Seattle Public Utilities | Protecting Seattle's Waterways

# Wastewater Collection System: 2020 Annual Report

March 24, 2021

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# List of Abbreviations

| Term | Definition |
|---|---|
| BMP | Best Management Practice |
| CMOM | Capacity, Management, Operations, and Maintenance |
| CSO | Combined Sewer Overflow |
| DOJ | U.S. Department of Justice |
| DNRP | King County Department of Natural Resources and Parks |
| DWO | Dry Weather Overflow |
| Ecology | Washington State Department of Ecology |
| EBI | King County Elliott Bay Interceptor |
| EPA | U.S. Environmental Protection Agency |
| FSE | Food Service Establishment |
| GSI | Green Stormwater Infrastructure (see also NDS, LID) |
| LID | Low Impact Development (see also NDS, GSI) |
| LTCP | Long-Term Control Plan |
| MG | million gallons |
| MGD | million gallons per day |
| NDS | Natural Drainage Systems (see also GSI, LID) |
| NPDES | National Pollutant Discharge Elimination System |
| PACP | Pipeline Assessment and Certification Program |
| Public Health | Public Health - Seattle & King County |
| RCM | Reliability Centered Maintenance |
| SCADA | Supervisory Control and Data Acquisition |
| SDOT | Seattle Department of Transportation |
| SOP | Standard Operating Procedure |
| SPU | Seattle Public Utilities |
| SSO | Sewer Overflow |

SECTION 1

# Introduction

This annual report was prepared to share information with the public on activities Seattle Public Utilities (SPU) is undertaking to improve its wastewater collection system and to meet state and federal regulatory requirements. The report includes updates on the Combined Sewer Overflow (CSO) Reduction Program and the Capacity, Management, Operations and Maintenance (CMOM) Program. The report is organized as follows:

- Section 1: Introduction
- Section 2: Planning Activities
- Section 3: Operation and Maintenance Activities
- Section 4: Capital Activities
- Section 5: Monitoring Programs and Results

Additional information is available at www.seattle.gov/cso.

## 1.1 The Wastewater Collection System

The City of Seattle's (City's) wastewater collection system is one of the largest in Washington State. It includes sanitary, combined, and partially separated combined sewers, as shown in Figure 1-1. In areas of the City served by sanitary sewers, stormwater runoff flows to a storm drainage system, and sewage is conveyed through City sewers to larger pipelines and treatment facilities owned and operated by King County Department of Natural Resources and Parks (DNRP). In areas of the City with combined sewers, stormwater runoff and sewage flow into the sewers and are conveyed to the DNRP facilities. In areas of the City served by partially separated combined sewers, storm drain separation projects were built during the 1960s and 1970s to divert street runoff to the storm drainage system; rooftop and other private property stormwater runoff and sewage continue to flow into the combined sewers.

During storm events, the amount of stormwater in the combined sewers sometimes exceeds the collection system's capacity. When this happens, the collection system overflows through structures designed for this purpose. These wet weather overflows are called Combined Sewer Overflows (CSOs), and the structures where these overflows can occur are called CSO outfalls. There are currently 82 CSO outfalls in SPU's wastewater collection system. As shown in Figure 1-2, the combined sewer basins they serve are located along Lake Washington, the Ship Canal, Puget Sound, Elliott Bay, the Duwamish River, and Longfellow Creek. The goal of SPU's CSO Reduction Program is to reduce the number of CSOs from these outfalls to an average of no more than one per outfall per year based on a 20-year moving average. DNRP owns and operates an additional 39 CSO outfalls in the City of Seattle and has a similar program to reduce CSOs.

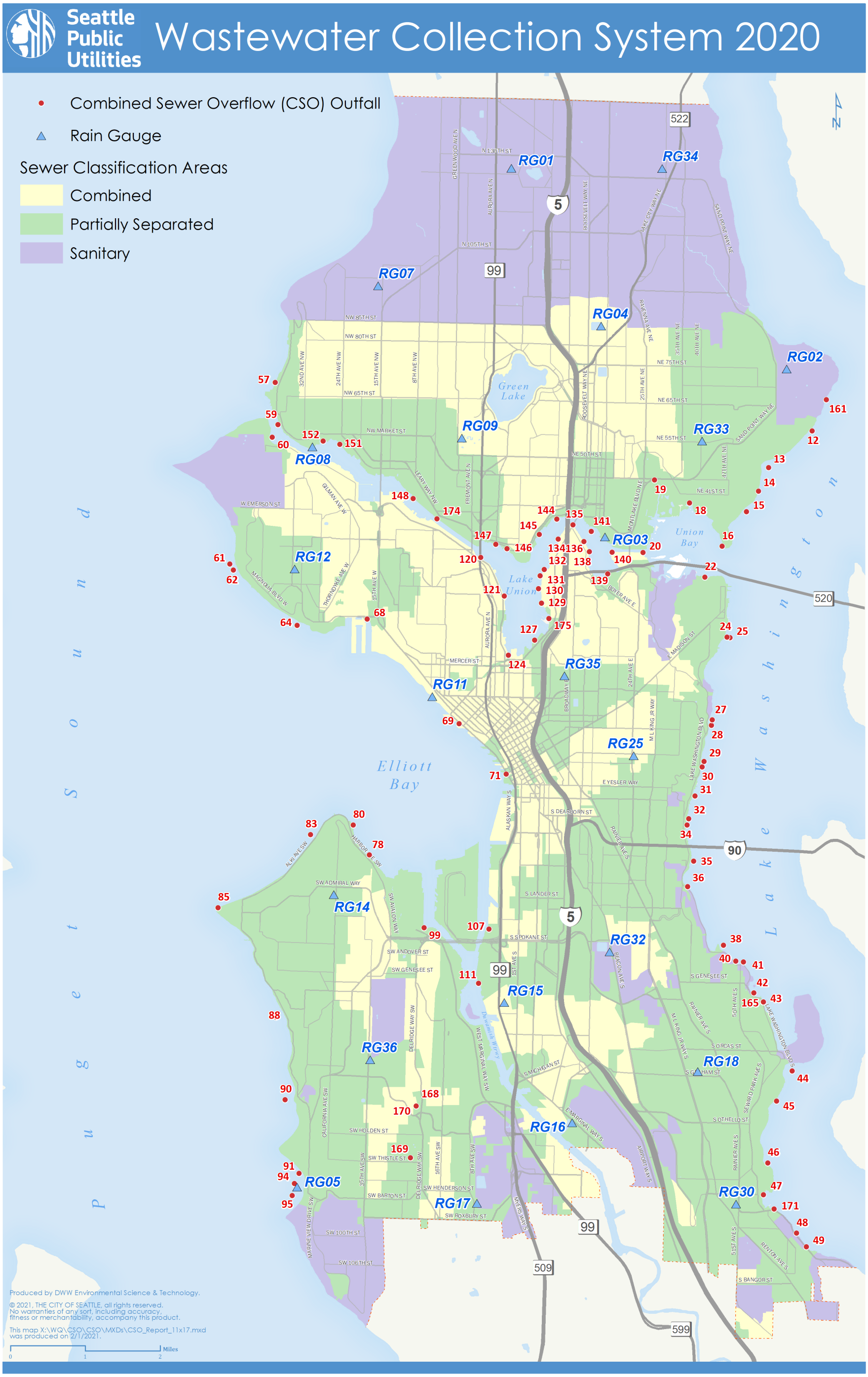



**Figure 1-1. City of Seattle Sewer Classification Areas**

# Seattle CSO Basins - 2020

CSO Outfalls by NPDES Permit Number

- SPU CSO Outfalls

CSO Basins

- SPU CSO Basins

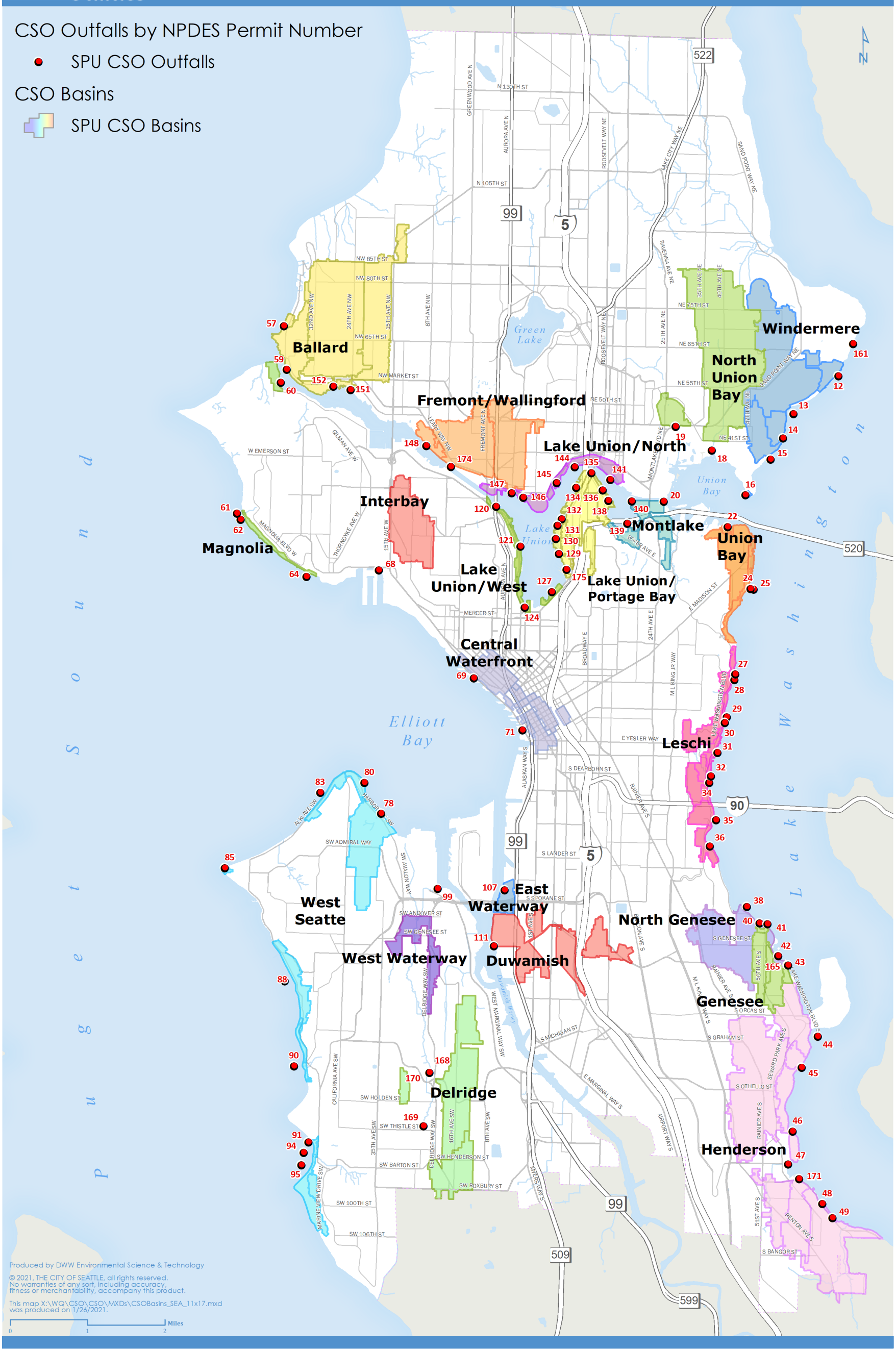



**Figure 1-2. City of Seattle Combined Sewer Basins**

## 1.2 Collection System NPDES Permit

The City's wastewater collection system is regulated by the Washington State Department of Ecology (Ecology), through a National Pollutant Discharge Elimination System (NPDES) Permit. Ecology first issued the City an NPDES Permit for CSO discharges in 1975. The permit has been reissued periodically (generally every 5 years), most recently as NPDES Permit WA0031682 issued on March 30, 2016, with an effective date of May 1, 2016. The permit was modified on September 28, 2017 and expires on April 30, 2021. SPU applied for permit renewal on August 31, 2020. Ecology reviewed the application and accepted it as complete on December 29, 2020.

The NPDES Permit:

- Authorizes CSOs at the 82 outfalls shown in Figures 1-1 and 1-2. Outfall 33, which formerly served the Leschi area and is not shown on these figures, was removed from CSO service on July 22, 2016. Outfalls 150 and 151, which formerly served the Ballard area, were replaced with a single rehabilitated Outfall 151 effective February 27, 2019. Outfall 150 is not shown on these figures. Outfalls 70 and 72, which formerly served the Central Waterfront area and are not shown on these figures, were removed from CSO service on April 24, 2020 and May 26, 2020, respectively.
- Requires that SPU limit the number of CSOs from each controlled outfall to an average of no more than one per outfall per year, based on a 20-year moving average.
- Includes a compliance schedule for CSO control projects and other activities that must be completed by the permit expiration date.
- Prohibits overflows from the CSO outfalls during dry weather. Regardless of their cause (mechanical failure, blockage, power outage, and/or human error), such overflows are called dry weather overflows (DWOs). Based on guidance from Ecology, if the volume of a wet weather overflow is increased because of a mechanical failure, blockage, power outage, and/or human error, the event is called an exacerbated CSO.
- Requires SPU to report DWOs and overflows that occur elsewhere in the collection system (called sewer overflows, abbreviated SSOs, and including basement backups and overflows from maintenance holes and other collection system structures) within specific timeframes.
- Required SPU to apply for permit renewal by October 30, 2020.

## 1.3 Collection System Consent Decree

The City also must meet the requirements of a Consent Decree with the United States Department of Justice (DOJ), United States Environmental Protection Agency (EPA), and Ecology (Civil Action No. 2:13-cv-678; July 3, 2013). The Consent Decree achieves the following:

- Resolved EPA's and Ecology's complaints that the City had violated the Clean Water Act and its collection system NPDES Permit.

- Sets a schedule for the City to come into compliance with state and federal requirements for controlling CSOs.
- Requires the City to implement a performance based adaptive management approach to system operation and maintenance (O&M), to prevent DWOs and reduce the number of SSOs and exacerbated CSOs.
- Requires the City to work with King County to jointly develop and implement a Joint Operations and System Optimization Plan.
- Requires the City to report annually on Consent Decree required activities.
- Establishes penalties for non-compliance.

On August 6, 2019, SPU submitted a letter to DOJ, EPA, and Ecology describing its interest in renegotiating the terms of the Consent Decree. King County also has a Consent Decree with DOJ, EPA, and Ecology (Civil Action No. 2:13-cv-677; July 3, 2013), and DNRP submitted a similar letter to EPA and Ecology on October 28, 2019. Confidential negotiations involving DOJ, EPA, Ecology, SPU and DNRP were initiated in January 2020.

## 1.4 Collection System Reporting Requirements

SPU's NPDES Permit requires submittal of the following types of reports:

- Monthly discharge monitoring reports. These document the volume, duration, precipitation, and storm duration for each CSO event and are due by the 28th of the following month.
- Reports of SSOs and DWOs. SPU must report any DWOs and certain types of SSOs (those that reach surface waters, the municipal storm system, or other areas with public access) immediately, by phone, to Ecology and Public Health – Seattle & King County (Public Health). Other SSOs must be reported to Ecology online or by phone within 24 hours. SPU must also file a written follow-up report within five days of each DWO or SSO, except those SSOs that are contained within buildings. SSOs that are contained within buildings are summarized quarterly in a spreadsheet.
- Engineering reports, plans, specifications, construction quality assurance plans, and post-construction monitoring plan reports. These are required for specific CSO reduction projects. Many of the due dates are specified in the permit.

Each of the 2020 monthly discharge monitoring reports was completed and submitted on time. All required engineering reports, plans, specifications, and construction quality assurance plans were submitted by their respective deadlines. All DWOs and almost all SSOs were reported by their respective deadlines, and all of the written follow-up reports were submitted on time.

