach
    - Public Involvement and Participation
- Combined Sewer Overflow (CSO) program
- Columbia Slough total maximum daily load (TMDL) and TMDL Implementation Plan (TIP)

- City Development Code
- City SWMM
- City Stormwater *Source Control Manual* (BES, 2020b)

These programs are recognized in the Columbia Slough ROD (DEQ, 2005) and 2021 DEQ/BES *Columbia Slough Intergovernmental Agreement* (DEQ and BES, 2021), and key Portland Harbor city outfall SCD documents (DEQ, 2021c; BES, 2011, 2014e, 2015, 2018; EPA and DEQ, 2005). Many of the comprehensive stormwater management programs (i.e., source control actions) are required under the City's DEQ issued MS4 permit to implement measures that reduce pollution in stormwater runoff and will continue to be implemented to meet DEQ Water Quality regulations.

The City programs that contribute to stormwater quality improvements and stormwater source control takes many forms. Some source controls are designed to keep pollutants out of stormwater, such as removing potential contaminant exposures to rainfall via technical assistance to industries and public education programs. Other "structural" controls remove pollutants from stormwater before the stormwater reaches a receiving water or divert stormwater that may include contaminants away from receiving waters (e.g., to infiltration facilities or offsite disposal). Examples of structural controls include water quality swales, sedimentation ponds or vaults, and green streets.

The Portland Harbor City Outfall SCD (DEQ, 2021c) concluded: comprehensive implementation of these programs ensures on-going action to control potential contaminant sources to the Slough. In addition, the City identified and implemented improvements to some of these programs, such as updates to the Stormwater Control Manual, which applies city-wide to development/redevelopment and roadway improvement projects on public and third-party properties and ROWs. These program improvements further the goals of source control efforts and serve as an on-going adaptive management opportunity to continue improving the quality of stormwater discharges to the Slough and prevent sediment recontamination and unacceptable water column risk.

Because these programs are applied comprehensively throughout the Columbia Slough watershed and specifically in the uplands, they also significantly improve stormwater discharges from non-City-owned conveyances. This programmatic approach to controlling stormwater contamination at the point of origination is a valuable component of overall stormwater source control into the Columbia Slough and serves as an on-going source control. This is because these programs are widespread and consistently applied, include regulatory mechanisms to ensure compliance, are iteratively improved and their implementation will continue in the long-term.

The effectiveness of the City's programmatic efforts and other regulatory programs have been documented through the following efforts:

- The 2017 Columbia Slough slough-wide long-term sediment monitoring investigation concluded the sediment contaminant distribution patterns and key COPC concentrations are similar between the three sediment sampling events (1994, 2006, and 2017), and there was a consistent pattern of lower contaminant concentrations in 2017 than previous years. The absence of sediment contamination or consistency in sediment

contaminant concentrations near an outfall over time (i.e., past 30 years) can be used to support that an outfall is an unlikely significant historical or current pathway to the Slough.

- Effectiveness monitoring completed for Portland Harbor by the City and others (BES, 2011, 2015, 2018, 2021, 2023b; DEQ, 2021c) helps to demonstrate that the recontamination risk from City stormwater outfalls is low (DEQ, 2021c).
- The pollutant concentration trend analysis of stormwater discharges and receiving water quality by the City's MS4 Program (see Part III – Monitoring Report included in the City's annual MS4 compliance report for fiscal year 2020–2021; BES, 2021) included evaluation of a Portland Harbor outfall (OF19) and found decreasing trends in copper, lead, and TSS stormwater. The strongest observed decreasing trend was in dissolved copper concentrations.

The effectiveness of the City's programmatic and Columbia Slough source control efforts may also be supported by additional stormwater concentration trend analysis. Stormwater trend analysis may be performed using over 18 years of stormwater data collected from selected Columbia Slough priority City outfalls or the City's UIC program.

4.2.2.2.5 Stormwater Treatment

Source control activities, including stormwater treatment, implemented within City outfall basins by the City or by third parties will be considered in basin specific WOE evaluations. The following types of source control activities and stormwater treatment projects (constructed or planned) will be identified at the time the WOE evaluation is performed and will be used in basin specific WOE evaluations as appropriate:

- Stormwater treatment systems to be constructed in identified City basins. This work will be performed in general accordance with the *Columbia Slough Basin Stormwater Treatment Projects Work Plan* [BES, 2024]).
- New City outfalls with stormwater treatment (e.g., NE 46th).
- Existing regional stormwater treatment facilities (e.g., Ramsey, Mason Flats, 148th).
- Treatment installed as part of past road improvement projects to meet City Code and SWMM requirements (e.g., AAA064, AAG236, AAL541, AAA145). Table 4 identifies City outfall basins with existing stormwater ROW and summarizes the types of treatment installed.
- Pollutant reduction through the implementation of City/DEQ Stormwater Source Control IGAs such as:
    - NPDES 1200Z permit administration: Pursuant to the City's MS4 Permit and an IGA between the City (BES Industrial Stormwater Program) and DEQ, the City administers DEQ NPDES 1200-A and 1200Z Industrial Stormwater General Permits for facilities located within the City of Portland that discharge to the municipal stormwater system or directly to surface waters. Under this Agreement, the City reviews new permit applications which include the facilities' stormwater pollution control plans (SWPCPs), conducts inspections to ensure compliance with the SWPCP and permit conditions and reviews Discharge Monitoring Reports to determine permit compliance. The City also

provides technical assistance to identify additional activities and BMPs to minimize pollutants in stormwater and issues City Code enforcement actions as applicable for prohibited discharges to the municipal stormwater system.

  - Infiltration of Stormwater through Contaminated Soil. Pursuant to the City's IGA with DEQ, the City or private upland parties may select to infiltrate stormwater onsite to meet City development/redevelopment requirements or DEQ cleanup requirements if it can be demonstrated the City conveyance system, groundwater, and surface water quality are protected. This IGA was developed to support onsite management of stormwater to facilitate source control and reduce discharges to the City system.

- Stormwater treatment or source control action by non-City parties at specific facilities, located within City outfall basins, to improve onsite stormwater management systems to address offsite migration of contaminants under:
  - DEQ Water Quality authority (i.e., NPDES 1200Z permits, NPDES Tier 2 improvements).
  - DEQ Cleanup authority (i.e., SCEs, SCMs, remedial action) to meet Columbia Slough source control objectives.
  - Other regulatory requirements (such as City development/ redevelopment requirements for management of site stormwater or addressing City Code violations).

The WOE evaluation will identify basins that have structural stormwater treatment facilities installed or have implemented other source control actions to support basin specific SCDs. This information may be used to reassess the stormwater pathway from selected basins. Any treatment within an outfall basin is anticipated to lower pollutant concentrations and/or potential pollutant loading to the Slough. City ROW stormwater treatment is required by City Code during development or redevelopment activities. The City expects that additional ROW stormwater treatment facilities will be constructed in basins across the Slough as development and redevelopment and road improvement continues in these basins (see the *Columbia Slough Basin Stormwater Treatment Projects Work Plan* [BES, 2024]).

4.2.2.2.6 Indirect Discharge to Slough

Numerous City outfalls do not discharge directly to the mainstem of Columbia Slough. The stormwater pathway for outfalls discharging indirectly to the Slough via Wilkes Creek, surface water channels managed by regional drainage districts (Peninsula Drainage Districts 1 and 2, Multnomah County Drainage District), or natural channels may be considered as relevant in the basin-specific WOE evaluations.

City outfalls with an indirect discharge pathway to the Slough are believed to be low priority for consideration of the risks to in-water receptors or for recontamination to remediated AOPCs. Sediment within the regional drainage districts is managed (e.g., maintenance dredging, dredge spoil disposal, pumping water upstream of levees to the Slough) by the Multnomah County Drainage District under DEQ oversight.

4.2.2.2.7 Basins with Only NPDES Permitted Sources Identified

These basins may be considered low priority if NPDES permitted sites within these basins are compliant with their permits, and are supported by other WOE criteria. Upland sites issued NPDES 1200Z permits are required to perform ongoing monitoring and install stormwater treatment, in accordance with permit required schedules, if annual geometric mean concentrations exceed an applicable benchmark value. Sites with an active NPDES 1200Z permit are required to meet a TSS benchmark concentration of 30 mg/L. As described in Section 3.4.1.6, reductions in TSS are associated with the reduction in other stormwater contaminant concentrations. Sites in compliance with their NPDES permit are implementing source control.

4.2.2.2.8 Basins with Sources that Are Inactive ECSI Sites or DEQ-Defined Low-Priority ECSI Site(s)

These basins may be considered low priority if supported by other WOE criteria because DEQ has reviewed the priority of these sites during past site discovery and assessment processes. Many DEQ recommendations or priorities for upland sites have not been changed for over 10 years. These sites are considered unlikely to be ongoing significant sources of COPC discharges to the Columbia Slough.

4.2.2.2.9 Basins with Upland Sources that Have DEQ Completed Approved SCEs, SCMs or Certificates of Completion

These basins may be considered low priority if supported by other WOE criteria because DEQ has reviewed and approved upland source control actions. These sites are considered unlikely to be ongoing significant sources of COPC discharges to the Columbia Slough.

4.2.2.2.10 Basins with Ongoing or Pending DEQ SCEs or SCMs

These basins may be considered low priority if potential ongoing significant sources have entered DEQ's Cleanup Program to complete appropriate source control actions (e.g., preliminary assessment, SCE, Remedial Investigation) and are supported by other WOE criteria. These sites are considered unlikely to be ongoing significant sources of COPC discharges to the Columbia Slough since these actions will have been completed under DEQ Cleanup Program oversight.

4.2.2.2.11 Non-City Outfall Regulatory Status

Over 500 non-city outfalls discharge to the Columbia Slough. The regulatory status (e.g., NPDES permitted, unpermitted) of each of these outfalls is not readily available. The proximity and number of non-city outfalls to DEQ-defined AOPCs, City outfalls, and upstream/ downstream locations, and the assumed drainage areas with potential bank erosion should be considered in WOE evaluations as relevant and appropriate in determining the priority of City outfall basins.

4.2.2.2.12 Basin-Specific Stormwater Quality Data

The City has collected source tracing and basin characterization data (e.g., stormwater, stormwater solids, street sweeping, catch basin samples) from over 40 outfall basins. This data

will be used as relevant and appropriate, to support a WOE demonstration that a basin is low priority or a basin SCD/closure decision. This data may be used to demonstrate the absence of potential ongoing significant sources or basin concentrations are below knee of the curve concentrations discussed in Section 3.4.1.

4.2.2.3 Basin Closure Demonstrations: Low-Priority Potentially Contributing Outfall Source Control Decisions

The WOE evaluation criteria described above will be used to demonstrate that low-priority contributing basins are controlled and/or:

- Are reasonably unlikely to have stormwater discharges that result in sediment contamination above DEQ-defined baseline or sediment knee of curve concentrations.
- Will continue to be managed long-term under City-wide programmatic efforts that reduce pollution in stormwater runoff.
- Do not warrant additional source control investigation, evaluation, or implementation of SCMs.

The low priority of these basins and continued long-term management of these basins under the DEQ issued MS4 permit, and City Code are anticipated to support NFA SCDs and ultimately a Certificate of Completion for each basin or group of basins.

4.2.3 Basin Closure: Complex Potentially Contributing Outfalls

This section provides the general procedure for WOE evaluations to demonstrate that discharges from complex potentially contributing basins are controlled or are unlikely to result in contamination or recontamination of Columbia Slough sediments. These WOE evaluations will assess the status of source control at potential ongoing significant sources within the basin discharging to the City stormwater system and whether these sources are or will be sufficiently addressed to allow in-water remedial actions to proceed and/or demonstrate that discharges from the City outfalls are unlikely to result in recontamination of remediated Columbia Slough sediments. These evaluations are intended to support NFA SCDs and ultimately a Certificate of Completion for each basin or group of basins.

The City will use the initial WOE evaluation process described in Sections 2 and 3 of this Agreement to identify complex potentially contributing outfall basins. Basins defined as complex are assumed to require a more comprehensive evaluation to support SCDs and regulatory closure. This process is similar to the Portland Harbor Sufficiency Assessment evaluation process (EPA, 2020; GSI, 2020). One or more of the following types of basin characteristics may be used to categorize basins as complex:

- Discharges to a DEQ-defined sediment AOPC
- Multiple potential ongoing significant upland sources
- Unknown outfall basin sources (e.g., CS-614, 56C)

4.2.3.1 Primary Line of Evidence: Basin Sources and Status of Upland Source Control

The primary line of evidence supporting a SCD for complex potentially contributing outfalls is the type and status of upland sources discharged to a DEQ-defined sediment AOPC. In addition to the WOE considerations described in Sections 4.2.1 and 4.2.2, the status, schedule, and compliance with applicable regulatory programs of potential ongoing significant sources will be reviewed. This review will focus on determining if potential ongoing significant sources discharging to the City stormwater system within the subject outfall basin have been referred to the appropriate regulatory program and are or will be sufficiently controlled to prevent recontamination of remediated sediments.

4.2.3.2 Additional Lines of Evidence

Additional lines of evidence based on outfall drainage basin characteristics are discussed in Sections 4.2.1 and 4.2.2 and will be used in the WOE evaluation to support that stormwater discharges from the complex potentially contributing City outfalls are reasonably unlikely to result in recontamination of remediated sediments.

The WOE evaluation may consider potential adverse impacts to the Columbia Slough from a range of potential sources and contaminant transport pathways including non-City outfalls, groundwater discharges, Slough bank erosion, or resuspension of sediments from natural (e.g., carp) and anthropogenic activities.

4.2.3.3 Basin Closure Demonstrations: Potentially Contributing Outfall Source Control Decisions

The WOE evaluation criteria described above will be used to demonstrate that complex contributing basins are controlled and/or:

- Are reasonably unlikely to result in sediment contamination above DEQ-defined baseline concentrations.
- Will continue to be managed long-term under City-wide programmatic efforts that reduce pollution in stormwater runoff.
- Do not warrant additional source control investigation, evaluation, or implementation of SCMs.