In addition, both the NPDES Permit and the Consent Decree include annual reporting requirements. This report meets these annual reporting requirements. Table 1-1 lists the requirements and identifies where the information is provided.

| Table 1-1. 2020 Annual Reporting Requirements | | |
|---|---|---|
| **Source** | **Requirement** | **Report Location** |
| **NPDES Permit** | | |
| S4.B | Detail the past year's frequency and volume of combined sewage discharged from each CSO outfall | Table 5-4 |
| S4.B | For each CSO outfall, indicate whether the number and volume of overflows has increased over the baseline condition and, if so, propose a project and schedule to reduce the number and volume of overflows to baseline or below | Table 5-5, Section 5.3 |
| S4.B | Explain the previous year's CSO reduction accomplishments | Section 4 |
| S4.B | List the CSO reduction projects planned for the next year | Table 4-1, Section 4 |
| S4.B | Document compliance with the Nine Minimum Controls | Section 3.1 |
| S4.B | Include a summary of the number and volume of untreated discharge events per outfall | Table 5-6 |
| S4.B | Determine and list which outfalls are controlled (no more than one overflow per year on average), using up to 20 years of past and present data, modeling, and/or other reasonable methods | Table 5-8 |
| S4.B | Summarize all event-based reporting for all CSO discharges for the year | Tables 5-4, 5-6, 5-7 |
| **Consent Decree** | | |
| V.C.26 | Report the metrics regarding sewer overflow (SSO) performance included in Appendix D, Paragraph E (1-7):<br>a. SSO performance;<br>b. Number of miles of sewer that were cleaned, inspected, and repaired/replaced/rehabilitated;<br>c. Number of pump station inspections and the capacity of each pump station;<br>d. Number of maintenance holes and force mains inspected and repaired/replaced/rehabilitated;<br>e. Number and type of CSO regulators inspected;<br>f. Summaries of inspections and cleanings of each CSO control structure; and<br>g. Summaries of Fats Oil and Grease (FOG) inspections and enforcement actions taken the preceding year. | <br>a. Tables 3-3, 3-4, A-1<br>b. Table 3-1<br>c. Tables 3-1, A-2, A-3<br>d. Table 3-1<br>e. Table 3-1<br>f. Section 3.1.1<br>g. Section 3.3 |
| V.D.28 | Submit summaries of FOG inspections and enforcement actions taken during the previous year. | Section 3.3 |
| VII.43.a.i | Describe the status of any work plan or report development | Section 2 |
| VII.43.a.ii | Describe the status of any design and construction activities | Section 4 |

| Table 1-1. 2020 Annual Reporting Requirements | | |
|---|---|---|
| VII.43.a.iii | Describe the status of all Consent Decree compliance measures and specific reporting requirements for each program plan, including:<br>a. The CSO control measures for the Early Action CSO Control Program (Henderson Basins 44, 45, 46, and 47/171);<br>b. The Long-Term Control Plan;<br>c. The Post-Construction Monitoring Program Plan;<br>e. The CMOM Performance Program Plan;<br>e. The FOG Control Program Plan; and<br>f. The Joint Operations and System Optimization Plan between the City of Seattle and King County | a. Section 4.6.3<br>b. No changes<br>c. Sections 5.4 and 5.5<br>d. Section 3.2<br>e. Section 3.3<br>f. Section 2.1 |
| VII.43.a.iv | Provide the project costs incurred during the reporting period | Table 4-1 |
| VII.43.a.v | Describe any problems anticipated or encountered, along with the proposed or implemented solutions | Sections 3.1.5, 4.1.3, 4.3.1, 4.5, 4.6, and 5.3 |
| VII.43.a.vi | Describe the status of any wastewater collection system permit applications | Section 1.2 |
| VII.43.a.vii | Describe any wastewater collection system reports submitted to state or local agencies | Section 1.4 |
| VII.43.a.viii | Describe any anticipated or ongoing collection system O&M activities | Section 3 |
| VII.43.a.ix | Describe any remedial activities that will be performed in the upcoming year to comply with the Consent Decree | Sections 4.6 and 5.3 |
| VII.43.b | Describe any non-compliance with the requirements of the Consent Decree and include an explanation of the likely cause, the duration of the violation, and any remedial steps taken (or to be taken) to prevent or minimize the violation | Sections 4.3.1, 4.5, 4.6 and 5.3. |
| Appendix D, Paragraph E | Include the listed CMOM performance metrics. | Tables 3-1, 3-3, 3-4, A-1, A-2, and A-3, and Sections 3.1 and 3.3 |

SECTION 2

# Planning Activities

In 2020, SPU continued planning efforts to help ensure SPU meets Clean Water Act, NPDES Permit, and consent decree requirements in a way that is cost-effective, community centered, and provides the most value to our customers.

## 2.1 Joint City of Seattle/King County Operations and System Optimization Plan

The City of Seattle's and King County's Consent Decrees direct both agencies to work together to develop a Joint Operations and System Optimization Plan (Joint Plan) and to review the Joint Plan every three years and update it as necessary. In developing the original Joint Plan (submitted to EPA and Ecology in February 2016), DNRP and SPU staff focused on areas in the system that have the greatest potential for operational optimization and developed a set of multi-basin joint commitments. These commitments were reviewed, updated, approved by SPU's Drainage and Wastewater Line of Business Branch Executive and DNRP's Wastewater Treatment Division Director, and included in the Joint Plan Update submitted to EPA and Ecology in January 2019.

In 2020, Joint Operational activities were partially curtailed due to restrictions enacted in response to the COVID-19 pandemic. The following describes each commitment and the progress made in 2020:

- The Joint System Event Debrief Committee commitment includes preparing for the wet season and debriefing after major storm events to exchange information, reviewing and updating emergency communication protocols between the agencies, discussing meteorological data, evaluating CSO performance, and assessing operational decision impacts on the combined system. To coordinate for the 2020/2021 wet season, a meeting was held in October 2020 to discuss pre-season maintenance activities, system changes, meteorological information, and emergency communication protocols.
- The Data Sharing commitment includes supporting a Joint Operations Information Sharing Team (JOIST), implementing a pilot project for sharing real-time SCADA data, developing data sharing protocols, and improving the regional ability to forecast storms and rainfall intensities.
    - JOIST held one meeting during which SPU and DNRP staff shared information on the operation of existing facilities, progress of capital projects, and coordination of Joint Plan commitments. Other 2020 meetings were cancelled due to COVID-19 restrictions.
    - SPU and DNRP held two workshops in June as part of the annual process to review flow monitoring data collected by each agency and provide recommendations for future monitoring.
    - SPU and DNRP held a series of workshops in the Fall to determine the scope and schedule of the upgraded real-time data sharing platform.

- The Joint Modeling Coordination Committee commitment includes sharing modeling tools and increasing understanding of modeling analyses and system operations while developing stronger working relationships between DNRP and SPU modeling staff and improving efficiencies through better coordination efforts. Members of the Joint Modeling Coordination Committee held meetings in 2020 to review modeling results and coordinate model developments between each agency. Work activity continued to focus on development and application of the MIKE URBAN model of the North Interceptor system incorporating the planned joint Ship Canal Water Quality Project Facility. In addition, King County shared information about development of the West Core model for downtown Seattle, North Queen Anne, and North Magnolia. The joint modeling work plan, initially developed in 2018, was updated to reflect current and future work. This plan will continue to provide a framework for coordination and communication for upcoming modeling work.
- The Coordination during Startup and Commissioning of CSO Control Facilities commitment includes conducting document review, attending commissioning meetings, and implementing data sharing for SPU and DNRP CSO control facilities. In 2020, SPU commissioned the Portage Bay (Basin 138) sewer system improvement project and provided an overview to DNRP during a JOIST meeting.
- The Real Time CSO Notification commitment includes revising both agencies' onsite signs and website information to improve notification of CSO events and communication with customers. In 2019 SPU and DNRP finished an updated design for signs identifying CSO outfalls. The design includes the website address to obtain CSO status, multiple languages, a larger size for visibility, and a new phone number directed to SPU's Operations Response Center, which serves as a single point of contact for both SPU and DNRP CSO outfalls located in the City of Seattle. Installation of the signs at DNRP CSO outfalls was completed in 2019. Installation of the signs at SPU's CSO outfalls was delayed due to O&M staffing reductions resulting from the COVID-19 pandemic and will be completed in 2021 .
- The Reduce Saltwater Intrusion commitment involves continuing to work together on studies, data, and solutions for reducing intrusion. In 2020, DNRP  monitored over 33 locations with sondes, drafted a new monitoring and modeling plan, tested and purchased monitoring equipment to measure salinity levels continuously, and developed a GIS tool to track salinity measurements in the conveyance system.

## 2.2 Shape Our Water Plan

SPU's Drainage and Wastewater (DWW) Line of Business is developing Shape Our Water, a 50-year plan for Seattle's water resilience (formerly known as the Integrated System Plan). The purpose of Shape Our Water is to plan future infrastructure investments that improve water quality while providing the greatest community value. The effort will integrate planning across drainage and wastewater systems, emphasize engagement, and focus on leveraging effective partnerships to meet Seattle's infrastructure and receiving water body challenges. Additional information on the intent of this planning process, including SPU's base responsibilities and commitments, is included in a Statement of Intent at www.shapeourwater.org.

The Shape Our Water Plan is made up of four interrelated stages, described below and shown graphically in Figure 2-1:

- ***Analysis:*** In the data collection and analysis stage, we are identifying drainage and wastewater system and receiving water body challenges and opportunities and prioritizing the challenges based on risk. Three major comprehensive analysis projects were included in this stage: the Wastewater System Analysis, which was completed in 2019; the Drainage System Analysis, which was completed in 2020; and a drainage and wastewater system seismic risk assessment, which will be complete in mid-2021.
- ***Visioning:*** In the visioning stage, we will set the vision, goals, and objectives for the Shape Our Water plan. The vision will be developed through collaboration with our community, City departments, and partner agencies and organizations. In 2020, SPU redesigned our engagement approach in response to COVID-19 related restrictions and shifts in community priorities. Engagement was launched in late 2020 and the vision will be developed and documented in 2021 (for more information, visit www.shapeourwater.org).
- ***Planning:*** The planning stage will identify and sequence near- and long-term investment in the partnerships, programs and projects that will improve receiving water quality and the performance and resilience of our drainage and wastewater systems while optimizing social and environmental benefits for the City. SPU also launched the planning stage in 2020 and anticipates substantial completion in 2023.
- ***Implementation:*** The implementation stage will begin in 2023 when the plan is complete. In order to stay accountable to stakeholders, SPU will monitor and adaptively manage implementation, tracking against identified measures of success. While Shape Our Water is being developed, SPU is also piloting near-term integrated projects in Seattle's neighborhoods. This is an opportunity for SPU and our partners to explore innovative approaches and learn as we develop the plan.

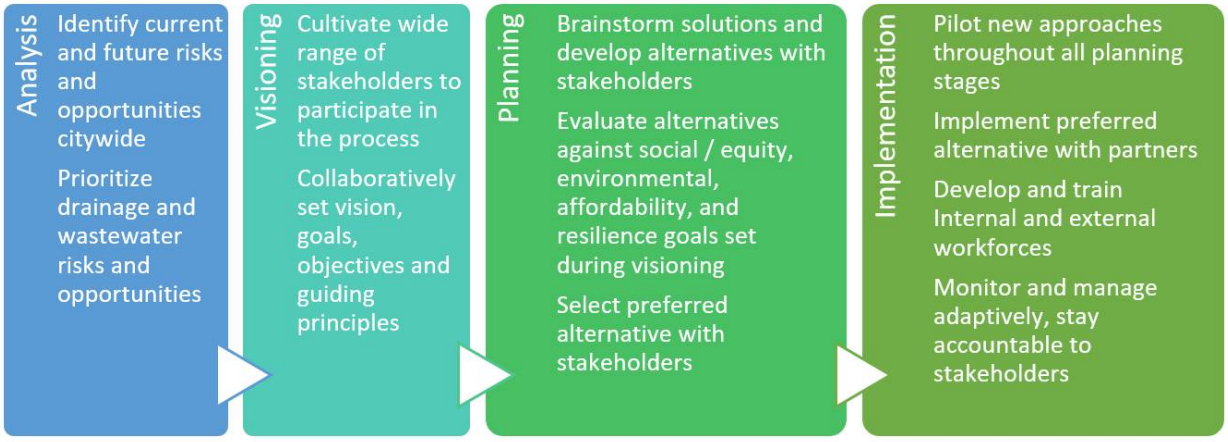



**Figure 2-1. Shape Our Water Planning Process**

## 2.3 CSO Reduction Plan Amendment

SPU's NPDES Permit required submittal of an amendment to the 2015 Plan to Protect Seattle's Waterways by October 30, 2020. The purpose of the update is to summarize CSO reduction projects completed in the five year period from 2015 to 2020, provide an assessment of the control status of all CSO outfalls, document any changes and updates from this period, and list the projects that SPU intends to construct in the next 5-year permit term. SPU submitted the 2020 CSO Reduction Plan Amendment to Ecology on October 19, 2020.

## 2.4 Outfall Rehabilitation Plan

SPU's NPDES Permit also required submittal of an outfall rehabilitation plan by October 30, 2020, describing outfalls to be repaired or replaced during the next permit cycle. Also in the plan, SPU was required to include a desktop evaluation of its CSO outfalls to determine the current number of discharge points from the collection system and to identify any outfalls that share a hydraulic connection to a common control structure. The 2021-2026 Outfall Rehabilitation Plan was submitted to Ecology on October 26, 2020. The Plan recommended cleaning eight outfalls (Outfalls 13, 25, 38, 40, 41, 43, 139, and 140 ), lining one outfall (Outfall 169), and cleaning and sliplining one outfall (Outfall 59) during the next permit cycle.

SECTION 3

# Operation & Maintenance Activities

This section describes the operation and maintenance (O&M) activities SPU undertakes to reduce the number and volume of sewer overflows, dry weather overflows (DWOs), and combined system overflows (CSOs).

## 3.1 Nine Minimum Control Activities

The Federal CSO Control Policy requires municipalities with combined sewer systems to implement nine measures that help reduce the number and volume of sewage overflows without extensive engineering studies or significant construction costs. The following paragraphs describe the work that was performed in 2020 on each of these nine control measures.

### 3.1.1 Control 1: Provide System Operations & Maintenance (O&M)

*Reduce the magnitude, frequency, and duration of CSOs through proper operation and maintenance (O&M) of the combined sewer system.*

Each year SPU performs extensive system O&M activities to reduce the frequency and volume of preventable overflows. Routine maintenance activities include sewer inspections, cleaning, and non-emergency point repairs; catch basin inspection, cleaning, and repairs; control structure and storage structure cleaning; valve and flap gate inspection, cleaning, lubricating, and servicing; and pump station electrical, mechanical, and facilities inspection and servicing.

SPU uses the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) defect coding system to identify and prioritize pipes to be scheduled for maintenance or rehabilitation. Once a sewer has been identified as having a maintenance-related problem, the sewer is placed on a routine cleaning schedule to prevent future overflows. The initial cleaning frequency is based on the cause of the initial overflow, and the cleaning frequency is increased or decreased over time as appropriate. Corrective activities include:

- Jetting, for light to medium debris;
- Hydrocutting, for roots and/or grease;
- Rodding, for pipes with an active blockage; and
- Chemical root treatment, when roots are present and no grease.

SPU's preventive sewer maintenance frequencies range from once a month to once every ten years. The challenge for sewer utilities is to clean sewers as frequently as necessary to maintain system capacity but no more than necessary, as cleaning sewers shortens the sewer's functional life span.

SPU inspects each of its 93 CSO control structures upstream of its 82 CSO outfalls. The control structures are inspected one to four times per year. During these inspections, crews make observations about flow, water level, sediment, debris, signs of infiltration, structural integrity, and whether the structure is operating as intended. Those observations lead to recommendations for cleaning, repair, and rehabilitation. The crews also perform any needed cleaning and make any necessary repairs. The 2020 inspections showed that the structures were generally in good working condition and did not require any extensive repair.

Pump station electrical and mechanical components are replaced as necessary during pump station maintenance. Since 2008 SPU has used Reliability Centered Maintenance (RCM) at its wastewater pump stations. The objective of RCM is to help ensure the right maintenance is performed at the right intervals, which in turn optimizes life cycle costs while increasing system reliability. In addition, RCM helps ensure the right data is collected and evaluated, adding discipline to decision-making around operations, spare parts inventory, maintenance strategies, and data collection. SPU continues to use, evaluate, and adjust its RCM-based strategies.

SPU's 2020 O&M accomplishments are summarized in Table 3-1. This year's accomplishments were impacted by the COVID-19 pandemic, primarily because high-risk staff were not in the workforce for approximately eight months of the year. Staffing levels were close to normal in November and December 2020.

### 3.1.2 Control 2: Maximize Storage of Flows

*Maximize the use of the collection system for wastewater storage, in order to reduce the magnitude, frequency, and duration of CSOs.*

SPU maximizes storage in its collection system through a multi-faceted approach that includes:

- Regular collection system maintenance, so that existing capacity is available during storm events;
- Ongoing monitoring and evaluation of storage use during storms;
- Modification of storage facilities whose existing capacity is not fully utilized;
- Increasing the height of overflow weirs, when doing so increases collection system storage capacity without creating backups; and
- Eliminating excessive inflow and infiltration.

In 2020, SPU continued to design and construct sewer system improvements to better utilize existing sewer system capacity. Work on these improvements is described in Section 4.1. SPU is also working to optimize the operation of recently constructed storage facilities, as described in Section 4.6.

| Table 3-1. 2020 O&M Accomplishments | |
|---|---|
| **Activity** | **Quantity** |
| Miles of mainline pipe cleaned | 208 |
| Miles of mainline pipe inspected via CCTV | 203 |
| Miles of mainline pipe repaired/replaced/rehabilitated | 1.9 |
| Number of pump station inspections [1] | 1,643 |
| Number of maintenance holes inspected | 190 |
| Number of force mains visually inspected | 68 |
| Number of force mains inspected using CCTV | 3 |
| Number of force mains repaired/replaced/rehabilitated | 2 |
| Number of CSO structure inspections | 129 |
| Number of CSO structure cleanings | 326 |
| Number of CSO HydroBrake inspections | 84 |
| Number of CSO HydroBrake cleanings | 21 |
| Linear feet of pipe receiving chemical treatment to inhibit root growth | 127,697 |
| Number of catch basins inspected | 13,191 |
| Number of catch basins cleaned | 1,877 |
| Number of catch basins repaired | 18 |
| Number of catch basins replaced | 0 |
| Number of catch basin traps replaced | 55 |

*1. See Tables A-2 and A-3 for pump station capacity and inspection details.*

### 3.1.3 Control 3: Control Nondomestic Sources

*Implement selected CSO controls to minimize CSO impacts resulting from nondomestic discharges.*

Two important programs help control nondomestic discharges into the Seattle sewer system: the Fats, Oils, and Grease (FOG) Control Program and the Industrial Pretreatment Program.