The continued long-term management of these basins under the DEQ-issued MS4 permit and City Code are intended to support NFA SCDs and ultimately a Certificate of Completion for each basin or group of basins.

The following types of WOE determinations will support the City's on-going programmatic stormwater approach and that SCMs implemented by the City in selected basins (as well as site-specific actions in many basins) are adequate to demonstrate that source control has been effectively achieved and that on-going discharges from the City's stormwater conveyance system are reasonably unlikely to result in sediment recontamination above DEQ-defined baseline or knee of curve concentrations:

- Documenting outfall does not discharge to an AOPC.

- Documenting source identification is complete and potential ongoing significant sources are in or have been referred to the appropriate regulatory program.
- Documenting basin characteristics (including physical and analytical data, potential for or magnitude of exceedance of cleanup screening levels measured in stormwater or stormwater solids, size, land use, basin discharge location, upland source characteristics, road types, presence of stormwater treatment facilities within basin).
- Documenting the presence of basin SCMs:
    - Existing SCMs and management practices on individual upland sites within a basin (implemented by the sites, not the City).
    - Existing stormwater treatment facilities on individual upland properties installed by the sites to meet City development/ redevelopment code.
    - Existing or planned SCMs and management practices within a basin implemented by the City.
    - Non-site specific measures, practices or actions intended to control or improve stormwater discharges from a basin, including individual and system-wide line cleanouts and repairs, actions that reduce or divert discharges, and structural and non-structural programmatic elements (i.e., implementation of City programmatic SCMs).
- Documenting effectiveness of City programmatic SCMs using City SWMM (BES, 2020a) requirements, Portland Harbor analysis (BES, 2011, 2015, 2018, 2021), or City UIC program data (BES, 2023b).
- Documenting programmatic SCMs implemented under the City's authority in individual basins (i.e., City ROW stormwater treatment projects) once completed will be adequate to protect the eventual sediment remedies in the Columbia Slough.
- Demonstrating a potentially contributing outfall is not a significant current or future contaminant pathway to the Slough by evaluating the WOE criteria as applicable or relevant to the specific and unique characteristics of each basin.

Section 4.3 describes the scope of work the City will perform to document and support these WOE decisions.

4.3 Basin Source Control Evaluation and Closure Documentation

4.3.1 Semi-Annual Reports

The City will prepare and submit semi-annual status reports to DEQ regarding the status of site identification, site investigation, and basin closure process. The brief status report will include, as appropriate:

- Basin inspections completed and/or planned by City's Industrial Stormwater Program
- Basin reconnaissance walks completed or planned with DEQ staff
- WOE evaluations completed, in progress, and/or planned for individual or groups of City basins

- Upland sites identified as potential ongoing significant sources and recommended referrals

4.3.2 Annual Columbia Slough Report

DEQ and the City intend to continue to prepare annual reports documenting the "State of the Slough." The reports are prepared jointly by DEQ and BES and made available to the public on or before January 31st of each year. The reports summarize activities performed during the previous year and include general conclusions relating to the environmental characteristics of the Columbia Slough and activities planned for the upcoming year.

The annual report will be available to the public on the City of Portland website. The annual report is not an obligation under the Consent Judgment but the City and DEQ see benefits from continuing to prepare these reports. A target schedule for the annual report is as follows:

- DEQ/BES Annual Report — Posted by January 31st of each year
  - City sections — To DEQ on or before November 30th of each year
  - DEQ sections — To BES on or before November 30th of each year
  - Review and comment — To City/DEQ within 30 days of receipt of Annual Report sections
  - Combined Annual Report — Issued by January 31st of each year

4.3.3 City Outfall Basin Closure Weight-of-Evidence Evaluation Reports

The City will prepare Basin Closure WOE Evaluation Reports for selected individual or groups of City outfall basins. The report structure and content will vary by the type of outfall or outfall groups (non-contributing, low-priority contributing, complex contributing, etc.). The contents of reports will generally follow the outline presented below as relevant and appropriate.

1. **Introduction**
   - 1.1 Purpose of Document
   - 1.2 Report Organization
2. **Outfall and Basin Setting**
   - 2.1 Basin Description

     (Location, Slough reach, size and configuration, drainage area, land uses, etc.)
   - 2.2 Outfall Setting

     (AOPC absence/presence, identification of nearby City or non-city outfalls, hydrodynamic considerations in Slough, etc.)
3. **City Outfall Basin Closure Process**
   - 3.1 Approach
   - 3.2 Decision Framework
4. **Basin Source Identification, Investigations, and Referrals**
   - 4.1 Identification of Potential Upland Sources
   - 4.2 Basin Characterization and Source Tracing Investigations

4.3 Identification of Potential Ongoing Significant Sources and Source Referrals

4.4 Completion of Source Identification and Source Referrals

5. Ongoing Basin Source Control Measures

5.1 Basin Improvements/Treatment Systems

5.1.1 City Source Control Measure Implementation

5.1.2 Upland Facility Source Control Measure Implementation

5.2 City Source Control Measure Operations and Maintenance Program

5.3 Evaluation of Basin Stormwater Data (this section will evaluate pre/post data that supports recommended SCD)

5.4 City-wide Programmatic Source Control

6. Basin Categorization (Discussion of initial WOE evaluations used to place basins into categories for further WOE evaluations to support basin SCD and closure)

6.1 Identification of Non-Contributing and Potentially Contributing Outfall Basins

6.2 Identification of Low Priority and Potentially Complex Contributing Outfall Basins

6. Basin Source Control Weight-of-Evidence Evaluation

6.1 Basin Closure: Non-Contributing, or Low-Priority Potentially Contributing, or Complex Potentially Contributing Outfalls (note report specific)

6.1.1 Primary Line of Evidence

6.1.2 Additional Lines of Evidence

6.1.3 Basin Closure Demonstration

6.2 Findings - Per DEQ Stormwater Guidance Appendix C – Section 8 (DEQ, 2010):

6.2.1 Existing and potential facility-related contaminant sources have been identified and characterized.

6.2.2 Contaminant sources are being controlled to the extent feasible.

- Describe how existing or potential sources are being controlled.
- Discuss the relative effectiveness of SCMs and stormwater BMPs at minimizing the contaminant load in stormwater, and the basis of that evaluation.
- List the contaminants that continue to exceed SLVs in spite of SCMs. Describe their source(s) and indicate why additional SCMs are either not feasible or not expected to achieve better results.

6.2.3 If pre- and post-SCM data was collected, post-SCM data supports the conclusion that the SCM is effective and/or supports the recommended SCD.

6.2.4 Adequate measures are in place to ensure source control and good stormwater management measures occur in the future.

6.2.5 Contaminants in stormwater that continue to exceed SLVs in spite of SCMs and stormwater management measures are not likely to result in sediment contamination in the receiving waterbody or contribute to unacceptable risk.

7. **Long-term Basin Management and Protectiveness**
8. **Basin Source Control Closure Recommendations**
9. **References**

DEQ will review and approve the Outfall Basin Closure WOE Evaluation Report(s) or provide written comments on the report and recommend NFA SCD and subsequent Certificate(s) of Completion, or other basin regulatory closure requests submitted by the City for City outfall basins. DEQ will provide written responses to each source control completion request.