SPU Wastewater Source Control Section administers the City's FOG Control Program. This program enforces Seattle Municipal Code requirements related to prohibited discharges and pretreatment of FOG-laden wastewater before its discharge to the City sewer system. FOG creates problems in the sewer system when it reacts with calcium in the wastewater to form hardened, soap-like deposits. As shown in Figure 3-1, the deposits adhere to the inside of sewer pipes, reducing sewer capacity and eventually causing blockages and sewer overflows. SPU enforces the FOG pretreatment code requirement through a FOG education, inspection, and enforcement program focused on commercial and institutional kitchen facilities and other nondomestic sources. FOG control inspection and enforcement activities conducted in 2020 and work planned in 2021 are summarized in Section 3.3.


**Figure 3-1. FOG Deposits in Sanitary Sewer Mainline – Pike Place Market Area**

The Industrial Pretreatment Program is administered by King County Wastewater Treatment Division – Industrial Wastewater Program (KCIW). KCIW issues industrial waste pretreatment permits that include appropriate discharge limits and conducts regular site inspections and periodic permit reviews. SPU reviews these permits and CCTV tapes of the sewers to which these industries discharge to assess impacts to the collection system. SPU refers industrial discharges that have negatively impacted the collection system to KCIW for potential enforcement and/or permit modification.

### 3.1.4 Control 4: Deliver Flows to the Treatment Plant

*Operate the collection system to maximize flows to the treatment plant, within the treatment plant's capacity.*

SPU maximizes flow to the treatment plant by implementing the measures described in Controls 1 and 2 and by providing ongoing system performance monitoring and analysis.

SPU's Control Center is staffed 24 hours a day and receives real-time Supervisory Control & Data Acquisition (SCADA) information. Control Center staff respond to any alarms at the pump stations that indicate a drop in performance or other problem. In addition, SPU monitors pump station, overflow structure, and outfall flow data as it is collected and uses the data to detect maintenance issues that may be affecting system performance.

In 2020, SPU completed rehabilitation projects at Wastewater Pump Stations 72 and 73 on Harbor Island and sewer system improvement projects in Magnolia (Basin 60), Portage Bay (Basin 138) and Montlake (Basin 140) and began construction of a sewer system improvement project in East Montlake (Basin 20).

Each of the sewer system improvement projects is described in Section 4.1 of this report. Each is expected to decrease the frequency and volume of CSOs and maximize flows to the treatment plant.

Following construction completion of any facility that includes operable equipment, SPU completes a stabilization phase. Stabilization includes monitoring and analysis to ensure the facility is functioning as intended. SPU began the stabilization phase for the completed Delridge (Basin 99) sewer system improvement project in 2019 and began the stabilization phase for the completed Magnolia (Basin 60) and Portage Bay (Basin 138) sewer system improvement projects in 2020. Stabilization of these facilities is expected to be complete in 2021.

In 2021, SPU expects to complete construction and begin stabilization of the sewer system improvement project in East Montlake (Basin 20). SPU also expects to begin rehabilitating Wastewater Pump Stations 17 (Beacon Hill), 118 (Northgate), and 38 (West Seattle).

### 3.1.5 Control 5: Prevent Dry Weather Overflows

*Prevent dry weather overflows; they are not authorized. Report any dry weather overflows within 24 hours and take prompt corrective action.*

To help prevent DWOs and exacerbated CSOs, each combined sewer system overflow location is configured with an alarm that is triggered if there is a likely overflow condition. The alarm alerts analysts and/or field crews to assess the situation and take corrective action if possible. In addition, whenever SPU experiences a DWO or exacerbated CSO, SPU investigates to identify the cause and takes action to reduce the possibility of recurrence.

There was one DWO in 2020. On February 12, 2020 at 9:26 PM, 1,892 gallons of sewage overflowed from Outfall 121 to Lake Union due to a power outage at Wastewater Pump Station 60. SPU used a portable generator to restore power to the pump station, notified Ecology and Public Health – Seattle and King County, posted warning signs near the outfall, and test the water quality daily until the results confirmed there was a low risk of public health exposure. To prevent reoccurrence, SPU is refining the power outage response protocols.

There were two exacerbated CSOs in 2020, as follows:

1. Construction of the Portage Bay Sewer System Improvement Project (Basin 138) included rehabilitation and temporary bypassing of Pump Station 20 (PS 20). During the rain event on May 21, the PS 20 bypass system provided greater capacity than the previously existing PS 20 pumps, but received higher than normal peak flows due to upstream replacement of the basin's HydroBrake with an automated sluice gate that was not yet operational. The total CSO volume was 10,808 gallons.
2. During a rain event on November 14, the CSO at Outfall 46 was exacerbated by a programming malfunction at Pump Station 9. Overflow monitoring data was unreliable due to a faulty sensor; overflow volumes were estimated using PS 9 wet well data. The estimated total CSO volume was 220,000 gallons.

In addition, an exacerbated sewer overflow occurred at Outfall 145. The overflow began during the intense December 21 storm event when debris and grease blocked the inflow pipe to Wastewater Pump Station 57. At the time, CSO monitoring for Outfall 145 focused on SCADA monitoring of the PS 57 wet well. Because this overflow occurred upstream of the pump station, the overflow went undetected for approximately 30 days, during which time there were periods of rain and periods of dry weather. Approximately 200,000 to 500,000 gallons overflowed from Outfall 145. SPU has since installed flow monitoring at the Outfall 145 overflow structure to prevent this type of overflow from going unnoticed.

A summary of the DWOs, exacerbated CSOs, and exacerbated sewer overflows from 2015-2020 is included in Table 3-2.

**Table 3-2. Dry Weather Overflows (DWOs) and Combined Sewer Overflows (CSOs) and Sewer Overflows Exacerbated by System Maintenance Issues 2015 – 2020**

| Year | DWOs[1] | | CSOs and Sewer Overflows Exacerbated by System Maintenance Issues[1] | |
|---|---|---|---|---|
| | No. of Overflows | Volume (gallons) | No. of Overflows | Volume (gallons) |
| 2015 | 3[2] | 77,598 | 3 | 10,825 |
| 2016 | 2 | 113,349 | 6 | 2,061,875 |
| 2017 | 0 | 0 | 8 | 465,938 |
| 2018 | 0 | 0 | 4 | 591,114 |
| 2019 | 3[2] | 52,205 | 2 | 197,886 |
| 2020 | 1 | 1,892 | 3[3] | 730,808 |

1. *DWOs and 'exacerbated CSOs' are included in the table listing all 2020 overflows (Table 5-4). Exacerbated CSOs are also included in the table comparing 2020 CSOs with 2010 baseline (Table 5-5), the tables comparing 2015-2019 discharges (Tables 5-6 and 5-7). and the table assessing whether outfalls meet the CSO performance standard (Table 5-8). Exacerbated Sewer Overflows are not included in Tables 4-5 through 5-8.*
2. *One of these DWOs was caused by a non-City entity.*
3. *One of these events (approximately 250,000-500,000 gallons, conservatively listed as 500,000 gallons in Table 3-2) was an Exacerbated Sewer Overflow.*

### 3.1.6 Control 6: Control Solids and Floatable Materials

*Implement measures to control solid and floatable materials in CSOs.*

SPU implements several measures to control floatables, as summarized in the following paragraphs.

Catch basins are designed to prevent floatables from entering the system. Specifically, SPU's catch basins are designed to overflow only when the water level in the catch basin is well above the overflow pipe opening. Because floatables remain on the water surface, they are trapped in the catch basins. Catch basins are inspected and cleaned regularly to remove debris and potential floatables. Catch basin inspection, cleaning, and rehabilitation metrics are included in Table 3-1.

In 2020, SPU continued its Protect Your Pipes: Flush Only Toilet Paper pilot outreach campaign to educate customers that only toilet paper and human waste should be flushed down the toilet. Following up on the initial 2018 research to look at potential audiences and the 2019 targeted outreach pilot campaign focused on University of Washington students, SPU conducted follow-up focus groups late in 2019 to research what might be more effective in eliciting behavior change. Using the results of those focus groups, and working with community partners that include the University of Washington, Seattle University, Seattle Pacific University, and Seattle Housing Authority, SPU developed new graphics and an animated social media video. SPU is currently conducting focus groups and a survey to test the effectiveness of these new materials. In addition, SPU ran a social media ad campaign in late Summer 2020 featuring the new social media video, which received more than 18,600 views on YouTube.

In response to the large uptick in the purchase of wet wipes during the COVID-19 pandemic, SPU developed shelf talkers for grocers and other retailers who sell wet wipes and other commonly flushed products like paper towels. As of November 30, SPU mailed 164 stall signs to 61 businesses in sewer clog hotspot areas, and 328 shelf talkers and 202 stall signs to 58 grocers. SPU also translated the shelf talker and stall sign into Spanish and Chinese.

Also in response to increased flushing of items like wipes and paper towels, in March through May SPU staff contacted property managers of multi-family buildings in hot spot areas prone to sewer backups. SPU emailed outreach materials to property managers of 83 buildings, representing about 9,400 residents. SPU also created and distributed a virtual informational quiz for multi-family residents to reinforce this messaging. Since wipes and other non-flushable items catch on roots, in Fall 2020 SPU staff began another round of outreach to more than 600 multi-family building property managers in high root risk areas.

SPU worked together with other utilities on the first successful state wipes legislation. The bill that was signed into law in March requires the do not flush symbol on non-flushable wipes.

In addition, the City of Seattle runs several solid waste and city cleanup programs to prevent and reduce the amount of street litter, including:

- Street sweeping, including increased efforts for Fall leaf pickup,
- Spring clean,
- Storm drain stenciling,
- Event recycling,
- Public litter and recycling cans,
- Waste free holidays,
- Product bans, and
- Illegal dumping investigation and response.

### 3.1.7 Control 7: Prevent Pollution

*Implement a pollution prevention program focused on reducing the impact of CSOs on receiving waters.*

***Source Control Pollution Prevention Program***

SPU has a fully developed source control program that has been in place since the early 2000's. The program is authorized by the City of Seattle Stormwater Code and Side Sewer Code. The program implements the following source control actions in the City's combined sewer basins:

- Spill Response: SPU performs spill response activities city-wide using a 24 hour per day, 7 day per week call out system. SPU Spill Responders respond to the site, assess the impact and procure resources to mitigate or clean up the spill.
- Water Quality Complaint Investigations: SPU responds to water quality complaints city wide. This program provides outreach and education on proper Best Management Practices (BMPs) to residents and businesses within the City.
- Business Inspections: SPU conducts business inspections to assess how businesses are implementing proper BMPs based on their onsite activities. SPU conducts these inspections in combined sewer basins as resources allow.
- Stormwater Facility Inspections: SPU conducts maintenance inspections of privately-owned stormwater facilities to assess how property owners are maintaining their drainage systems. SPU conducts these inspections in combined sewer basins as resources allow.

***Public Education***

In 2020, SPU completed an assessment of our Drainage and Wastewater focused education and outreach programs. The assessment compared our programs to those of similar cities and looked for opportunities to strengthen our work. Programs covered in the assessment include storm drain stenciling, K-12 youth education, sustainable landscapes, pet waste disposal, and automotive leak prevention. Following recommendations from the assessment, SPU will be re-launching an invigorated Adopt-a-Drain program in 2021. Other SPU public education programs include spring clean, green cleaning, adopt-a-street, surface water pollution report line, event recycling, and reduce, reuse, and recycle tips. Additionally, SPU works with other City departments on Trees for Seattle, promoting residential tree planting, and with King County on promoting green stormwater infrastructure. SPU's Wastewater Education program includes side sewer maintenance, proper disposal of cooking oil and what not to flush, described in more detail in Sections 3.1.3 and 3.1.6.

***Street Sweeping***

Street Sweeping continued in 2020 to reduce the amount of pollutants entering the sewer system. The Seattle Department of Transportation (SDOT) performs street sweeping, including street sweeping downtown streets every night and cleaning alleys three nights per week. In 2020, SDOT street sweeping crews swept 8,252 miles in the SPU combined sewer area.

### *Illegal Dumping*

The City has made it easier for anyone to report illegal dumping and other issues via the Find It, Fix it app available for mobile phones. In 2020, SPU received 26,229 illegal dumping complaints from customers. More than 2,556,150 pounds of debris were removed from Seattle's public property. 99.5 percent of complaints were addressed in 10 days or less. Thanks to new ways of using technology, customer engagement, and process improvements, SPU reduced the average time for removing illegally dumped materials from 21 days in 2015 to under 10 days in 2020.

### *Other Pollution Prevention Programs*

- Clean City Program: SPU's Clean City Program invests $4 million/year into new and existing programs to clean up litter and garbage across the city. The program pulls together and expands efforts from SPU in concert with Seattle Parks and Recreation and Seattle Department of Transportation. These departments work together to service litter collection routes; provide parks and neighborhoods maintenance and trash, debris, and needle collection; and provide trash pick-up from encampments and RVs.
- RV Pumpout Program: In response to the growing number of wastewater spills from RVs, SPU began a pilot RV Pumpout Program in 2020, taking a pump truck out to RVs and pumping out the RV sewage tanks if the RV occupants want them pumped. In the first half of 2020 the number of illegal sewage spills from RVs was cut in half.

### *Legal Authority and Administrative Procedures Used for Program Implementation*

The following City of Seattle codes provide authority to implement the pollution prevention program in the City's combined sewer basins:

- The Side Sewer Code (SMC 21.16) regulates side sewers and, for example, prohibits discharge of certain materials; requires repair of inoperative or inadequate sewers, drains, or natural watercourses; and regulates the construction, alteration, repair, and connection of side sewers and service drains. The Side Sewer Code was last substantially amended in 2010, signed by the Mayor on December 20, 2010, and effective on January 5, 2011.
- The Stormwater Code (SMC 22.800-22.808) provides the City with the legal authority to address discharges to the combined sewer system owned and operated by Seattle Public Utilities (SMC 22.800.030.C). The Stormwater Code was effective January 1, 2016. The Stormwater Code is currently being updated and it's anticipated that the updated version will become effective in July of 2021.

***Appropriate BMPs***

BMPs to be used at businesses and properties are described in the City of Seattle Stormwater Manual, Volume 4: Source Control. The Manual details BMPs that the Stormwater Code requires city-wide and that are appropriate pollution prevention steps in combined sewer basins. The following BMPs from the City of Seattle Directors' Rules SDCI 17-2017/DWW200, Volume 4: Source Control are appropriate for preventing pollution in combined sewer overflow basins:

- BMP1: Eliminate Illicit Connections - All properties are required to examine their systems and obtain permits and eliminate illicit connections if found.
- BMP2: Perform Routine Maintenance - All properties are required to (a) conduct annual inspections of all conveyance, catch basin, detention and treatment systems and (b) maintain the systems per thresholds described in Appendix G of the Directors' Rule. Solids and polluted water removed from these systems must be properly disposed.
- BMP 3: Dispose of Fluids and Wastes Properly - All properties must properly dispose of solid and liquid wastes and contaminated stormwater and sediment.
- BMP 4: Proper Storage of Solid Wastes - All properties are required to implement proper solid waste storage and disposal practices.
- BMP 5: Spill Prevention and Cleanup - Businesses and real properties that load, unload, store, or manage liquids or erodible materials (e.g., stockpiles) must maintain spill plans, equipment and practices to prevent and clean spills, and must follow notification procedures for spills to the drainage and sewer systems.
- BMP 6: Provide Oversight and Training for Staff - Businesses and public entities that have activities requiring BMPs are required to have trained personnel for their implementation.
- BMP 7: Site Maintenance - Businesses and public entities that involve materials or wastes that may come into contact with stormwater are required to implement proper housekeeping practices to minimize discharge of contaminants. Such practices include inspections, avoidance measures (containment, covering, or locating activities away from drainage systems), and sweeping and cleaning procedures.

***Future Actions***

The City is in the process of updating the Stormwater Code to meet the requirements of the 2019 NPDES Phase I Stormwater Permit, and it's anticipated that the update will be effective in July 2021. As part of this update, SPU intends to evaluate possible revisions to SMC 22.800.040.A.4 to require installation of source control BMPs during site development if the site discharges to a combined sewer in one of the City's combined sewer basins.

### 3.1.8 Control 8: Notify the Public

*Implement a public notification process to inform the citizens of when and where CSOs occur.*

SPU, together with Public Health - Seattle & King County, maintains a sewage overflow notification and posting program for Seattle's CSO outfalls. Signs at each outfall identify the outfall and warn of possible combined sewage overflows. The signs previously included the phone number for the CSO Hotline, staffed and managed by Public Health. Public Health also provided a website with detailed information about CSOs, potential public health hazards, and precautions the public may take to protect themselves.

In 2018 SPU and DNRP developed a new CSO outfall sign design with more languages, a link to the CSO overflow website, and a new phone number that is staffed 24 hours a day. SPU will complete installation of the new signs at its CSO locations in 2021.

In addition, King County DNRP has hosted an overflow website since December 2007, providing a map of recent and current DNRP CSO overflows. In 2009, SPU and DNRP worked together to incorporate SPU information on the DNRP website. In 2015, SPU and DNRP worked together as part of their Joint Operations and System Optimization Plan activities to make the map more user-friendly and interactive and to increase the map information refresh rate. Now the community is able to access near real-time information to assist them in making choices about use of local waters. The screen shots that comprise Figure 3-3 show the simplified website language and the zoomable map the public sees when they access the website. Figure 3-3 also shows the new outfall signage.

### 3.1.9 Control 9: Monitor CSOs

*Monitor CSO outfalls to characterize CSOs and the effectiveness of CSO controls.*

SPU monitors each of its CSO outfalls to detect sewage overflows. SPU also tracks the performance of its flow monitors to help ensure consistent, high quality measurements. The flow, precipitation, and flow monitor performance monitoring programs and results are summarized in Section 5 of this report.

# Combined sewer overflow status

Check the map below to see if a combined sewer overflow, or CSO, is occurring before going swimming, wading, fishing, or boating near a CSO warning sign. These overflows take place within the City of Seattle.

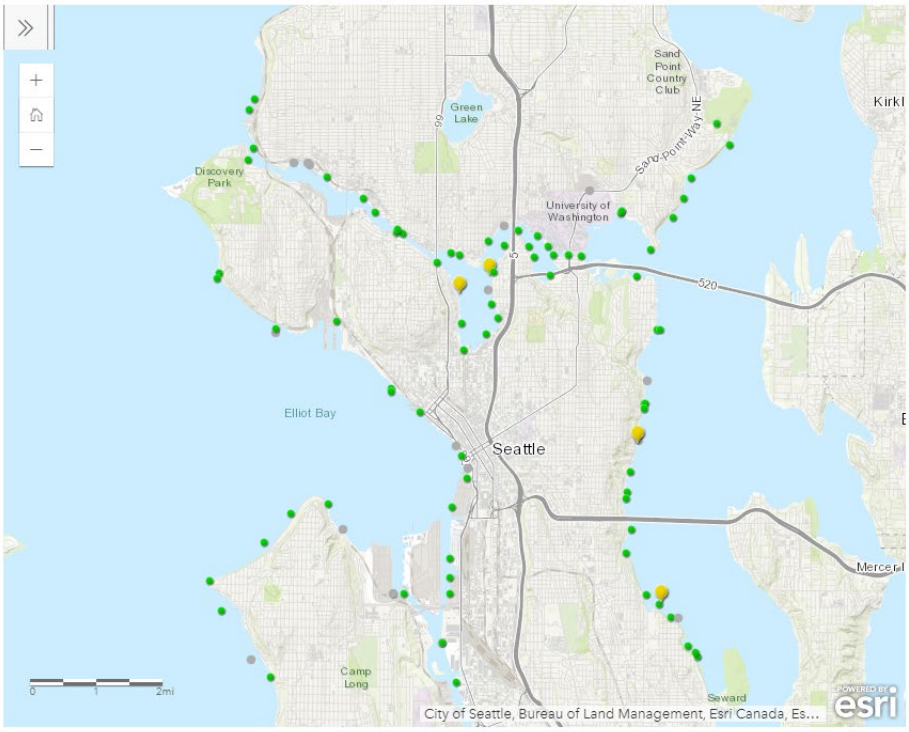
**Warning**

Stay out of the water for 48 hours after a combined sewer overflow; contact with polluted water can make you sick.

Learn more
Más información
進一步瞭解
Hãy tìm hiểu thêm
자세히 알아보기


Posted warning sign

Click on each CSO outfall symbol to learn more. Click on the [+] or [-] symbols to zoom in or out, or on [>>] to view Legend.




## About the information on this map

During heavy rains, pipes that carry sewage and stormwater together can overflow through relief points called combined sewer overflows (CSOs). This map gives the most current information on recent CSOs to allow people to make informed decisions about using our local waters.

While this is the most current information available, the real-time data has not yet been reviewed for accuracy. People can review confirmed data in King County's and Seattle's monthly and annual reports that these agencies send to the Washington State Department of Ecology

**Figure 3-2. DNRP/SPU Real-Time Overflow Website Screen Shots**

## 3.2 CMOM Performance Program Activities

SPU develops and implements program roadmaps that identify program work and improvements for multi-year periods. The current roadmap has initiatives in the following program areas:

- Sewer cleaning;
- Sewer condition assessment; and
- Sewer rehabilitation.

### 3.2.1 Sewer Cleaning Initiatives

The purpose of the sewer cleaning initiatives is to improve the quality and efficiency of sewer cleaning by standardizing the procedures, providing ongoing crew training, measuring and tracking the quality of cleaning efforts, providing feedback to the crews, and using technology to help identify where changes in cleaning frequency should be considered. Work completed in 2020 and planned for 2021 includes:

- Chemical Root Control – Since 2018, SPU has significantly increased the annual application of chemical root control agents. In 2020, that increased level of investment continued, and nearly 25 miles of pipe were treated in areas with known root intrusion. SPU also is conducting a comprehensive review of the pipes identified for treatment. That review effort will continue in 2021, in order to optimize the effectiveness and efficiency of chemical root control activities.
- Preventive Maintenance – In 2018, SPU began reviewing planning and scheduling processes and preventive maintenance schedules to help ensure maximum efficiency of our cleaning activities. During the first review, sixty percent of the preventive maintenance schedules were validated or fine-tuned. This effort paused in 2019 but resumed in 2020 following the reorganization of SPU's Planning and Scheduling Group and in light of COVID-19 related staffing shortages. The work will continue in 2021 with an emphasis on coordinating various maintenance-related work activities into a coordinated maintenance strategy.

### 3.2.2 Sewer Condition Assessment Initiatives

The purpose of the condition assessment initiatives is to reduce the risk of sewer overflows through greater understanding of the wastewater collection system condition, leading to well informed decisions about the maintenance and rehabilitation of its components. Work completed in 2020 and planned for 2021 includes:

- Increased Condition Assessment via CCTV – In 2017, SPU increased its annual goal for wastewater collection system condition assessment via CCTV from 190 to 240 miles of pipe, prioritizing areas with a higher risk of failure (based on likelihood and consequence of failure) and where no CCTV data currently exists. SPU was unable to continue at this increased level in 2020 because of COVID-19 related staffing shortages, which translated to a 30 percent reduction in staffing. These issues were resolved towards the end of 2020, and SPU is now at or near full workforce again.

- Management Areas – In 2017, SPU developed a new approach for scheduling inspection and condition assessment of the entire wastewater collection system every ten years. The system was divided into 100 Management Areas based on system hydraulics, the design and flow of the system, and discharge points to the DNRP system. SPU then developed and applied prioritization criteria and adjusted for practical implementation factors and inspection work completed since 2012. The Management Area work was essentially paused in 2020 due to staffing shortages and will be resumed in 2021. SPU plans to complete inspection of the wastewater collection system by 2024.

### 3.2.3 Sewer Rehabilitation Initiatives

The purpose of the rehabilitation initiatives is to prioritize and complete sewer rehabilitation in a timely, efficient, and cost-effective manner. Work completed in 2020 and planned for 2021 includes:

- Rehabilitation Strategy – In 2017, SPU began developing a comprehensive wastewater collection system Rehabilitation Strategy that documents SPU's priorities, our approach to making system rehabilitation investments, and process improvements to improve efficiency. As a part of this effort, SPU identified the need to replace enterprise technology tools that support the Rehabilitation Program. New risk management software was fully implemented in 2020. SPU also implemented various process improvements to gain efficiencies in rehabilitation project delivery. SPU also finished developing a Rehabilitation Strategy, which includes a long term investment forecast. Implementation of the Strategy will begin in 2021.
- Increased Rehabilitation Budget – SPU has increased sewer rehabilitation funding each year since 2013. Sewer renewal spending in 2020 ($20.8 million) was five times the 2013 spending level. SPU plans to continuing increasing investment in sewer renewal, spending up to $35 million per year in 2041.

### 3.2.4 SSO Performance

There were 88 sewer overflows in 2020, and they are summarized by cause in Table 3-3. Many of the sewer overflows occurred as a result of intense storm events that began on September 24 and December 21. During these storm events, multiple neighborhoods experienced rainfall with recurrence intervals of 50 to 100 years and more. The greatest number of sewer overflows were caused by extreme wet weather events (37 SSOs) and roots (26 events).

SSO performance for the years 2013 through 2020 is summarized in Table 3-4. SSO performance measures the effectiveness of SPU's CMOM Program and helps SPU focus its efforts on activities that help prevent sewer overflows. For these reasons, the SSO performance calculation excludes sewer overflows that are beyond SPU's ability to control, including sewer overflows caused by extreme weather events (rainfall with a recurrence interval of 25 years or more), other agency construction, private construction, King County capacity and vandalism. This table shows that SPU is continuing to meet the performance target of no more than 4 SSOs per 100 miles of sewer per year, assessed on a two-year moving average.

| Table 3-3. 2020 Sewer Overflows by Category | | |
|---|---|---|
| **Category** | **Primary Cause** | **Number of 2020 Sewer Overflows** |
| 1 | Roots | 26 |
| 2 | FOG | 1 |
| 3 | Debris | 6 |
| 4 | Structural Failure – Gravity | 4 |
| 5 | Structural Failure – Force Main | 0 |
| 6 | Capacity – Gravity | 2 |
| 7 | Pump Station – Mechanical | 0 |
| 8 | Pump Station - Capacity | 0 |
| 9 | Power Outage | 0 |
| 10 | Operator Error | 0 |
| 11 | Maintenance Error | 0 |
| 12 | Pressure Release | 0 |
| 13 | City Construction | 4 |
| 14 | New Facility Startup | 0 |
| 15 | Private Side Sewer Issue | 1 |
| 16 | Capacity – King County | 2 |
| 17 | Private Construction | 4 |
| 18 | Other Agency Construction | 0 |
| 19 | Vandalism | 1 |
| 20 | Extreme Weather Event (≥25year) | 37 |
| | Total for Categories 1 – 20 | 88 |
| | Total for Categories 1 – 15 | 44 |

| Table 3-4. 2013-2020 SSO Performance | | | |
|---|---|---|---|
| **Year** | **Number of SSOs[1]** | **SSOs/100 Miles of Sewer[2]** | **2-Year Average SSOs/ 100 Miles of Sewer** |
| 2013 | 40 | 2.8 | 3.3 |
| 2014 | 36 | 2.5 | 2.7 |
| 2015 | 72 | 5.1 | 3.8 |
| 2016 | 38 | 2.7 | 3.8 |
| 2017 | 41 | 2.9 | 2.8 |
| 2018 | 14 | 1.0 | 1.9 |
| 2019 | 22 | 1.5 | 1.3 |
| 2020 | 44 | 3.1 | 2.3 |

1. *Numbers in this column exclude sewer overflows caused by extreme weather events, other agency construction, private construction, King County capacity constraints, and vandalism.*
2. *SPU has 1,420 miles of sewers.*

To remain in the high-performing utility band and continue reducing the annual number of SSOs, SPU analyzes each SSO and identifies appropriate follow-up actions, including system modifications and/or increased maintenance where appropriate. SPU also reviews SSO data on an ongoing basis, looking for any patterns or trends that can be addressed through adaptive management of the CMOM Program. Based on the increasing number of SSOs caused by roots, in 2021 SPU plans to focus on root removal and root chemical treatment in areas where root intrusion is known to be an issue.

## 3.3 FOG Control Program Activities

The purpose of the Fats, Oils, and Grease (FOG) Control Program is to reduce the number of FOG-related sewer overflows (SSOs) by developing and implementing a FOG Control Program Plan. The four main elements of the FOG Control Plan are:

- Implement the FOG Management Plan;
- Implement the Food Service Establishment (FSE) Inventory Management Plan;
- Update and implement Standardized Operating Procedures (SOPs) and Outreach Plan; and
- Conduct FOG Inspector Training.

Work completed in 2020 and planned for 2021 is described in the following sections. It should be noted that the restaurant industry was greatly impacted by the COVID-19 pandemic and associated mandates for social distancing. As a result, the focus and processes used by SPU in implementing the FOG Control Program changed dramatically. Details of the process changes in response to the COVID-19 pandemic are included in the following paragraphs.

### 3.3.1 Implement the FOG Management Plan

Analysis of SPU FOG Hotspot data indicates a nearly even distribution of hotspots between commercial and residential sources. To mitigate these sources, the FOG Management Plan focuses on residential community engagement and a commercial regulatory program. Each of these areas of focus is described in the following sections.

#### *3.3.1.1 Residential – Community Engagement*

In residential areas SPU utilizes an education and outreach-based program to increase awareness of the negative impacts of FOG discharges from homes. SPU has continued to update and develop new resources, including transcreated materials in other languages. In 2020, SPU further expanded use of social media to increase our online presence and engage a high number of people during this unprecedented period of social isolation. Following are highlights of SPU's residential efforts in 2020.

- Delivered outreach materials to 83 multi-family property managers representing more than 9,400 multi-family residential customers located in or near FOG "hotspot" areas;
- Posted new outreach handouts on SPU website and shared FOG messages via social media channels;
- Updated our Cooking Oil and Grease videos for 2020 engagement;

- Conducted holiday social media campaigns from November 19 to December 28:
  - YouTube ad campaign: More than 24,000 views of the updated video and more than 500 comments/engagements;
  - Facebook ad campaign: Reached more than 51,000 users with more than 3,000 visits to SPU's website and more than 100 comments;
- Developed online Clog Stoppers quiz as a new remote engagement tactic. The quiz has received 220 responses;
- Transcreated outreach materials into Korean and Simplified Chinese. These new materials supplement materials created in 2019 in Vietnamese, Traditional Chinese, and Spanish; and
- Through our customer service web portal and in response to individual inquiries, distributed 4,282 FOG educational flyers, primarily to multi-family property owners and managers.


**Figure 3-3. Front and back of residential FOG messaging postcard in Simplified Chinese**

#### *3.3.1.2 Commercial – Regulatory FOG Program*

In a typical year, the commercial program consists of restaurant engagement, site assessment, inspections, and enforcement. 2020 was not a typical year. Due to COVID related, mandatory restaurant closures beginning in March 2020, onsite in-person assessments and inspections were no longer an option. Inspectors shifted focus and used CCTV to assess the condition of restaurant connections to the SPU system. Inspectors flagged connections with visible accumulations of FOG for follow-up when onsite in-person inspection of these facilities is feasible. In addition to this work, inspectors also reviewed CCTV videos showing residential connections. Connections with FOG, root, or structural issues were flagged and inspectors then engaged the property owners via mailed letters and video screenshots to encourage proactive maintenance on their side sewers, to prevent back-ups and overflows onto their private property and into their homes.


**Figure 3-4. Private side sewer connections demonstrating visible FOG accumulations and impacts from root intrusion**

In May 2020, SPU migrated into a new Linko Online database system that is a marked improvement over the previous platform. Inspectors now have access to all records electronically via any computer, tablet, or smartphone with internet access. The ease of use and access of the new system should greatly improve inspector efficiency once SPU returns to a normal inspection environment.

In June 2020, when restaurants were allowed to re-open in a reduced capacity, SPU engaged Linko Data Systems to create a new inspection type and online form to allow telephone audits until onsite inspections are again feasible. The goal of the telephone audit process was to gain an understanding of the COVID related impacts on businesses, assess compliance based on question responses and electronic verification, e.g. submission of pictures and invoices, and provide an opportunity to engage the restaurants and provide program materials. The new form and audit process were rolled out in October 2020 and used during most of November until restaurants were required to close to in-person dining. SPU resumed telephone audits in early January 2021 with a focus on high volume, drive-through businesses that have experienced fewer COVID related impacts.

Other 2020 highlights included:

- Completed 186 FSE FOG discharge risk assessments and regulatory compliance inspections. This number included 25 High Priority facility inspections. Inspections included FOG education, data collection, an evaluation of FOG discharge risk, and an assessment of compliance with Seattle Municipal Code. Due to COVID-19 impacts the number of inspections completed is well below the stated annual goal of 1,300 total inspections including 275 "High Priority" facility inspections;
- Work in lieu of FSE FOG discharge risk assessments and regulatory compliance inspections included:
  - Completed 101 Telephone Audits;
  - Reviewed CCTV for 323 High Priority mainline segments to assess private connections for FOG accumulation. Flagged 67 facilities for follow-up action and possible enforcement post COVID;
  - Reviewed CCTV footage in residential areas. Provided 146 private property owners with information on FOG accumulation, root intrusion, and/or structural deficiencies.
- SPU coordinated and hosted an online roundtable discussion with 12 FOG program managers from agencies in the Puget Sound area. The goal of this engagement was to discuss local impacts to businesses and programs in addition to sharing ideas and information on how area agencies are functioning in the COVID environment;
- Continued collaboration with the King County Plumbing and Gas Piping Program has led to increased plan review for FSEs and a more thorough interpretation and enforcement of the Seattle/King County Plumbing Code as it pertains to FOG pretreatment.

Although their production was also significantly impacted by the COVID-19 pandemic, SPU's contracted engagement firm (Cascadia) completed the following commercial, FOG-related engagement tasks:

- Delivered in-language FOG messaging, maintenance logs, kitchen posters, and sink strainers to 60 businesses through onsite, virtual, or hotline assistance;
- Delivered free spill kits to 49 facilities, including 21 FSEs, as part of a Seattle EnviroStars Program multi-faceted conservation, pollution prevention, and recycling campaign;
- Reached businesses through attendance at in-person and virtual 2020 events including the Seattle Chamber Restaurant After Hours, Seattle Good Business Network EnviroStars Application Party, GoGreen conference, and the All Chamber After Hours;
- Partnered with GreenShoots, a community engagement subcontractor, and SPU in anticipation of SPU's 2021, Non-enforcement Based Compliance Project Pilot in the Seattle International District. The group developed an interview guide and interviewed 21 businesses in the International District to assess their knowledge of regulatory FOG requirements, their ability to achieve compliance, and financial resources available as part of the community designed outreach effort.