SECTION 5

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Tables

Table 1: Stormwater Screening Levels

Analyte Group	Analyte	Stormwater Screening Levels					
		DEQ (2010)		Knee of Curve Columbia Slough (2017-2021)	NPDES 1200-Z		DEQ (2010)
		SLV for non-Portland Harbor sites	10X SLV		Benchmark (2023)	Impairment Reference Concentration (2019); Oregon Aquatic WQ critiera (DEQ 2023)	Portland Harbor stormwater knee of curve
PCB Congeners *(pg/L)*	Total PCB Congeners	64	640	40,000	NA	2,000,000	100,000
Metals *(µg/L)*	Antimony	640	6400				
	Arsenic	0.14	1.4	1.6		340	
	Cadmium	0.094	0.94				
	Chromium	11	110				
	Copper	2.7	27	35	17		
	Lead	0.54	5.4	40	100		
	Mercury	0.77	7.7			2.4	
	Nickel	16	160				
	Phosphorus	160	1600		160		
	Zinc	36	360	240	240		
Organochlorine Pesticides *(ng/L)*	2,4'-ddd	--	--				
	2,4'-dde	--	--				
	2,4'-ddt	--	--				
	4,4'-ddd	0.31	3.1				
	4,4'-dde	0.22	2.2	4		10	
	4,4'-ddt	0.22	2.2				
	Total DDX	200	2000			1100	
	aldrin	0.05	0.5			3000	
	alpha-BHC	4.9	49				
	alpha-chlordane*	0.81	8.1			2400	
	beta-BHC	17	170				
	delta-BHC	37	370				
	dieldrin	0.054	0.54	3		240	
	endosulfan I	56	560			220	
	endosulfan II	56	560				
	endosulfan sulfate	89000	890000				
	endrin	36	360				
	endrin aldehyde	300	3000			30	
	endrin ketone	--	--				
	gamma-BHC	80	800				
	gamma-chlordane*	0.81	8.1				
	heptachlor	0.079	0.79			520	
	heptachlor epoxide	0.039	0.39				
	methoxychlor	30	300				
	toxaphene	0.2	2				
Polycyclic Aromatic Hydrocarbons *(µg/L)*	acenaphthene	520	5200			95	
	acenaphthylene	--	--				
	anthracene	40000	400000			2900	
	benzo(a)anthracene	0.018	0.18			1	
	benzo(a)pyrene	0.018	0.18			1	
	benzo(b)fluoranthene	0.018	0.18	0.15		1	
	benzo(g,h,i)perylene	--	--				
	benzo(k)fluoranthene	0.018	0.18			1	
	bis(2-ethylhexyl) phthalate	2.2	22				5
	butyl benzyl phthalate	3	30				
	chrysene	0.018	0.18	0.1		1	
	dibenzo(a,h)anthracene	0.018	0.18			1	
	diethyl phthalate	3	30				
	dimethyl phthalate	3	30				
	di-n-butyl phthalate	3	30				
	di-n-octyl phthalate	3	30				
	fluoranthene	140	1400			14	
	fluorene	3.9	39			390	
	indeno (1,2,3-cd) pyrene	0.018	0.18			1	
	naphthalene	620	6200				
	phenanthrene	--	--				
	pyrene	4000	40000			290	
Total Suspended Solids *(mg/L)*	TSS		300	75	30		

Notes:

Gray shading indicates the value is selected for screening a potential ongoing significant upland source.

Table 2: Stormwater Solids Screening Levels [DEQ Columbia Slough Sediment Screening Levels (2/10/22)]

Analyte Group	Analyte	Upland Source Control Screening Level (mg/kg dry weight)		
		Concentration	10x SLV	Basis
Metals	Antimony	0.56		background
	Arsenic	8.8	88.0	background
	Barium	790		background
	Cadmium	0.63		background
	Chromium	76		background
	Copper	34	340	background
	Cobalt	NA		
	Lead	79	790	background
	Manganese	1800		background
	Mercury (inorganic)	0.23		background
	Nickel	47		background
	Selenium	2		background
	Silver	4.5		toxicity
	Thallium	5.2		background
	Zinc	180	1800	background
PCBs	Total Aroclor [1]	0.01	0.10	MRL [2]
Pesticides	alpha-BHC	0.001		MRL
	beta-BHC	0.001		MRL
	gamma-BHC	0.0009		toxicity
	delta-BHC	--		--
	DDD	0.001		MRL
	DDE	0.001	0.010	MRL
	DDT	0.001		MRL
	Total DDT (DDx) [1]	0.001	0.01	MRL
	Endosulfan	0.35		bioaccum
	Endrin Aldehyde	0.003		toxicity
	Aldrin	0.001		MRL
	Chlordane	0.001		MRL
	Dieldrin	0.001	0.01	MRL
	Heptachlor	0.001	0.01	
	Heptachlor epoxide	no value		MRL
	2-Methylnaphthalene	0.02		toxicity
	Acenaphthene	0.29		toxicity
	Acenaphthylene	0.16		toxicity
	Anthracene	0.057		toxicity
	Benzo(a)anthracene	0.032		toxicity
	Benzo(a)pyrene	0.032		toxicity
	Benzo(b)fluoranthene	no value		
	Benzo(g,h,i)perylene	0.3		toxicity
	Benzo(k)fluoranthene	0.03		toxicity

Analyte Group	Analyte	Upland Source Control Screening Level (mg/kg dry weight)		
		Concentration	10x SLV	Basis
SVOCs	Bis(2-ethylhexyl)phthalate	0.75	7.50	toxicity
	Chrysene	0.057	0.57	toxicity
	Dibenzo(a,h)anthracene	0.06		toxicity
	Dibenzofuran	5.1		toxicity
	Fluoranthene	0.111		toxicity
	Fluorene	0.077		toxicity
	Indeno(1,2,3-cd)pyrene	0.017		toxicity
	Naphthalene	0.176		toxicity
	Phenanthrene	0.042		toxicity
	Phenol	0.048		toxicity
	4-methylphenol	NA		
	Pyrene	1.9		CTL
	Pentachlorophenol	0.1		bioaccum
	LPAH [3]	0.076	0.76	toxicity
	HPAH [3]	0.193	1.93	toxicity
	Total PAH [3]	1.61	16.1	toxicity
	cPAHs (BaP eq)	--		--

Notes:

Concentrations are Generic Values from DEQ's 6/3/14 SLV tables, unless otherwise noted.
Gray shading indicates the value is selected for screening a potential ongoing significant upland source.

[1] Total Aroclor and Total DDT (DDX) concentrations are from DEQ's 2007 Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment.

[2] MRL= Minimum Reporting Limit

[3] LPAH, HPAH and Total PAH concentrations are from DEQ's 2020 Internal Management Directive, Conducting Ecological Risk Assessments. Table 3 Risk-based Concentrations for Sediments. Total PAH = Total LPAH and HPAH.