2021 goals and efforts will include the following activities, pending a reduction in COVID-19 restrictions, to be adjusted as conditions dictate:

- Conduct regulatory compliance inspections on a minimum of 90% of all Priority 1, 2, and 3 facilities as identified in the Linko Online Database;
- Conduct regulatory compliance inspections on 90% of facilities scheduled in 2020 per the periodicity set in the Linko Online Database;

- Continue initial risk assessments for new FSEs and facilities connected to Category 3, 4, 5, and 6 mainlines;
- Conduct a reassessment of facilities that discharge to high priority sewer mainlines and whose initial assessment indicated no or inadequate pretreatment, and conduct Notice of Violation enforcement as needed to achieve Code compliance;
- Continue collaboration with King County Plumbing and Gas Piping Program as well as the Plumbers and Pipe Fitters Training Center;
- Engage with business districts, neighborhood organizations, and area restaurant associations to collaborate on maintenance reporting and other FOG Program project rollouts;
- Complete and pilot online FSE registration and maintenance reporting project (deferred from 2020);
- Craft and implement a Preferred Service Provider Program for companies that install, repair, and maintain grease interceptors (deferred from 2020).

### 3.3.2 FSE Inventory Management Plan

The FSE Inventory Management Plan describes SPU's approach for collecting, using, and managing FSE data. SPU utilizes Linko Online software to store and maintain FSE related data. In 2020, SPU updated the FSE database quarterly by uploading an updated listing of FSEs permitted through Public Health - Seattle & King County (Public Health). An ongoing and automated quarterly report is obtained via the Public Health database to help ensure FSE information in the FOG database remains current.

In 2020 SPU shifted from the Access based LinkoFOG program to the Linko Online data management system. This online database includes web access portals for SPU staff, FSE Owners/Management, and Service Providers. Direct access by FSEs and Service Providers will allow SPU to obtain maintenance information, including photographs, which will greatly enhance SPU's ability to assess proper maintenance and functionality of grease interceptors outside of the compliance inspection process.

### 3.3.3 Standard Operating Procedures

SPU has developed and maintains the following Standard Operating Procedures (SOPs) relating to the FOG Management Plan:

- FOG Regulatory Inspection SOP
- Linko Online Database User's Manual and Data Entry SOP
- FOG Enforcement SOP
- FOG GIS & Hotspot SOP
- FOG Violation and Enforcement SOP
- FOG Characterization and Risk Assignment SOP
- FOG Remote Inspector User's Manual and SOP

SPU FOG Inspectors reviewed all FOG Standard Operating Procedures (SOPs) in 2020. As a result of this review, the Linko Database SOP and Regulatory Inspection SOPs were updated to reflect procedural changes. This annual review process:

- Helps ensure field staff are familiar with and are utilizing SOPs;
- Helps ensure SOPs accurately reflect actual field activity processes; and
- Empowers and expands the capabilities, ownership, and buy-in of field inspectors by providing them with a voice in the program process development.

### 3.3.4 FOG Inspector Training

Continued education and training of FOG Inspectors remains a fundamental component of the SPU FOG Program. However, opportunities for training were limited in 2020 due to COVID-19 related travel restrictions and social distancing requirements. FOG Inspector training in 2020 included the following activities:

- In-house FOG inspector training included informal discussions concerning procedural changes brought about by technology improvement projects and program improvements. These sessions occur bi-weekly during FOG Team meetings and in conjunction with software and procedural updates;
- Monthly online webinar training sessions were offered by the FOG program software provider, Linko Technologies, and attended by FOG inspectors as appropriate.
- FOG Team Members attended the Aquatics Insider and Linko User Group online workshop in October 2020;
- FOG Team members actively participated in periodic online meetings of the APWA PREFOG Sub-Committee.

In 2021, SPU will continue to participate in the activities outlined above and seek out other training resources and opportunities.

## 3.4 Annual Review of Operations and Maintenance Manuals

SPU regularly reviews its operations and maintenance manuals and updates them when necessary. They are available for O&M staff to access through a dedicated SharePoint site for wastewater facility documentation. Equipment specific operations and maintenance instructions and procedures are maintained as job plans in SPU's computer maintenance management system.

In 2015, SPU submitted O&M manuals to Ecology and EPA for the new operable CSO storage facilities at Windermere and Genesee. In 2016, SPU reviewed and updated the O&M Manuals for Windermere and Genesee. The updates mainly consisted of modifications to control logic made to the facilities operations during the stabilization phase. In 2018, SPU submitted an O&M Manual for the Henderson North CSO storage facility. In 2019, SPU reviewed and updated the control logic for the Windermere, Genesee, Henderson and Delridge facilities. In 2020, SPU submitted an O&M Manual for the Portage Bay (Basin 138) sewer system improvement project.

SECTION 4

# Capital Activities

This section describes activities SPU is undertaking to reduce the number and volume of sewage overflows and implement the Plan to Protect Seattle's Waterways. Included is a summary of progress made in 2020 and work that SPU plans to complete in 2021. During 2020, SPU continued to proactively monitor and control scope, schedule, and budget on each of its major projects. In addition, SPU applied considerable attention to applying lessons learned across capital projects. 2020 project spending is summarized in Table 4-1.

**Table 4-1. 2020 Plan Implementation Spending**

| Project Name | Amount Spent |
|---|---|
| Ship Canal Water Quality Project | $20,402,498 |
| North Henderson CSO Reduction Project | $72,737 |
| Central Waterfront CSO Reduction Projects | $1,528,694 |
| Delridge 168/169 CSO Control | $ 1,079,290 |
| South Henderson 49 CSO Reduction Project | $52,578 |
| Sewer System Improvement Projects (Retrofits) | $4,292,544 |
| Pump Station Rehabilitation | $12,787,504 |
| Outfall Rehabilitation | $2,084,599 |
| Sewer Renewal | $20,780,835 |
| Windermere Supplemental Compliance | $18,000 |
| Genesee Supplemental Compliance | $45,500 |
| South Henderson 47/171 Supplemental Compliance | $52,000 |
| Magnolia 62 Supplemental Compliance | $12,000 |
| Roadside Raingardens | $54,179 |
| RainWise | $1,567,720 |
| NDS Partnering | $4,569,857 |
| South Park Water Quality Facility | $207,463 |
| Expanded Street Arterial Sweeping | $1,524,055 |
| Total | $ 133,221,314 |

## 4.1 Sewer System Improvement Projects

SPU made significant progress on a variety of combined sewer system improvement projects in 2020, as summarized in the following paragraphs.

### 4.1.1 Delridge (Basin 99) HydroBrake Retrofit Project

Delridge Basin 99 is located at the north end of the Delridge neighborhood in West Seattle, just south of the West Seattle Bridge. In 2019, SPU replaced the Basin 99 HydroBrake flow restriction device with an automated sluice gate. This new sluice gate allows SPU to achieve a consistent discharge flowrate to the King County regional sewer system and more optimally utilize the existing offline storage tank, thereby reducing the frequency and volume of Basin 99 CSOs. Construction Completion was achieved on December 9, 2019. In 2020, SPU monitored the facility and adjusted its performance to meet the design intent. There are two operational modes that this facility switches between during wet weather (depending on the regional sewer system condition) and 2020 was spent optimizing the primary operational mode's settings. In 2021, SPU will optimize the secondary mode.

**Figure 4-1. New Basin 99 Sluice Gate (left) and Actuator Motor (right)**

### 4.1.2 Magnolia (Basin 60) Pump Station 22 Rehabilitation Project

Basin 60 is located in the Lawtonwood neighborhood of Magnolia, on the west side of Seattle. The sewer system improvement for this basin includes increasing the pumping capacity of Pump Station 22 from 0.86 MGD to 4.0 MGD, rehabilitating other station assets, and replacing the aging 8-inch diameter force main with a 12-inch diameter force main and a new connection to King County's Fort Lawton Tunnel.

Construction began in September 2019 and was completed in 2020, before the regulatory construction completion milestone of December 31, 2020. The rehabilitated pump station operates using a variable frequency drive (VFD), which is a new approach to managing system flows through SPU's pump stations. As such, SPU will monitor and adjust the station's VFD performance throughout 2021 to verify that the pumps operate at the design intent.


**Figure 4-2. New Basin 60 pumps being installed (left) and New Basin 60 connection to King County trunk sewer (right)**

### 4.1.3 East Montlake (Basin 20) Pump Station and Force Main Rehabilitation Project

East Montlake Basin 20 is located in central Seattle, just south of the Ship Canal Cut and east of Montlake Basin 140. The sewer system improvement for this basin, similar to the project in Magnolia Basin 60, includes increasing the pumping capacity of Pump Station 13 from 0.9 MGD to 2.8 MGD, rehabilitating other assets of the station, and replacing the aging 8-inch diameter force main with a 12-inch diameter force main.

Construction of this pump station rehabilitation project began in April 2020 to accommodate an eagle breeding window, as specified by the Washington Department of Fish and Wildlife construction permit. The intent was to complete the project by the regulatory construction completion milestone of December 31, 2020. However, due to COVID-19 pandemic-caused delays in the shipping of essential equipment, the need to socially distance field workers (elongating the construction schedule), and other delays caused by vendor illness, the project was delayed past the regulatory milestone. SPU

notified Ecology and EPA of a potential milestone violation by letter dated November 4, 2020 and provided an update on February 1, 2021. SPU currently estimates a six-month delay in achieving the regulatory milestone.

Following construction completion of this sewer system improvement, SPU will monitor and adjust the operation of the pump station's variable frequency drives to ensure its performance meets the design intent.

### 4.1.4 Portage Bay (Basin 138) HydroBrake Retrofit Project

Portage Bay Basin 138 is located on the west side of Portage Bay and is bounded by State Highway 520 to the south and Interstate 5 to the west. The sewer system improvement for this basin includes replacing the HydroBrake at the existing offline storage tank with an automated sluice gate and rehabilitating and increasing the pumping capacity of Pump Station 20 from 1.1 MGD to 1.5 MGD. The rehabilitated pump station operates using VFDs, and new automated controls will allow the sluice gate to manage flows at the pump station's new higher peak flowrate, better utilizing existing offline storage and reducing overflow volumes and frequency.

Construction began in early 2020 and was completed before the regulatory construction completion milestone of December 31, 2020. Due to this facility's complex hydraulic operation, SPU will be closely monitoring the performance of the gate and upgraded pump station in 2021 to verify that they operate at the design intent.

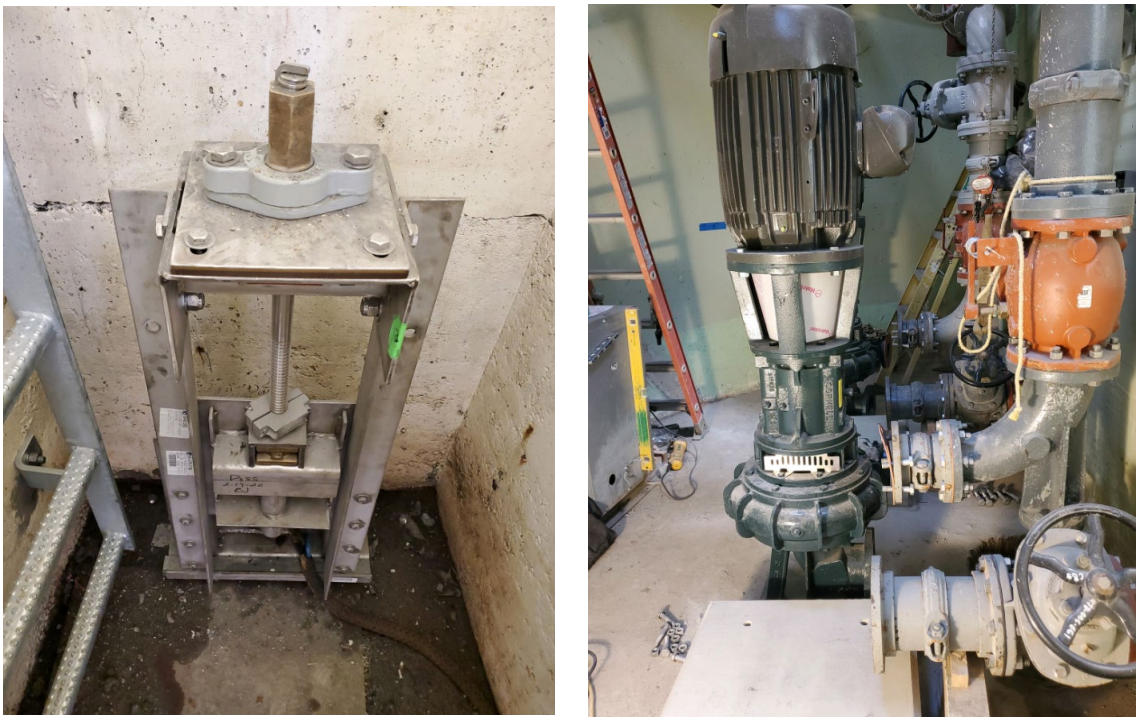


**Figure 4-3. Installation of Basin 138 slide gate (left) and new higher capacity pumps (right)**

### 4.1.5 Montlake (Basin 140) Sewer System Improvement Project

Montlake Basin 140 is located in central Seattle, just south of the Ship Canal Cut and west of East Montlake Basin 20. The sewer system improvement project for this basin consists of lowering the transfer weir to this basin's offline storage tank to offload high flows to the storage tank more easily, thereby reducing the frequency of CSOs that occur when the offline storage tank is not completely full. SPU submitted a scope report to Ecology in March 2020 detailing this work and completed the weir lowering work (by installing a new, smaller, metal weir plate) in August 2020, before the regulatory construction completion milestone of December 31, 2020. SPU will monitor the system's performance in 2021 to ensure the desired outcome is achieved during wet weather events. Monitoring will also inform longer term planning for this basin and its downstream basin, Montlake 139. SPU intends to plan these future improvements in coordination with DNRP's Montlake CSO control project, to identify the best opportunities to leverage economies of scale and minimize community disruptions through partnership.

**Figure 4-4. New Basin 140 smaller metal weir plate installed**

## 4.2 Ship Canal Water Quality Project

The Ship Canal Water Quality Project (SCWQP) is a joint SPU-DNRP project that will control CSOs from SPU's Wallingford, Fremont and Ballard areas (Outfalls 147, 151, 152, and 174) and DNRP's 3rd Avenue West (DSN 008) and 11th Avenue Northwest (DSN 004) outfalls.

On July 27, 2016, the City of Seattle and King County signed a Joint Project Agreement (JPA) to guide implementation, operation, and cost-sharing of the Ship Canal Project. SPU is the lead for construction and implementation of the tunnel, and will own, operate, and maintain the tunnel and its related structures. (DNRP will continue to own its two outfall structures.) SPU and DNRP have also chartered both the Joint Oversight and the Project Review and Change Management Committees to provide policy guidance and senior level management oversight, support and direction to the project.

In 2020, the project team made significant progress on project design and construction:

- Construction for the Ballard Early Work and Advance Utilities work packages achieved final completion. The scope of these work packages was to prepare the Ballard site for tunnel construction, rebuild the 24$^{th}$ Ave NW pier, replace Outfalls 150 and 151 with a single outfall (Outfall 151), and relocate utilities out of the way at several sites for future tunnel construction.
- Construction of the Storage Tunnel work package began and has progressed to include work at all five of the tunnel drop shaft sites. Work accomplished in 2020 includes: completing excavation of the drop shaft in Ballard (the launch site for the storage tunnel boring machine), ground improvement and/or installation of drop shafts at four other drop shaft sites, completing manufacturing and factory testing of the storage tunnel boring machine, removing the underground storage tank and contaminated soil at the Wallingford site, and execution of a cost-saving change order to eliminate the requirement to barge away tunnel spoils (they will now be hauled by truck).
- The Tunnel Effluent Pump Station (TEPS) work package team completed 60% design with a site design that celebrates the function of the facility based on input from the community and the Seattle Design Commission. The 60% design also received approval from the Seattle Design Commission. Finally, the Ship Canal Program decided in 2020 to merge the TEPS and Ballard Conveyance design documents into a single construction contract. This decision will greatly reduce coordination and construction risks for the two projects.
- The Ballard Conveyance work package team completed 60% design. As discussed in the TEPS section above, the Ship Canal Program decided in 2020 to merge the TEPS and Ballard Conveyance design documents into a single construction contract. The 90% and 100% designs in 2021 and 2022 will include both work packages.
- The Wallingford Conveyance work package team completed 90% design. Construction of this work package will begin following tunneling completion.
- The entire project team participated in a cost reduction effort that was completed in July 2020. The effort reduced base costs by approximately $16M, increased reserves, and evaluated risks, all while maintaining the existing budget confidence level.

- In addition, SPU completed an ordinance with the Seattle City Council allowing the project team to acquire property rights (such as temporary and permanent easements for construction), submitted an application for a 2022 State Revolving Fund loan, and executed a WIFIA loan agreement with the US Environmental Protection Agency. The $192M loan will save SPU ratepayers an estimated $52.5M in interest costs when compared to traditional bond funding. King County executed a separate WIFIA loan in January 2021 for their cost share.

**Figure 4-5. Drop Shaft Construction in Ballard**

SPU continued with community outreach for the Ship Canal Project during 2020, as summarized below:

- Delivered project briefings to SPU's Customer Review Panel (a group established to provide input and review progress on SPU's Strategic Business Plan), community groups and business associations (Groundswell Northwest, Friends of Street Ends, Friends of Ballard Waterfront Park, Ballard Community Council, Seattle Freight Advisory Board, and North Seattle Industrial Association).
- Delivered presentations to the Seattle Mayor's Office, Seattle City Council, the King County Regional Water Quality Committee, Ecology, and EPA.