Table 3: NPDES General Industrial Stormwater Permit Benchmarks for the Columbia Slough

		Columbia Slough Benchmarks							
Permit effective date	**Comment**	**Copper (mg/L)**	**Lead (mg/L)**	**Zinc (mg/L)**	**pH (s.u.)**	**TSS (mg/L)**	**Oil & grease (mg/L)**	**BOD (mg/L)**	**Phosphorus (mg/L)**
7/1/2021	1200-Z Permit; Reissued early	0.017	0.10	0.24	5.5-9.0	30	removed	24	0.16
10/22/2018	1200-Z Permit; Reissued early	0.02	0.06	0.24	5.5-8.5	30	10	33	0.16
7/1/2017	combined Z & COLS into 1 permit	0.02	0.06	0.24	5.5-8.5	30	10	33	0.16
11/3/2016	1200-COLS B Permit (interim); expired 9/30/17	0.036	0.06	0.24	5.5-8.5	50	10	33	0.16
10/1/2011	1200-COLS Permit	0.036	0.06	0.24	5.5-8.5	50	10	33	0.16
9/1/2006	1200-COLS Permit	0.036	0.06	0.24	5.5-8.5	50	10	33	0.16
12/21/2004	1200-COLS Permit	0.036	0.006	0.24	6.5-8.5	50	10	33	0.16
12/22/1999	1200-COLS Permit	0.036	0.006	0.24	6.5-8.5	50	10	33	0.16

Table 4: City Outfall Basins with Stormwater Treatment

MS4 Basin ID (e.g., OF56C)	Hansen Outfall ID	CIP Projects	Basin Stormwater Treatment	CIP Status (12-30-2022)
AAA064	AAO064	ROW Treatment Completed	GS-21, STMFLTR, other	Completed
AAA287	AAA287	Completed	Regional Facility: Ramsey Lake Treatment, GS-22	Completed
AAA303	AAA303	ROW Treatment Completed	STMFLTR, ecoroof, other	Completed
AAA452	AAA452	ROW Treatment Completed	Other	Completed
AAC164	AAC164	ROW Treatment Completed	Swale, other	Completed
AAC234	AAC234	ROW Treatment Completed	GS-2	Completed
AAE001	AAE001	ROW Treatment Completed	Other	Completed
AAE039	AAE039	ROW Treatment Completed	Swale	Completed
AAG255	AAG255	ROW Treatment Completed	GS-1, other	Completed
AAG236	AAG236	ROW Treatment Completed	GS	Completed
AAG402	AAG402	ROW Treatment Completed	STMFLTR	Completed
AAP316	AAP316	ROW Treatment Completed	GS-10, other	Completed
AAP330	AAP330	ROW Treatment Completed	Swale	Completed
AAP570	AAP570	ROW Treatment Completed	GS-9, VORT, other	Completed
AAP644	AAP644	ROW Treatment Completed	Other	Completed
AAS684	AAS684	ROW Treatment Completed	STMFLTR, other	Completed
AAS905	AAS905	ROW Treatment Completed	Other	Completed
AAW440	AAW440	ROW Treatment Completed	GS-7 (Drains to City of Gresham system)	Completed
ABA385	ABA385	ROW Treatment Completed	GS-16	Completed
AMR130	AMR130	ROW Treatment Completed	Other	Completed
AMR137	AMR137	ROW Treatment Completed	STMFLTR	Completed
AMR155	AMR155	ROW Treatment Completed	STMFLTR, other	Completed
AMW387	AMW387	ROW Treatment Completed	Other	Completed
ANL158	ANL158	ROW Treatment Completed	GS-2	Completed
ANM194	ANM194	ROW Treatment Completed	Swales	Completed
ANM510	ANM510	ROW Treatment Completed	Swale, other	Completed
84 (ANX801)	ANX801	Completed	Regional SW Treatment for former basin 84. Vegetated swale parallel to Owen Corning Swale	Completed
APB704	APB704	ROW Treatment Completed	GS-9	Completed
APQ040	APQ040	ROW Treatment Completed	Other	Completed
APT335	APT335	ROW Treatment Completed	Other	Completed
AQJ890	AQJ890	Completed	Regional SW Treatment (148th) for refined residential (AQJ890) portion of former basin 110A	Completed
CS-068	AMT157	ROW Treatment Completed	GS-2, STMFLTR, other	Completed
CS-610	AMN842	ROW Treatment Completed	Swale	Completed
OF100	AAS509	CIP - Completed	GS-11, UICs, STMFLTRs, other	Completed
OF104B	AAS784	CIP - Completed	GS-53, other	Completed
OF108	AAS873	ROW Treatment Completed	GS-5	Completed
OF111	AAW080	ROW Treatment Completed	GS-4	Completed

MS4 Basin ID (e.g., OF56C)	Hansen Outfall ID	CIP Projects	Basin Stormwater Treatment	CIP Status (12-30-2022)
OF111B	AAS709	ROW Treatment Completed	GS-3, STMFLTR, other	Completed
OF112	AAW278	Completed	Regional Facility: Upper Slough via Mason Flats Drainage Complex	Completed
OF113	AAW205	Completed	Regional Facility: Upper Slough via Mason Flats Drainage Complex	Completed
OF53B	AAA038	ROW Treatment Completed	GS-1	Completed
OF53C	AAA039	ROW Treatment Completed	GS-1	Completed
OF53D	AAA532	ROW Treatment Completed	GS-3, STMFLTR, other	Completed
OF55A	AAA854	ROW Treatment Completed	Other	Completed
OF66A	AAJ330	ROW Treatment Completed	GS-1	Completed
OF72	AAL341	ROW Treatment Completed	GS-2, VORT	Completed
OF77	AAL598	ROW Treatment Completed	Other	Completed
OF77A	AAL608	CIP - Completed	Filter vault	Completed
OF92	AAS597	ROW Treatment Completed	GS-6	Completed

Notes:

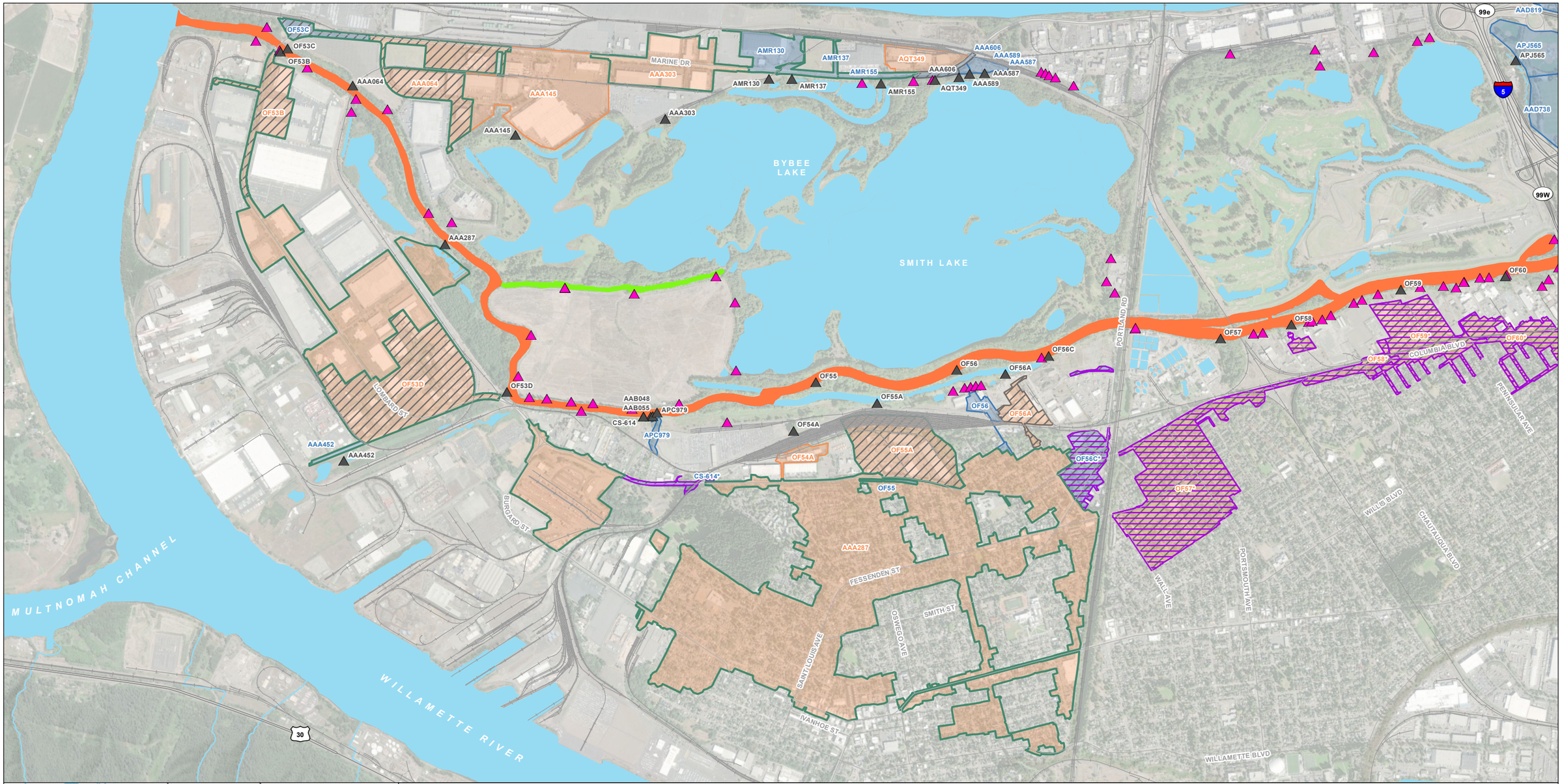
CIP Stormwater Treatment Projects Completed: 3 of the 16 priority projects identified in 2015 have been constructed.

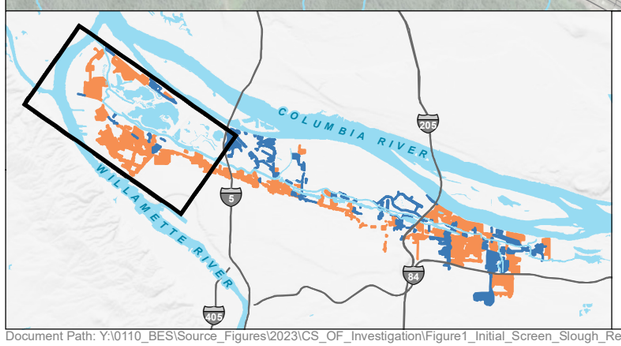
Regional Stormwater Facility Projects Completed: regional facilities capture and treat stormwater from large areas within outfall basins (AQJ890; OF112; OF113 and AAA287). Projects were constructed to meet City Watershed goals.

Right-of-Way Stormwater Treatment Projects Completed within City Outfall Basins: City constructed stormwater treatment required by the City's Stormwater Management Plan. This stormwater treatment reduces flow and/or pollutant discharges to the Slough and supports improvement of Watershed Health.

GS	indicates greenstreet facility
Other	indicates other stormwater treatment method
STMFLTR	indicates stormwater filter(s) used for treatment
VORT	indicates vortex filter used for treatment

Figures





LEGEND

- Outfall, City
- Outfall, Non-City
- ROW Treatment
- Treated Basin
- Sampled Basin
- No Source Identified
- Known or Potential Source Present

Slough Reach

- Lower Slough
- North Slough

All Other Features

- Railroad
- Major Road
- Watercourse
- Waterbody

NOTES

Basin names with asterisk are proposed for treatment

Treated Basin indicates current City installed stormwater water quality treatment of selected public rights-of-way.
Sampled Basin indicates stormwater or stormwater solids samples have been collected by the City within the stormwater outfall basin between FY2008 and FY2023.
No Source Identified indicates the stormwater outfall basin does not contain either DEQ ECSI site(s) or NPDES 1200z permitted site(s).
Known or Potential Source Present indicates stormwater outfall basin contains either DEQ ECSI site(s) and/or NPDES 1200z permitted site(s).
ROW Treatment indicates basins the City will construct in accordance with this Work Plan and the Consent Judgment.

FIGURE 1

City Stormwater Outfall Basin Overview - Lower Slough

Interim Columbia Slough Outfall Investigation and Basin Closure Work Plan

N

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Feet

GSI Water Solutions, Inc.