**Figure 4-6. Completed Tunnel Boring Machine at Factory in Schwanau, Germany**

- Conducted numerous stakeholder briefings with property owners and businesses along the proposed project sites and tunnel alignment.
- Contacted property owners and property managers along the tunnel alignment to obtain rights-of-entry to support the settlement monitoring program for tunneling operations (203 right of entries collected to date).
- Conducted pre-construction community outreach prior to the start of tunnel construction at each of the five shaft sites in the Ballard, East Ballard, Fremont, Queen Anne, and Wallingford neighborhoods, which included virtual open house events, social media campaigns, and paid ads in local blogs. The shafts facilitate construction of the storage tunnel and will ultimately connect flows from the combined sewer system into the storage tunnel.
- Sent 17 project updates to approximately 1,131 residents and business owners using the Ship Canal Project listserv.
- Produced short public relations videos for the website and social media to promote project artwork and other highlights.

In 2021, the project team anticipates continued progress on project design and construction:

- Construction will continue for the Storage Tunnel work package. Work will include completion of all 5 drop shafts, completion of the 8-foot diameter conveyance tunnel beneath the Ship Canal, and launching of the storage tunnel boring machine from the Ballard site.
- Design revisions for the Queen Anne conveyance system and hydraulic modeling will be completed to confirm that the project will not unacceptably impact the hydraulics of the system.
- The TEPS and Ballard Conveyance teams are scheduled to complete a joint 90% design in the 2nd quarter of 2021. This deliverable will be submitted to Ecology as the Draft Plans and Specifications.
- The Wallingford Conveyance team is scheduled to complete a 100% design deliverable in the 2nd quarter of 2021, which will be submitted to Ecology for review and approval. Following submittal of the 100% design, the project will be put on hold temporarily until it is ready to advertise for bids in 2022.
- The SCWQP program is scheduled to complete a 60% O&M manual deliverable for the overall facility in 3rd quarter of 2021.
- SPU plans to execute a 2021 SRF loan with the Department of Ecology in 2021. SPU also plans to issue an addendum to the Final Supplemental Environmental Impact Statement (FSEIS) to address the additional height planned for the TEPS building and additional improvements to the 24th Ave NW street end.

SPU's planned 2021 outreach activities include:

- Conduct virtual outreach events for significant design milestones related to the Tunnel Effluent Pump Station and Wallingford and Ballard Conveyance packages.
- Deliver project briefings at organizations, boards and/or associations focused on potential project impacts to trees, bicycles, pedestrians, residents, and industry.
- Deliver listserv updates, notices, and mailers along the tunnel alignment, as necessary.
- Continue stakeholder briefings and attend community meetings.
- Provide project information via fact sheets, website, listserv, and other materials.

The Ship Canal Water Quality Project is on track to meet all remaining Consent Decree and NPDES Permit regulatory milestones.

## 4.3 Central Waterfront CSO Reduction Projects

### 4.3.1 South Central Waterfront (Basins 70, 71, 72)

To control combined sewer overflows from the south end of the Central Waterfront, SPU is currently installing approximately 2,000 linear feet of new 24 to 36-inch diameter sewer and connecting combined sewer basins 70, 71, and 72. The project is designed to eliminate Outfalls 70 (University Street) and 72 (Washington Street) and limit CSOs from Outfall 71 (Madison Street) to no more than one per year on average.

SPU and Seattle's Office of the Waterfront are coordinating construction of these sewer system modifications and the Waterfront Seattle Alaskan Way-Elliott Way (S King Street to Bell Street) Project, because critical portions of both City projects are located where the Alaskan Way Viaduct stood and neither of these City projects could be completed until the Alaskan Way Viaduct was demolished. Attempting to complete the CSO control project prior to demolition of the Viaduct would have resulted in significant additional cost, additional disruption to businesses and the travelling public, additional risk of failure of the then-compromised viaduct structure itself, and risk that the completed improvements would be damaged during subsequent demolition work. In addition, the Viaduct could not be demolished until the new SR-99 tunnel was complete, or there would have been major additional disruption to businesses and the travelling public. WSDOT was solely responsible for completing the new SR-99 tunnel and the Viaduct demolition; the City was not able to direct the activities of WSDOT or its tunneling or demolition contractors and therefore was not able to accelerate WSDOT's schedule for completing SR-99 and demolishing the Viaduct.

In the Plan to Protect Seattle's Waterways, SPU indicated that construction of the Basins 70, 71, 72 CSO control project would be complete by the end of 2020. This completion date was based on construction beginning in 2017, which coincided with WSDOT's original schedule for completion of SR-99 and demolition of the Viaduct. On October 22, 2015, WSDOT and STP notified the Washington State Legislature's Joint Transportation Committee that resumption of the tunneling on SR-99 was delayed until December 23, 2015. This delay in tunneling resumption, and subsequent delays in the State's work, pushed the SR-99 completion and Viaduct demolition schedules beyond the point where the City could assure that the CSO control project would be completed by 2020. Consequently, SPU submitted notification of this force majeure event the same day.

Viaduct demolition was completed in late 2019. The Waterfront Seattle Alaskan Way-Elliott Way (S King Street to Bell Street) Project, including the South Central Waterfront (Basins 70, 71, 72) CSO control project, was bid, awarded and construction commenced in 2019. Also in 2019, SPU completed the final measures to mitigate impacts of the completed project on our customers. Construction of the project will continue in 2021, and substantial completion is projected to occur by early 2024.

The WSDOT-caused delay is not expected to cause or contribute to endangerment of public health, welfare, or the environment. Outfalls 70 and 72 were controlled before construction began and have since been removed from CSO service (on April 24 and May 26, 2020, respectively), and the discharge from Outfall 71 is a relatively small portion of the City's CSO volume.

**Figure 4-7. Central Waterfront Construction – Dewatering System**

**Figure 4-8. Central Waterfront Construction – Maintenance Hole Installation**

### 4.3.2 North Central Waterfront (Basin 69)

Basin 69 is the most northern CSO basin along the Central Waterfront. Basin 69 is approximately 150 acres in size and the wastewater collection system is fully combined. Combined sewage flows north from Basin 69 into DNRP's Elliott Bay Interceptor.

In 2019, SPU completed an evaluation of alternatives to control the basin, submitted a Draft Engineering Report on June 26, 2019, and submitted a Final Engineering Report on December 20, 2019. The preferred alternative includes installation of 1,800 feet of 24-inch diameter gravity combined sewer pipe to transfer peak flows from Basin 69 to DNRP's Elliott Bay Interceptor. The pipe would be located under Elliott Avenue and run from Vine Street to Bay St. This basin is upstream of DNRP's Elliott West Wet Weather Treatment Plant, and SPU needs to coordinate with DNRP to confirm the efficacy of flow transfer and determine the design and implementation schedule.

## 4.4 Longfellow Starts Here Project (Basins 168, 169)

Longfellow Starts Here (previously known as the Longfellow Creek Water Quality Improvement Project) is a community driven, long-term project to control CSOs from Delridge Basins 168 and 169. The ultimate goal of this project is to identify the best pairing of CSO reduction and stormwater quality projects and programs that improve the water quality of Longfellow Creek while meeting the community's needs and vision, using the lens of racial equity. Longfellow Starts Here is currently in Options Analysis, which is broken into 2 phases. Each "option" in this project is an infrastructure scenario - a suite of projects and programs that collectively meet the performance goals for the basins over time, while providing other co-benefits. The tools and frameworks needed to create infrastructure scenarios are developed in the first phase (Phase A). Infrastructure scenarios are developed and evaluated in collaboration with stakeholders in the second phase (Phase B).

In 2020, SPU delivered the majority of Phase A. The tools and frameworks developed in Phase A define the component pieces of a potential infrastructure scenario, including the cost and performance of all the major types of CSO reduction and stormwater quality projects and programs, characterization of how those projects and programs fit within an urban design context, the location of opportunities, needs, and limitations in the basins, and the opportunities for workforce development and arts-based engagement to empower communities of color within the area.

In 2021, SPU will finish documenting Phase A, and plan and kick-off Phase B. Phase B will collaboratively engage various City departments and external stakeholders in the development and evaluation of potential infrastructure scenarios. Phase B will identify CSO reduction and stormwater quality approaches that best support the community's vision for southern Delridge. It is expected to take approximately one year to develop the infrastructure scenarios and another six months to complete technical evaluation and refinement of those scenarios to complete Options Analysis.

Following Options Analysis, SPU will select the preferred option and develop a phased implementation plan. SPU will implement (through design, construction, stabilization, and monitoring) the first phase of infrastructure and will assess CSO frequency performance for both CSO basins. If additional

infrastructure is needed in either basin to achieve the CSO performance standard, a second implementation phase will be delivered based on the remaining components of the preferred option. This adaptive management approach ensures the right amount of infrastructure is built in each phase and that there is always a plan to guide any subsequent investments.

## 4.5 Leschi (Basins 26 – 36)

The Leschi area is in east Seattle bordering Lake Washington and comprises Basins 26 through 36. Over a dozen individual sewer system improvements were implemented in this area in two phases: Phase 1, which was completed in 2015, and Phase 2, which was completed in 2016. Phase 1 improvements were described in the 2014 Annual Report. Phase 2 improvements were detailed in the 2016 Annual Report. As part of the improvements, Outfalls 26 and 33 were sealed and removed from service.

Based on flow monitoring data, it is apparent that the constructed sewer improvements changed the flow characteristics of the Leschi Area. As a result of the changed flow characteristics, together with recent changes in precipitation patterns, the constructed improvements did not reduce CSOs as much as expected in the Leschi area. Modeling conducted in 2018, together with flow monitoring in 2019, show that Outfalls 27, 29, 34, 35, and 36 meet the CSO performance standard and Outfalls 28, 30, 31, and 32 are not controlled to the CSO standard (see Table 5-8).

Because the Leschi area flow characteristics have changed and the location of the CSO control issue has shifted (for example, Basin 30 was not previously identified in the “if needed” Leschi CSO Control Project), SPU believes it is prudent to look again at the options for controlling the Leschi Area instead of moving forward with the originally identified off-line storage pipes. As part of this re-look, SPU will be working with DNRP to determine whether the most cost-effective and technically sound control measure involves partnering on DNRP’s Montlake (DSN 014) CSO control project. This analysis will be completed as part of DNRP’s future LTCP update work effort.

On June 14, 2018, SPU submitted a Notification of Potential Milestone Violation notifying Ecology and EPA of the possibility that SPU might not meet the Leschi CSO Control Project Engineering Report submittal milestones. On June 26, 2019, SPU submitted a request to EPA and Ecology for modification of the Engineering Report Milestone to have more time to develop revised control alternatives and partnership opportunities with DNRP.

## 4.6 CSO Control Supplemental Compliance Plans

### 4.6.1 Windermere Supplemental Compliance Plan

In 2015 SPU completed construction of a 2.05 million-gallon (MG) storage tank near Magnuson Park on the south side of NE 65th Street to reduce the number of overflows from Outfall 13. Hydraulic modeling to assess facility performance was completed in Summer 2016. The modeling showed that, although the project significantly reduced overflows from Basin 13, the 20-year average was 1.6 CSOs/year. On October 4, 2016, SPU submitted a Supplemental Compliance Plan to Ecology and EPA outlining the steps SPU plans to take to meet the CSO standard. Ecology and EPA approved the Plan on January 5, 2017.

Per the approved Plan, in 2017 SPU evaluated operational adjustments to the recently constructed control structures and submitted a technical memorandum summarizing its findings on December 28, 2017. SPU found that the two main control gates in the Windermere Area needed to be reprogrammed and recalibrated to better respond to changes in flow. The evaluation also found that Basin 15 was barely exceeding the CSO standard (at 1.1 CSO per year based on modeling), so SPU submitted a Supplemental Compliance Plan for Basin 15 on April 17, 2018.

In 2018 SPU implemented the recommended gate programming changes. Throughout 2019 and continuing into 2020, SPU monitored their effectiveness. In 2021 SPU will continue to work with DNRP to identify other short-term system operational improvements.

**Figure 4-9. Completed Windermere CSO Storage Facility**

### 4.6.2 Genesee Supplemental Compliance Plan

In 2015 SPU completed the construction of a 380,000-gallon storage tank and a 120,000-gallon storage tank to reduce overflows from Outfalls 40, 41, and 43. The project was constructed in two parking lots along Lake Washington Boulevard S at 49th Avenue S and at 53rd Avenue S. Each has a facility vault, diversion sewer, and a force main with motor-operated gates to control the flow of wastewater similar to the Windermere storage facility.

In February 2016, SPU found significant root intrusion in the Lake Line that conveys combined sewage from the two newly constructed CSO storage tanks to Wastewater Pump Station 5. This root intrusion caused the tanks to fill prematurely during storms and drain too slowly after each storm.

These issues prevented SPU from updating the hydraulic model and completing the modeling work needed to determine whether the Genesee Area was controlled to the Consent Decree performance standard. Consequently, SPU submitted a Supplemental Compliance Plan to Ecology and EPA on March 8, 2017, requesting more time to complete flow monitoring and hydraulic modeling. Ecology and EPA approved the SCP on May 30, 2017. SPU cleaned the Lake Line and, in 2017, monitored flows in the Genesee Area.

In June of 2018, SPU submitted a Revised Supplemental Compliance Plan to Ecology, noting that the storage tanks have significantly reduced overflows in the Genesee Area but four basins are still exceeding the 1 CSO per year standard. The Basins are 40, 41, 42 and 43, and modeling conducted in 2018 indicated they had 1.7, 1.7, 1.1, and 2.75 overflows per year, respectively. Similar to the steps taken in the Windermere Area, SPU evaluated possible operational improvements in the Genesee Area, which led to the recommendation to revise the programming of two control gates and install a new gate controller on CSO Storage Facility 9. In 2019, SPU implemented these operational improvements. SPU began to monitor those improvements in 2020 and will continue to do so in 2021.

**Figure 4-10. Completed Genesee CSO Storage Facility 9A**

**Figure 4-11. Completed Genesee CSO Storage Facility 11A**

### 4.6.3 South Henderson Supplemental Compliance Plan

In 2015-2016 SPU constructed the following improvements to the combined system in the South Henderson Area:

- The 52nd Ave S Conveyance Project (Basins 47B and 171), which included a new diversion system and a pipeline to convey peak flows to DNRP's Henderson Pump Station.
- Pump Station 9 Upgrade (Basin 46), which included pumping and mechanical upgrades to SPU's pump station to better handle peak flows coming down from the sewer lake line.
- Henderson 47C Retrofit (Basin 47C), which included installing a new higher weir in the 47C control structure to optimize upstream storage and improve overflow monitoring.

**Figure 4-12. Completed 52nd Ave S Combined Sewage Conveyance Project**

In late 2016, hydraulic modeling was used to assess the performance of these improvements. The modeling showed that Basin 46 is meeting the CSO performance standard and Basins 47 and 171 are not. Prior to construction of these improvements, Basin 47 averaged 15.7 CSOs per year and Basin 171 averaged 7.4 CSOs per year. Based on 2016 modeling, the completed projects decreased the average frequency to 4.1 CSOs per year from Basin 47 and 3.3 CSOs per year from Basin 171.

Because the two basins were not yet meeting the CSO performance standard, on March 22, 2017 SPU submitted a Supplemental Compliance Plan to Ecology and EPA describing the additional steps that will be taken to control CSOs from Basins 47 and 171. Ecology and EPA approved the Plan on May 19, 2017.

In 2017, SPU evaluated these basins and identified operational adjustments to the recently constructed control structures. SPU submitted a Technical Memorandum summarizing the evaluation on September 29, 2017. The main recommendation was to remove an orifice plate in Sub-Basin 47B to achieve the desired design flowrate, and this adjustment was implemented by December 29, 2017. SPU then conducted flow monitoring and hydraulic modeling to assess the effectiveness of the orifice plate removal. In March 2019, SPU submitted a technical memorandum summarizing results. Orifice plate removal reduced Basin 47 overflows to 3.1 CSOs/year and Basin 171 overflows to 2.5 CSOs/year. However, both outfalls still exceed the one CSO per year standard. In 2020, SPU identified and modeled potential operational adjustments. In 2021 SPU will implement the operational adjustments and begin monitoring their effectiveness.

### 4.6.4 Magnolia 62 Supplemental Compliance Plan

In the 2016 Annual Report, SPU noted that the 20-year average CSO frequency at Magnolia Outfall 62 had increased in recent years to 1 per year (1997 – 2016). On March 21, 2018 SPU verbally notified Ecology and EPA that the frequency of CSOs from Outfall 62 had increased to a 20-year average of 1.1 per year (1998 – 2017) and that Outfall 62 no longer met the CSO performance standard. On April 3, 2018, SPU submitted a Supplemental Compliance Plan to Ecology and EPA, describing the remedial measures SPU will pursue to control the outfall. Following receipt of comments from Ecology and EPA on April 19, 2019, and a site visit with Ecology during Summer 2018, SPU submitted a revised Supplemental Compliance Plan on September 6, 2018.

The revised Supplemental Compliance Plan was approved on October 24, 2018. SPU committed to raise the Basin 62 CSO weir by December 31, 2018, and report on its functionality by March 31, 2019. On August 27, 2018, SPU installed a metal weir plate on the existing concrete weir wall, raising the weir 6.4 inches. SPU also evaluated how to inspect and clean (if required) the beach line (gravity conveyance from Basin 61 to Basin 64) as this line may be partially occluded with sediment. SPU submitted a technical memorandum to Ecology on June 27, 2019 summarizing the inspection and cleaning approach. However, preliminary monitoring data collected in 2018 and 2019 shows that the new weir plate is effective in reducing overflows. To determine if the weir raising was successful in keeping overflows to one or less per year, SPU submitted a revised Supplemental Compliance plan on June 27, 2019 requesting additional time to deploy flow monitors in 2019 and 2020 to be able to recalibrate the hydraulic model. In 2021 SPU will continue to monitor flows and determine the effectiveness of the weir raising.