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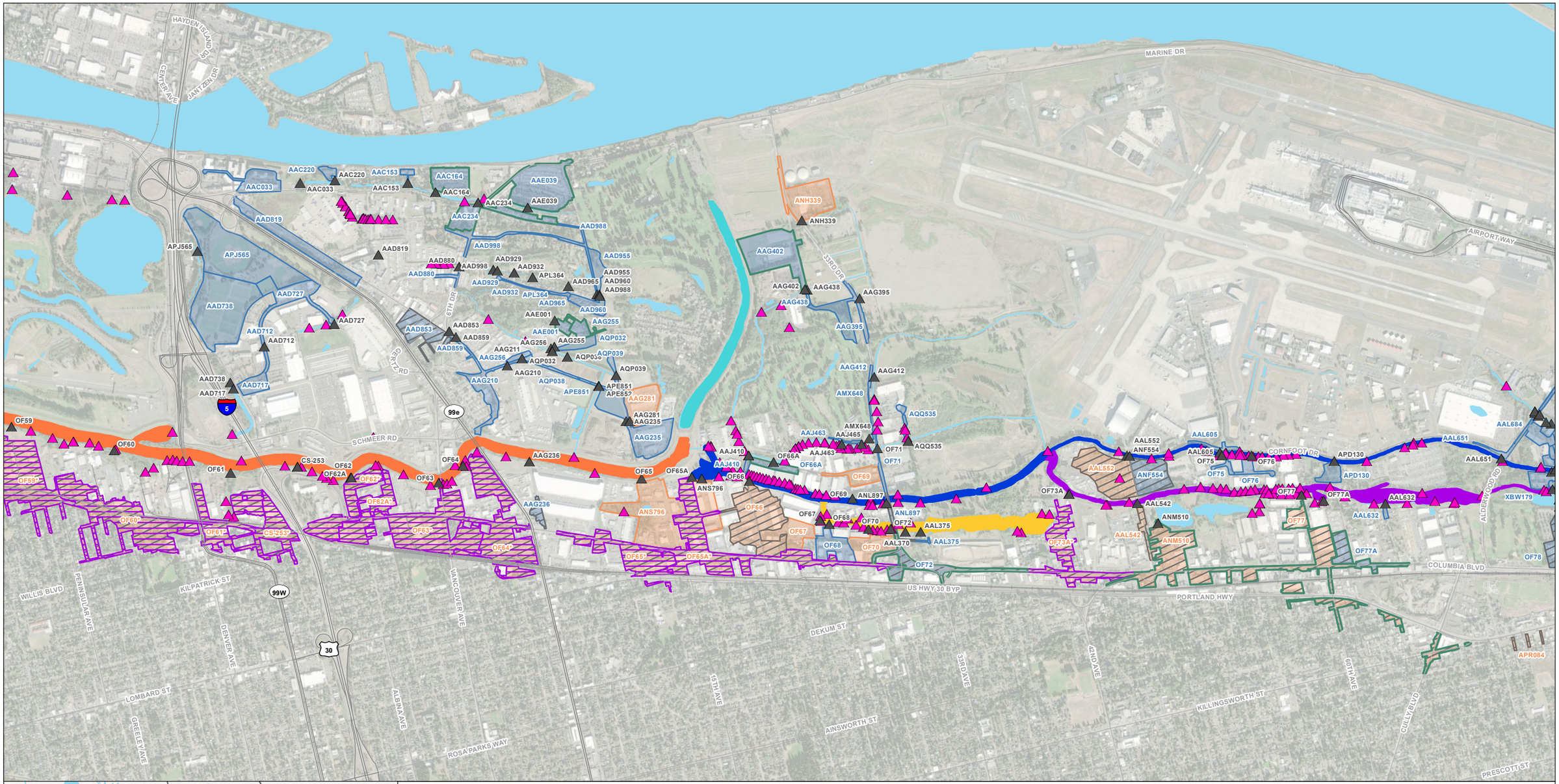

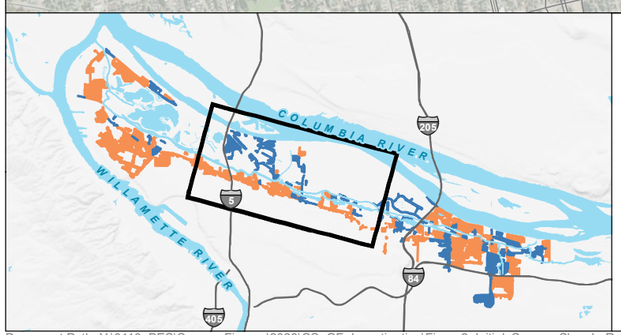

LEGEND

- Outfall, City
- Outfall, Non-City
- ROW Treatment
- Treated Basin
- Sampled Basin
- No Source Identified
- Known or Potential Source Present

Slough Reach

- Buffalo Slough
- Lower Slough
- Middle Slough
- Peninsula Drainage Canal
- Whitaker Slough

All Other Features

- Railroad
- Major Road
- Watercourse
- Waterbody

NOTES

Basin names with asterisk are proposed for treatment

Treated Basin indicates current City installed stormwater water quality treatment of selected public rights-of-way.
Sampled Basin indicates stormwater or stormwater solids samples have been collected by the City within the stormwater outfall basin between FY2008 and FY2023.
No Source Identified indicates the stormwater outfall basin does not contain either DEQ ECSI site(s) or NPDES 1200z permitted site(s).
Known or Potential Source Present indicates stormwater outfall basin contains either DEQ ECSI site(s) and/or NPDES 1200z permitted site(s).
ROW Treatment indicates basins the City will construct in accordance with this Work Plan and the Consent Judgment.

FIGURE 2

City Stormwater Outfall Basin Overview - Lower to Middle Slough

Interim Columbia Slough Outfall Investigation and Basin Closure Work Plan

N

0 1,000 2,000 3,000
Feet

GSI Water Solutions, Inc.

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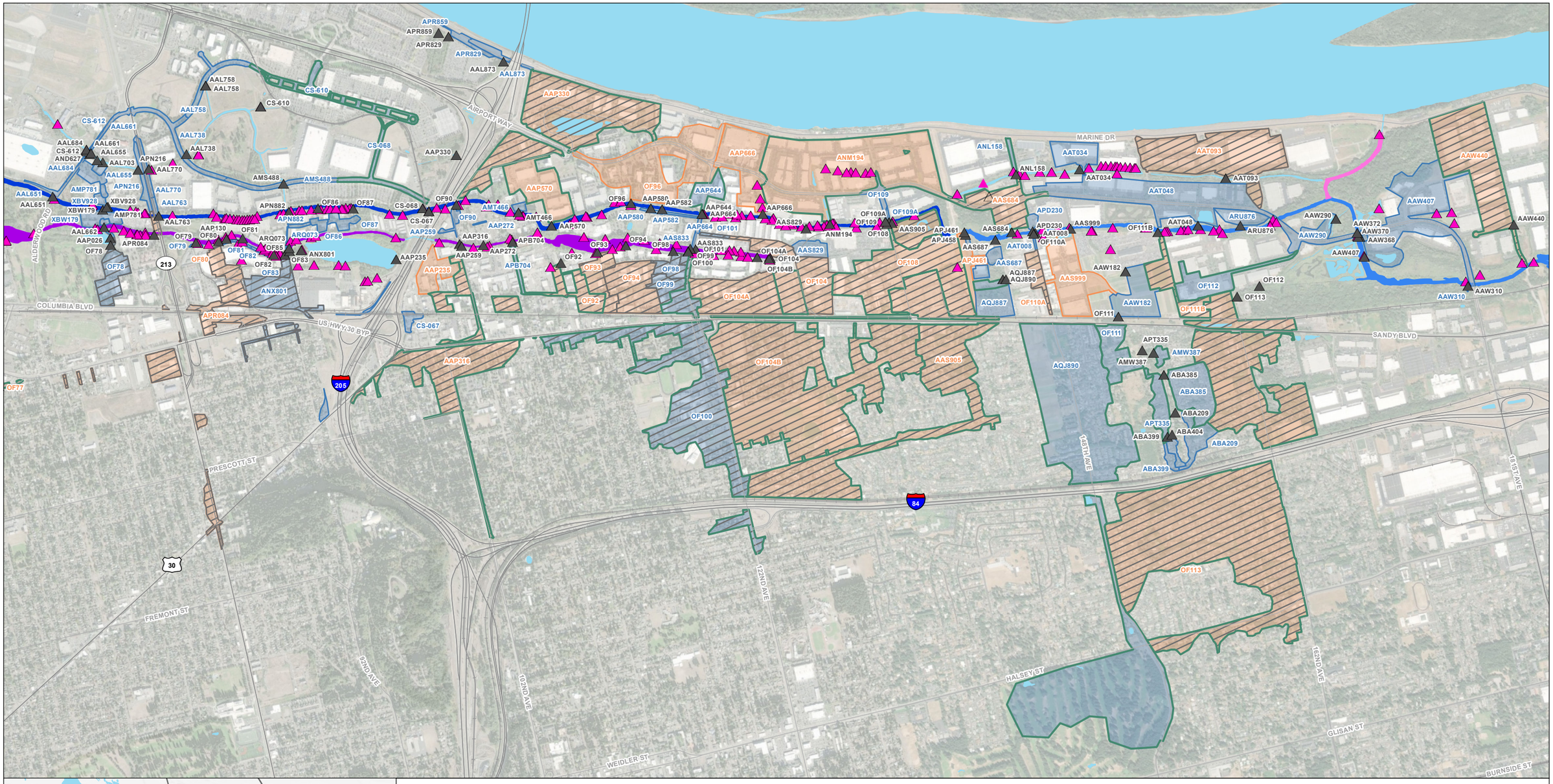

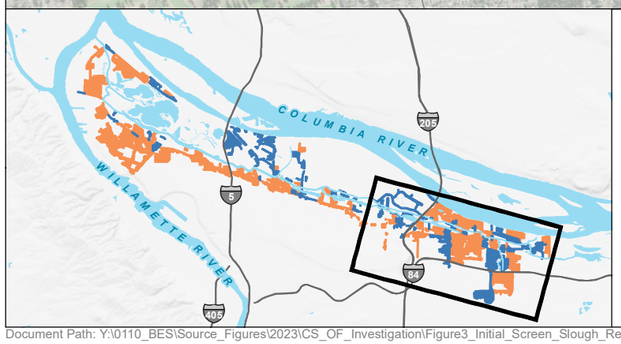

LEGEND

- Outfall, City
- Outfall, Non-City
- ROW Treatment
- Treated Basin
- Sampled Basin
- No Source Identified
- Known or Potential Source Present

Slough Reach

- Big Four Corners East Slough
- Middle Slough
- Upper Slough
- Whitaker Slough

All Other Features

- Railroad
- Major Road
- Watercourse
- Waterbody

NOTES

Basin names with asterisk are proposed for treatment

Treated Basin indicates current City installed stormwater water quality treatment of selected public rights-of-way.
Sampled Basin indicates stormwater or stormwater solids samples have been collected by the City within the stormwater outfall basin between FY2008 and FY2023.
No Source Identified indicates the stormwater outfall basin does not contain either DEQ ECSI site(s) or NPDES 1200z permitted site(s).
Known or Potential Source Present indicates stormwater outfall basin contains either DEQ ECSI site(s) and/or NPDES 1200z permitted site(s).
ROW Treatment indicates basins the City will construct in accordance with this Work Plan and the Consent Judgment.

FIGURE 3

City Stormwater Outfall Basin Overview - Middle to Upper Slough

Interim Columbia Slough Outfall Investigation and Basin Closure Work Plan

N

0 1,000 2,000 3,000
Feet

GSI Water Solutions, Inc.

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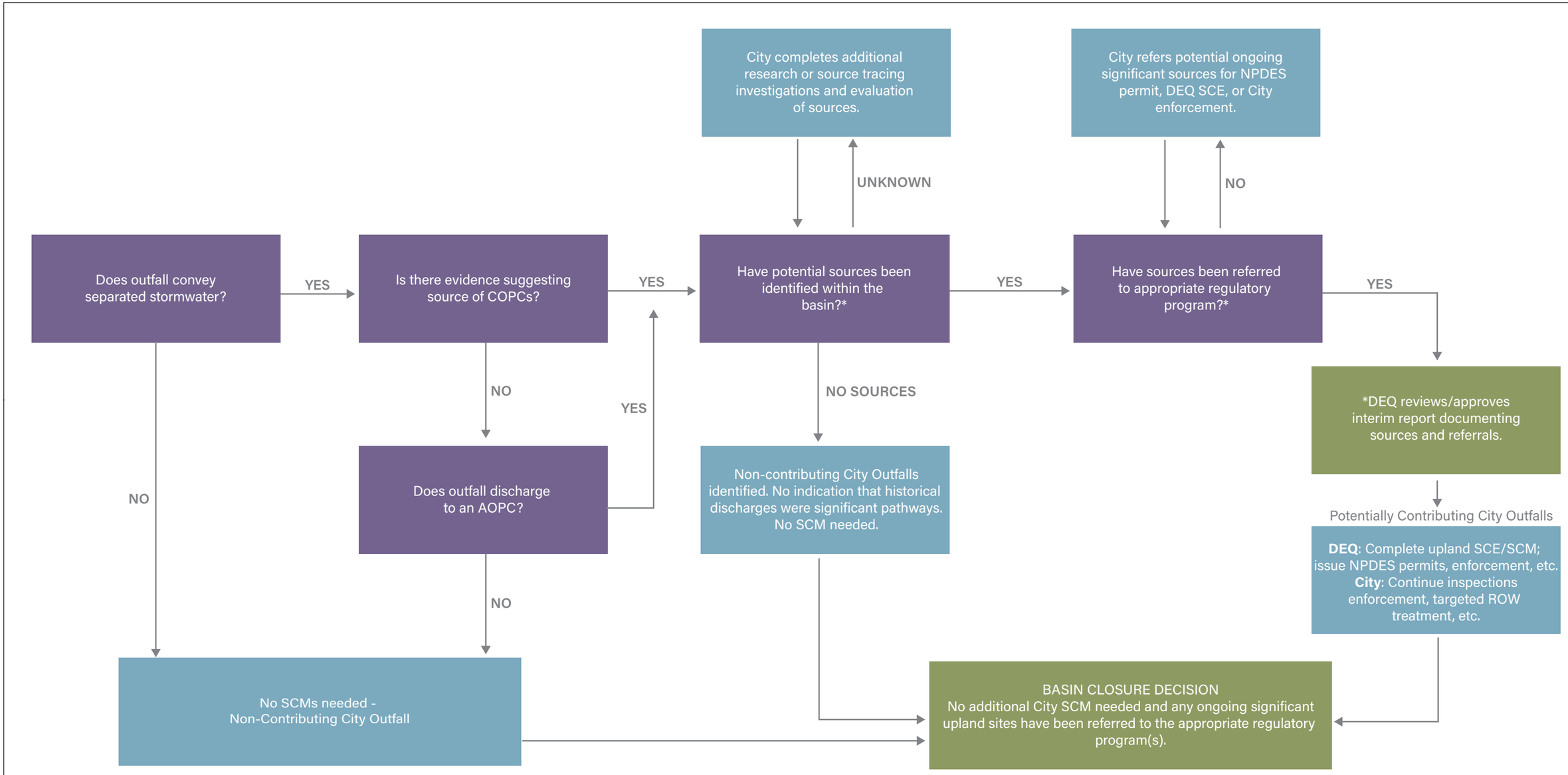

NOTE
*DEQ concurrence required to document source identification and referrals complete.

FIGURE 4

Decision Framework for Basin-Scale Weight-of-Evidence Closure

Columbia Slough Outfall Investigation and Basin Closure Work Plan

GSI Water Solutions, Inc.

Document Path: Y:\0110_BES\Figures\2023\Decision_Framework