## 4.7 South Park Water Quality Facility

The South Park Water Quality Facility is one of the stormwater improvement projects included in the approved Plan to Protect Seattle's Waterways. The intent of the facility is to treat stormwater runoff from the existing 7th Avenue South drainage basin, a highly industrial basin in the City's South Park neighborhood, and discharge treated water to the Lower Duwamish Waterway. The South Park Water Quality Facility will work in conjunction with the South Park Pump Station, which is in construction and, when complete, will enable the existing stormwater collection system and outfall to function during all tidal conditions in the Lower Duwamish Waterway.

In 2018, SPU determined that the South Park Pump Station will require full use of the site previously slated for both the Pump Station and the Water Quality Facility. In 2019, SPU continued evaluation of other potential Water Quality Facility sites in the industrial area of the South Park neighborhood. In early January 2021, SPU's Asset Management Committee approved the recommendation to purchase property for the purpose of building a regional, stormwater quality improvement facility in the South Park neighborhood. In 2021 the project team will identify a site for purchase and transition from planning into the options analysis project phase.

## 4.8 Green Stormwater Infrastructure

The term green stormwater infrastructure (GSI) describes a variety of measures that use soil to absorb stormwater or slow the rate of stormwater entering the sewer system. Green solutions control the sources of pollution by slowing, detaining, or retaining stormwater so that it does not carry runoff into nearby waterways. This reduces the volume and timing of flows into the system. GSI facilities also are referred to as natural drainage systems (NDS) and they are a type of low impact development (LID). Examples of GSI include:

- RainWise – A program that provides homeowners with rebates for installing rain gardens and cisterns on their own property.
- Roadside bioretention – Deep-rooted native plants and grasses planted in a shallow depression in the public right-of-way, such as the planting strip adjacent to homes.

SPU's general goal is to use green solutions to reduce CSOs.

SPU and DNRP continue to work together to help ensure GSI projects in the City of Seattle use a consistent approach. Collaborative work in 2020 included:

- Finalizing the upgraded joint www.700milliongallons.org website, including improving user access to RainWise materials. The platform is continuing to become more mobile friendly and RainWise information will be easier to access and understand.
- Updating Volume III (Design Phase) to include guidance from a series of workshops with SPU, DNRP, and subject matter experts on underground injection control (UIC) facilities that may be included as part of bioretention projects to help achieve volume reduction.
- Drafting Volume IV (Construction and Commissioning) to document procedures and practices and help ensure the quality of projects based on lessons learned from recent projects.
- Updating Volume V (Operations & Maintenance) to address issues identified during finalization of Volume III.
- Evaluating the lifecycle cost of a new bioretention soil mix (that does not include compost) compared to the current standard bioretention soil mix, to help determine which mix to recommend on bioretention projects.

In 2021, planned collaborative work includes:

- Finalizing Volume II (Options Analysis) and an evaluation of presettling technologies, and updating presettling guidance.

### 4.8.1 RainWise Program

Since 2010, RainWise has offered rebates to property owners in the combined sewer areas of Seattle. Eligible property owners are alerted about the program through regular mailings, public meetings, and media events. By visiting the RainWise website at www.700milliongallons.org, property owners are able to learn about green stormwater technologies and are presented with solutions appropriate for their property. Through this site, they are also able to find trained contractors.

Over 750 contractors, landscape designers and similar professionals have been trained in the program since 2009. Each year, the program offers two training opportunities for interested contractors. There are currently 32 active contractors listed on the RainWise website that are available to bid and install systems for RainWise customers. In 2020, we tightened up the list to include only those contractors that responded to our surveys and have completed installations in the last two years. In addition, there are several contractors with RainWise training who choose not to be on the RainWise list because they consider RainWise as part of much larger installations.

COVID-19 necessitated several changes to the RainWise Program in 2020. Contractor fairs and training as well as customer workshops were delivered virtually via webinar and online meeting programs. A virtual inspection protocol was developed to aid in maintaining social distancing, and RainWise contractors were declared essential workers and complied with site-specific regulations to maintain safety.

In 2020, four contractor fairs were offered to connect interested participants with participating contractors. Additionally, SPU and its community partners held several information workshops for potential RainWise customers to learn about the program, talk with satisfied participants, and meet contractors. Workshops have been expanded to included webinars that enable interested customer participation from their homes. In an ongoing effort to provide equitable outreach, all events were either offered in multiple languages or direct translation was available at the regular event.

This year, an intensive 48 hour, 12 week contractor incubator, the RainWise Academy, was piloted and graduated a diverse class of 18 new RainWise contractors. In addition to previous efforts to improve outreach, education and program delivery to potential customers and contractors, the RainWise program completed a comprehensive racial equity toolkit, which will guide future efforts to BIPOC communities.

Upon completion, installations are inspected by a RainWise inspector and property owners apply for the rebate. RainWise rebates for rain gardens are currently four dollars per square foot of roof area controlled. Rebates for cisterns equal 69 percent or more of the rain garden rate, depending on the size of the cistern and contributing area. In some instances, the rebate for a cistern is nearly 100% of the rain garden rate, but that is rare. The average 2020 installation now controls the runoff from nearly 1,400 square feet of roof area, on par with historic trends.

Typical RainWise installations are shown in Figure 4-13.

**Figure 4-13. Raingarden installations**

In 2020, the RainWise Program rebated 103 projects in the Ballard, North Union Bay, Delridge, Fremont, Genesee, Henderson, Leschi, Montlake, and Windermere basins. Since program inception, 1,108 installations have been rebated in combined sewer basins managed by SPU. These installations control approximately 35.0 acres of impervious roof area and an estimated 15.8 million gallons (MG) per year of stormwater, and they provide an estimated 272,000 gallons of CSO control volume.

In an effort to reach historically underserved communities, SPU continues to undertake equity inclusion initiatives, particularly in the Delridge, Genesee, and Henderson basins, and to explore and implement best practices for involving these communities in RainWise. In 2020, the initiative provided outreach to Vietnamese, Filipino and Chinese homeowners. Additionally, one Vietnamese, one Latinx, and two Chinese contractors were recruited and trained.

The RainWise Program continues to operate under a memorandum of agreement with DNRP to make RainWise rebates available to customers whose properties are located in the City of Seattle and within CSO basins served by DNRP, in Ballard/West Phinney, University, Montlake, Central District, Highland Park, and South Park. DNRP rebated 85 installations in 2020, for a total of 991 installations since 2013.

SPU will continue to offer its RainWise Program in 2021.

### 4.8.2 NDS Partnering

In 2015, the Natural Drainage System (NDS) Partnering Program developed the methodology, budget, and schedule required to achieve the NDS Partnering Program commitments in the approved Plan to Protect Seattle's Waterways. In 2018, the Program began construction of the 30th Ave NE Sidewalk and NDS Project, the first partnership project with the Seattle Department of Transportation (SDOT), meeting the NDS Partnering regulatory milestone of issuing construction NTP by July 2019. Construction was completed in early 2019. In 2020, the second partnership project with SDOT was constructed, the 12th Ave NE Sidewalk and NDS Project. Similar to the 30th Ave NE project, this project constructed sidewalk and NDS along two blocks within the Thornton Creek Basin. The NDS provides separation between the street and the new sidewalk and treats stormwater runoff from 12th Ave NE.

**Figure 4-14. Completed 12th Ave NE Sidewalk and NDS Project**

In 2020 SPU continued to perform options analysis on the North Thornton Creek NDS Project. SPU has slowed the pace of this work in order to more fully engage with the community in identifying project locations. SPU is trying a newer approach for engaging with the community, and in particular underserved populations, by implementing a community liasion program that brings local community members to the table to reach out to and support community members who wouldn't ordinarily participate in more traditional outreach events.

SPU continued to design the Longfellow NDS Project, South Thornton Creek NDS Project, and Broadview NDS Project. The Longfellow and South Thornton NDS Projects are both much larger in scale than the first two projects completed under the NDS Partnering Program. Work to date has included community outreach, working with an artist on one site in the Longfellow NDS Project, and continued design collaboration with SDOT on joint project sites. The Broadview NDS Project completed 60% design.

In 2021, the NDS Partnering Program will begin options analysis for the Piper's NDS Project and continue options analysis for the North Thornton Creek NDS Project, including identifying potential project blocks with potential partnership opportunities (such as with SDOT), conducting geotechnical analysis, developing concept plans, implementing the basin outreach plans and stategies for reaching underserved communities, incorporating community feedback into the concept plans, and finalizing the selection of preferred blocks for design. The Longfellow NDS Project will begin construction in Spring/Summer 2021. The South Thornton NDS Project will complete design in 2021 and begin construction in 2022. The Broadview NDS Project will complete design in 2021.

## 4.9 Expanded Arterial Street Sweeping Program

This program expanded the City's arterial street sweeping program, per commitments in the Plan to Protect Seattle's Waterways. During 2020, the team continued implementing the expanded program. SDOT street sweeping crews swept just under 10,000 miles in the municipal separate stormwater system area, capturing 153 dry tons of total suspended solids (TSS) equivalent (125% of plan). Key tasks involved in completing the work included:

- Continued to utilize overtime to address difficulties maintaining a full crew due to a tight labor market and high turnover; and
- Adapted operations in response to the COVID-19 pandemic.

During 2021, the team will continue to implement the expanded program and adapt as needed to meet the regulatory targets. The key tasks planned for this year include:

- Continue sweeping established routes;
- Continue sample collection on a quarterly basis; and
- Improve process efficiency with a focus on incorporating protected bike lanes into the program.

The City is on schedule to meet the annual commitment of capturing 122 tons of total suspended solids (TSS) equivalent in 2021.

SECTION 5

# Monitoring Programs and Results

This section provides a brief overview of SPU's precipitation and flow monitoring programs and presents 2020 results, including CSO overflow details, 5-year average overflow frequencies, and a summary of the outfalls meeting the CSO control standard.

## 5.1 Precipitation Monitoring Program

SPU collects precipitation data from a network of 22 rain gauges located throughout the City of Seattle, as shown in Figure 1-1. No changes were made to the network of permanent rain gauges in 2020.

Two tables summarizing 2020 precipitation monitoring results are included in this report:

- Table 5-1 provides precipitation by gauge and by month; and
- Table 5-2 summarizes the last five years of precipitation monitoring results by year and by month.

Normal annual rainfall, averaged citywide, is 34.94 inches. In 2020, every SPU rain gauge exceeded that amount. Totals ranged from 35.90 inches to 45.05 inches, and the average was 40.79 inches.

## 5.2 Flow Monitoring Program

At the beginning of 2020, SPU's flow monitoring consultant operated and maintained 69 monitoring points while SPU staff operated and maintained an additional 27 monitoring points, for a total of 96 continuous monitoring sites. During the year, responsibility for the operation and maintenance of two monitoring points was transferred to SPU staff and three consultant monitoring points were sealed, at Outfalls 70 and 72 and Overflow Structure 71B. By the end of 2020, SPU's flow monitoring consultant operated and maintained 64 monitoring points and SPU staff operated and maintained an additional 29 monitoring points for a total of 93 continuous monitoring points.

Dedicated monitoring program staff review flow monitoring results on a regular basis and evaluate data quality and flow monitor performance. If emerging problems are identified during these reviews (such as data showing slow storage tank drainage or missing data), the issues are rapidly addressed by requesting field service from the monitoring consultant or from the SPU Drainage and Wastewater crews. The consultant and SPU staff also perform site-specific troubleshooting.

Each month, the consultant's lead data analyst and senior engineer and SPU monitoring staff review and analyze any apparent overflows that occurred the previous month, taking into consideration rainfall, knowledge of site hydraulics, and the best available monitoring data. When needed, SPU meets with consultant staff to make a final determination regarding whether an overflow occurred, and any necessary follow-up actions are documented.

## 5.3 Summary of 2020 Monitoring Results

Several tables summarizing 2020 flow monitoring and flow monitor performance are included in the following pages of this report:

- Table 5-3 show the 2020 flow monitor performance by outfall and month;
- Table 5-4 provides the details of all 2020 discharges by outfall and date;
- Table 5-5 includes the most recent 5-year overflow frequency for each outfall and compares 2020 and baseline CSO conditions;
- Table 5-6 compares 2015-2020 CSOs by outfall;
- Table 5-7 compares 2016-2020 CSOs by receiving water body;
- Table 5-8 shows which outfalls met the CSO performance standard for controlled outfalls in 2020.

Exacerbated CSOs and DWOs are included in the table listing all 2020 overflows (Table 5-4). Exacerbated CSOs (and not DWOs) are also included in Tables 5-5, 5-6, 5-7, and 5-8.

Observations and conclusions from these tables include:

- System-wide, flow monitors were in service an average of 99.9%. With the exception of monitors at Outfalls 15 and 57, each SPU flow monitoring station was in service over 99% of the time. The monitors at Outfalls 15 and 57 were in service 98.9% of the time.
- There were 220 CSOs in 2020, totaling 85.6 million gallons (MG). 53 of these CSOs, totaling approximately 28.4 MG, occurred as a result of a single major storm event on December 21. As noted in Section 3.1.5, there were also 2 exacerbated CSOs, 1 DWO, and 1 sewer overflow through a CSO outfall that occurred over a period of both dry and wet weather.
- Over 30 percent of the 2020 CSO volume was discharged from Outfall 152 (Ballard), which serves the largest combined sewer area of any of the City of Seattle combined sewer basins.
- The four outfalls that will be controlled by the Ship Canal Water Quality Project (Outfalls 147, 151, 152, and 174) contributed 56 percent of the 2020 CSOs (123 of the 220 CSOs) and 65 percent of the 2020 CSO volume (55.9 of the 85.6 MG).
- The three water bodies that received the greatest 2019 CSO volumes were Salmon Bay (29.3MG), Lake Union (22.0 MG), and Lake Washington (18.3 MG).

One outfall that was reported to be controlled in SPU's baseline report and has been uncontrolled in recent years is Outfall 139 in the Montlake Area. In July 2016 SPU increased the pumping capacity of Wastewater Pump Station 25 by approximately 20 percent to increase the rate of flow to DNRP. SPU will continue to monitor the performance of the pump station to refine the remaining control volume estimate ahead of possible partnership with DNRP on a Montlake area CSO storage project.

Table 5-8 indicates that the 2001-2020 20-year moving average number of CSOS per year at two outfalls identified as controlled in SPU's NPDES Permit exceeded the State CSO performance standard: Outfalls 59 and 68. SPU notified Ecology and EPA of the Outfall 59 noncompliance in the 2018 Annual Report,

attributed to the unexpected failure of a force main serving Wastewater Pump Station (WWPS) 43. The 2018 Annual Report also reported that SPU was replacing the force main using emergency contracting procedures and was bypassing WWPS 43 in the meantime, that there were unavoidable flow constraints downstream of the bypass system, and that SPU expected Outfall 59 to return to controlled status once the force main was replaced. Prior to the force main break, Outfall 59 averaged 0.4 CSOs/year. For the period 2001-2020, Outfall 59 averaged 1.1 CSOs/year, including 11 exacerbated CSOs that occurred while WWPS 43 was bypassed in 2017-2019. Now that the WWPS 43 force main has been replaced, SPU believes that Outfall 59 is once again controlled.

SPU notified Ecology and EPA of the Outfall 68 noncompliance in the 2019 Annual Report. As noted in Table 5-8, some of the 5 CSOs that occurred in 2015-2016 and contributed to the 2001-2020 average of 1.2 CSOs/year were likely exacerbated by a partially clogged HydroBrake. SPU plans to continue monitoring this outfall to determine whether additional action is needed and, if so, the type of action.

In 2017, SPU notified Ecology and EPA that Outfall 62 no longer met the CSO performance standard and submitted a Supplemental Compliance Plan. On August 27, 2018, SPU raised the Basin 62 overflow weir to optimize use of the existing sewer system. Based on hydraulic modeling conducted in February 2021, and using modeling for the period 2001 through August 27, 2018 and flow monitoring for the remaining period, the 2001-2020 average number of CSOs is 0.5 CSOs/year and the outfall is considered controlled.

## 5.4 CSO Control Post-Construction Monitoring

Post-Construction Monitoring Program (PCMP) in-situ sediment sampling was completed at Outfall 44 on September 1, 2020. The sampling was performed by King County staff. Sampling was completed successfully, in accordance with the approved Quality Assurance Project Plan/Sediment Analysis Plan (QAPP/SAP). Seven sediment samples and one duplicate sample were collected in the vicinity of Outfall 44. The analytical results of these samples will be included in the Outfall 44 Post Construction Monitoring Program report due April 30, 2022.

## 5.5 Integrated Plan Post-Construction Monitoring

Volume 3 of the Plan to Protect Seattle Waterways included a commitment to monitor the individual performance of the three Integrated Plan projects as data is available and to monitor overall performance once data is available from all three Integrated Plan projects. Table 5-9 summarizes the Integrated Plan performance targets and the data that is available to date. As noted, overall performance is not assessed because performance data is not yet available on the South Park Water Quality Facility and NDS Partnering.

City staff completed the Expanded Arterial Street Sweeping Program post-construction monitoring sampling activities on December 20, 2018. A final report on the Street Sweeping Program post-construction monitoring was submitted with the 2018 Annual Report. The NDS Partnering and South Park Water Quality stormwater facilities have not been constructed so no post-construction monitoring was conducted during 2020.

| Table 5-1. 2020 Precipitation by Gauge and by Month (inches) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Rain Gauge** | **January** | **February** | **March** | **April** | **May** | **June** | **July** | **August** | **September** | **October** | **November** | **December** |
| **RG01** | 8.52 | 4.30 | 4.42 | 2.28 | 3.62 | 3.15 | 0.13 | 0.77 | 3.05 | 3.01 | 5.46 | 6.24 |
| **RG02** | 8.26 | 4.98 | 3.61 | 1.91 | 3.60 | 2.31 | 0.10 | 0.49 | 3.38 | 2.77 | 5.03 | 5.62 |
| **RG03** | 8.37 | 4.36 | 3.39 | 1.64 | 3.26 | 1.94 | 0.14 | 0.36 | 2.90 | 3.10 | 5.45 | 6.02 |
| **RG04** | 8.83 | 4.57 | 3.49 | 1.91 | 3.60 | 2.44 | 0.20 | 0.61 | 3.03 | 2.90 | 5.79 | 6.02 |
| **RG05** | 8.26 | 2.47 | 2.69 | 1.29 | 2.75 | 1.39 | 0.16 | 0.22 | 2.99 | 2.49 | 4.75 | 6.44 |
| **RG07** | 8.05 | 4.03 | 3.45 | 1.84 | 3.10 | 2.18 | 0.14 | 0.67 | 2.72 | 2.82 | 5.11 | 5.99 |
| **RG08** | 8.22 | 3.99 | 3.63 | 1.67 | 2.99 | 1.65 | 0.15 | 0.62 | 2.64 | 2.88 | 5.41 | 6.14 |
| **RG09** | 8.65 | 4.52 | 3.44 | 1.84 | 3.43 | 1.88 | 0.12 | 0.64 | 2.99 | 3.03 | 5.88 | 6.27 |
| **RG11** | 7.13 | 3.28 | 3.04 | 1.47 | 2.91 | 1.24 | 0.08 | 0.42 | 2.65 | 2.63 | 5.22 | 5.87 |
| **RG12** | 7.53 | 3.15 | 3.35 | 1.46 | 2.98 | 1.45 | 0.09 | 0.43 | 3.49 | 2.55 | 4.90 | 5.45 |
| **RG14** | 8.87 | 4.13 | 3.29 | 1.55 | 3.16 | 1.52 | 0.14 | 0.31 | 3.75 | 2.81 | 6.05 | 6.96 |
| **RG15** | 8.66 | 4.05 | 3.55 | 1.50 | 2.88 | 1.26 | 0.14 | 0.19 | 2.98 | 2.69 | 5.41 | 6.74 |
| **RG16** | 8.35 | 3.79 | 2.72 | 1.63 | 2.78 | 1.35 | 0.17 | 0.18 | 2.39 | 2.51 | 5.37 | 6.20 |
| **RG17** | 8.22 | 3.52 | 2.71 | 1.45 | 2.93 | 1.73 | 0.21 | 0.25 | 2.42 | 2.57 | 5.03 | 6.28 |
| **RG18** | 8.22 | 4.31 | 3.06 | 1.60 | 3.45 | 1.56 | 0.21 | 0.31 | 2.43 | 3.05 | 5.42 | 6.32 |
| **RG25** | 8.21 | 4.53 | 3.55 | 1.53 | 3.62 | 1.59 | 0.17 | 0.47 | 2.95 | 3.44 | 5.17 | 6.70 |
| **RG30** | 9.00 | 4.10 | 3.11 | 1.46 | 3.14 | 1.49 | 0.21 | 0.32 | 2.65 | 2.98 | 6.23 | 6.67 |
| **RG32** | 8.12 | 4.17 | 3.01 | 1.57 | 3.17 | 1.46 | 0.12 | 0.18 | 2.88 | 3.03 | 5.36 | 6.11 |
| **RG33** | 8.71 | 5.00 | 3.58 | 2.14 | 3.98 | 2.52 | 0.12 | 0.48 | 3.36 | 3.09 | 5.89 | 6.18 |
| **RG34** | 8.51 | 4.81 | 4.11 | 2.26 | 3.99 | 2.65 | 0.14 | 0.65 | 2.99 | 2.88 | 5.58 | 5.78 |
| **RG35** | 8.65 | 4.35 | 3.47 | 1.71 | 3.60 | 1.69 | 0.16 | 0.49 | 2.81 | 3.38 | 5.51 | 6.80 |
| **RG36** | 9.38 | 3.92 | 3.79 | 1.45 | 3.21 | 1.66 | 0.23 | 0.27 | 3.15 | 3.02 | 5.52 | 7.31 |
| **Monthly Average** | **8.40** | **4.11** | **3.38** | **1.69** | **3.28** | **1.82** | **0.15** | **0.42** | **2.94** | **2.89** | **5.43** | **6.28** |

| Table 5-2. 2016-2020 Average Precipitation by Month (inches) | | | | | |
|---|---|---|---|---|---|
| **Month/Year** | **2016** | **2017** | **2018** | **2019** | **2020** |
| **January** | 7.53 | 4.00 | 8.11 | 3.28 | 8.40 |
| **February** | 4.42 | 8.61 | 2.75 | 4.16 | 4.11 |
| **March** | 5.57 | 6.80 | 2.12 | 1.50 | 3.38 |
| **April** | 1.46 | 4.09 | 5.34 | 2.57 | 1.69 |
| **May** | 1.18 | 2.55 | 0.21 | 1.11 | 3.28 |
| **June** | 1.50 | 1.16 | 1.26 | 0.69 | 1.82 |
| **July** | 0.59 | 0.01 | 0.01 | 1.31 | 0.15 |
| **August** | 0.09 | 0.09 | 0.21 | 1.18 | 0.42 |
| **September** | 1.17 | 0.93 | 1.18 | 3.01 | 2.94 |
| **October** | 10.57 | 3.39 | 3.42 | 2.70 | 2.89 |
| **November** | 7.44 | 8.39 | 4.72 | 1.72 | 5.43 |
| **December** | 3.91 | 4.80 | 6.02 | 7.21 | 6.28 |
| **Annual Total** | **45.43** | **44.82** | **35.35** | **30.43** | **40.79** |

## Table 5-3. 2030 Flow Monitor Performance by Outfall and Month

| Outfall Number | Jan | | Feb | | Mar | | Apr | | May | | Jun | | Jul | | Aug | | Sept | | Oct | | Nov | | Dec | | 2019 Cumulative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) |
| **12** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **13** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **14** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **15** | 0.0 | 100.0 | 96.6 | 87.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 96.6 | 98.9 |
| **16** | 3.3 | 99.6 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 3.3 | 100.0 |
| **18** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **19** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **20** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 70.3 | 90.6 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 70.3 | 99.2 |
| **22** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 19.6 | 97.4 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 19.6 | 99.8 |
| **24** | 5.4 | 99.3 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 5.4 | 99.9 |
| **25** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **27** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 56.9 | 92.3 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 56.9 | 99.4 |
| **28** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 1.3 | 99.8 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 1.3 | 100.0 |
| **29** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **30** | 16.4 | 97.8 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 23.2 | 96.9 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 39.6 | 99.6 |
| **31** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **32** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **33** | 0.0 | NA | 0.0 | NA | 0.0 | NA | 0.0 | NA | 0.0 | NA | 0.0 | NA | 0.0 | NA | 0.0 | NA | 0.0 | NA | 0.0 | NA | 0.0 | NA | 0.0 | NA | NA | NA |
| **34** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **35** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **36** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |

| Outfall Number | Jan | | Feb | | Mar | | Apr | | May | | Jun | | Jul | | Aug | | Sept | | Oct | | Nov | | Dec | | 2019 Cumulative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) |
| **38** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **40** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **41** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **42** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **43** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **44** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **45** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **46** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 75.9 | 89.8 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 219.8 | 70.5 | 0.0 | 100.0 | 13.0 | 98.3 | 0.0 | 100.0 | 308.8 | 96.5 |
| **47** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 1.8 | 99.8 | 1.4 | 99.8 | 0.0 | 100.0 | 0.0 | 100.0 | 62.0 | 91.7 | 65.2 | 99.3 |
| **48** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **49** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **57** | 0.0 | 100.0 | 0.0 | 100.0 | 69.9 | 90.6 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 26.2 | 96.5 | 0.0 | 100.0 | 96.1 | 98.9 |
| **59** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **60** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **61** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **62** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **64** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **68** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 1.0 | 99.9 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 1.0 | 100.0 |
| **69** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **70** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | NA | 0.0 | NA | 0.0 | 100.0 | 0.0 | NA | 0.0 | NA | 0.0 | NA | 0.0 | NA | 0.0 | NA | 0.0 | 100.0 |
| **71** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **72** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | NA | 0.0 | NA | 0.0 | 100.0 | 0.0 | NA | 0.0 | NA | 0.0 | NA | 0.0 | NA | 0.0 | NA | 0.0 | 100.0 |
| **78** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |

| Outfall Number | Jan | | Feb | | Mar | | Apr | | May | | Jun | | Jul | | Aug | | Sept | | Oct | | Nov | | Dec | | 2019 Cumulative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) |
| **80** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **83** | 5.6 | 99.3 | 56.7 | 92.4 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 62.3 | 99.3 |
| **85** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **88** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **90** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **91** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 42.4 | 94.3 | 0.0 | 100.0 | 0.0 | 100.0 | 42.4 | 99.5 |
| **94** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **95** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **99** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **107** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **111** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **120** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **121** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **124** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **127** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **129** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **130** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **131** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **132** | 44.6 | 94.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 44.6 | 99.5 |
| **134** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **135** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **136** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **138** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |

| Outfall Number | Jan | | Feb | | Mar | | Apr | | May | | Jun | | Jul | | Aug | | Sept | | Oct | | Nov | | Dec | | 2019 Cumulative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) | Downtime (hrs) | Uptime (%) |
| **139** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **140** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **141** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **144** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **145** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **146** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **147** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **148** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **150/151** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **152** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **161** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **165** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 16.4 | 97.8 | 16.4 | 99.8 |
| **168** | 0.0 | 100.0 | 1.4 | 99.8 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 1.4 | 100.0 |
| **169** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **170** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **171** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **174** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 16.6 | 97.8 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 16.6 | 99.8 |
| **175** | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| **TOTAL:** | 75.2 | 99.9 | 154.7 | 99.8 | 69.9 | 99.9 | 56.9 | 99.9 | 75.9 | 99.9 | 42.8 | 99.9 | 16.6 | 100.0 | 4.1 | 100.0 | 291.5 | 99.5 | 42.4 | 99.9 | 39.2 | 99.9 | 78.4 | 99.9 | 947.6 | 99.9 |

| Table 5-4. 2020 CSO Details by Outfall and Date | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| | | | | | | | | |
| WA0031682 | **12** | City of Seattle | Lake Washington | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **13** | City of Seattle | Lake Washington | 02/05/20 | 5,528,980 | 24.00 | 54.20 | 3.09 |
| | | | | 06/13/20 | 174,434 | 1.18 | 119.25 | 0.98 |
| | | | | 09/19/20 | 2,213 | 0.53 | 29.17 | 0.81 |
| | | | | 09/24/20 | 49,761 | 1.02 | 32.67 | 1.69 |
| | | | | 12/21/20 | 1,951,736 | 9.38 | 23.85 | 2.06 |
| | | | | Total | 7,707,124 | 29.45 | 252.34 | 8.39 |
| | | | | Average | 1,541,425 | 5.89 | 50.47 | 1.68 |
| | | | | | | | | |
| WA0031682 | **14** | City of Seattle | Lake Washington | 12/21/20 | 5,005 | 1.00 | 15.35 | 1.86 |
| | | | | Total | 5,005 | 1.00 | 15.35 | 1.86 |
| | | | | Average | 5,005 | 1.00 | 15.35 | 1.86 |
| | | | | | | | | |
| WA0031682 | **15** | City of Seattle | Lake Washington | 12/21/20 | 372,636 | 3.73 | 18.12 | 2.26 |
| | | | | Total | 372,636 | 3.73 | 18.12 | 2.26 |
| | | | | Average | 372,636 | 3.73 | 18.12 | 2.26 |
| | | | | | | | | |
| WA0031682 | **16** | City of Seattle | Union Bay | 12/21/20 | 575 | 0.33 | 15.47 | 1.91 |
| | | | | Total | 575 | 0.33 | 15.47 | 1.91 |
| | | | | Average | 575 | 0.33 | 15.47 | 1.91 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| | | | | | | | | |
| WA0031682 | **18** | City of Seattle | Union Bay | 02/05/20 | 1,107,957 | 22.17 | 51.53 | 2.43 |
| | | | | 12/21/20 | 1,313,159 | 3.58 | 18.77 | 2.29 |
| | | | | Total | 2,421,116 | 25.75 | 70.30 | 4.72 |
| | | | | Average | 1,210,558 | 12.88 | 35.15 | 2.36 |
| | | | | | | | | |
| WA0031682 | **19** | City of Seattle | Union Bay | 09/24/20 | 215 | 0.16 | 50.93 | 1.63 |
| | | | | Total | 215 | 0.16 | 50.93 | 1.63 |
| | | | | Average | 215 | 0.16 | 50.93 | 1.63 |
| | | | | | | | | |
| WA0031682 | **20** | City of Seattle | Union Bay | 02/01/20 | 128,812 | 4.53 | 39.30 | 1.43 |
| | | | | 02/05/20 | 378,155 | 24.03 | 53.83 | 2.47 |
| | | | | 12/21/20 | 327,183 | 2.00 | 16.52 | 2.07 |
| | | | | Total | 834,150 | 30.56 | 109.65 | 5.97 |
| | | | | Average | 278,050 | 10.19 | 36.55 | 1.99 |
| | | | | | | | | |
| WA0031682 | **22** | City of Seattle | Union Bay | 12/21/20 | 461 | 0.95 | 16.55 | 2.08 |
| | | | | Total | 461 | 0.95 | 16.55 | 2.08 |
| | | | | Average | 461 | 0.95 | 16.55 | 2.08 |
| | | | | | | | | |
| WA0031682 | **24** | City of Seattle | Lake Washington | 12/21/20 | 540,526 | 2.33 | 17.42 | 2.51 |
| | | | | Total | 540,526 | 2.33 | 17.42 | 2.51 |
| | | | | Average | 540,526 | 2.33 | 17.42 | 2.51 |
| | | | | | | | | |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| | | | | | | | | |
| WA0031682 | **25** | City of Seattle | Lake Washington | 12/21/20 | 812,813 | 2.30 | 17.30 | 2.50 |
| | | | | Total | 812,813 | 2.30 | 17.30 | 2.50 |
| | | | | Average | 812,813 | 2.30 | 17.30 | 2.50 |
| | | | | | | | | |
| WA0031682 | **27** | City of Seattle | Lake Washington | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **28** | City of Seattle | Lake Washington | 01/24/20 | 2,480 | 0.15 | 154.98 | 2.93 |
| | | | | 09/24/20 | 2,432 | 0.13 | 32.47 | 1.66 |
| | | | | 10/21/20 | 154 | 0.07 | 73.53 | 0.62 |
| | | | | 12/21/20 | 50,757 | 2.17 | 16.87 | 2.44 |
| | | | | Total | 55,823 | 2.52 | 277.85 | 7.65 |
| | | | | Average | 13,956 | 0.63 | 69.46 | 1.91 |
| | | | | | | | | |
| WA0031682 | **29** | City of Seattle | Lake Washington | 09/24/20 | 9,370 | 0.30 | 32.67 | 1.67 |
| | | | | 12/21/20 | 96,308 | 3.40 | 18.23 | 2.56 |
| | | | | Total | 105,678 | 3.70 | 50.90 | 4.23 |
| | | | | Average | 52,839 | 1.85 | 25.45 | 2.12 |
| | | | | | | | | |
| WA0031682 | **30** | City of Seattle | Lake Washington | 02/01/20 | 619 | 0.17 | 342.82 | 6.43 |
| | | | | 09/24/20 | 3,504 | 0.17 | 32.60 | 1.66 |
| | | | | 12/21/20 | 85,346 | 4.17 | 19.13 | 2.58 |
| | | | | Total | 89,469 | 4.51 | 394.55 | 10.67 |
| | | | | Average | 29,823 | 1.50 | 131.52 | 3.56 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| WA0031682 | **31** | City of Seattle | Lake Washington | 01/21/20 | 6,226 | 0.50 | 92.67 | 1.48 |
| | | | | 01/24/20 | 5,458 | 0.33 | 158.25 | 3.04 |
| | | | | 02/01/20 | 149,362 | 5.50 | 345.08 | 6.49 |
| | | | | 02/05/20 | 315,978 | 26.08 | 56.20 | 2.50 |
| | | | | 09/24/20 | 19,234 | 0.75 | 33.10 | 1.69 |
| | | | | 12/21/20 | 367,820 | 9.00 | 23.33 | 2.79 |
| | | | | Total | 864,078 | 42.16 | 708.63 | 17.99 |
| | | | | Average | 144,013 | 7.03 | 118.11 | 3.00 |
| | | | | | | | | |
| WA0031682 | **32** | City of Seattle | Lake Washington | 02/01/20 | 10,521 | 3.00 | 343.50 | 6.48 |
| | | | | 02/06/20 | 27,003 | 1.93 | 52.28 | 2.42 |
| | | | | 12/21/20 | 242,395 | 7.70 | 22.47 | 2.74 |
| | | | | Total | 279,919 | 12.63 | 418.25 | 11.64 |
| | | | | Average | 93,306 | 4.21 | 139.42 | 3.88 |
| | | | | | | | | |
| WA0031682 | **33** | City of Seattle | Lake Washington | *Sealed and removed from service on July 22, 2016* | | | | |
| | | | | | | | | |
| WA0031682 | **34** | City of Seattle | Lake Washington | 12/21/20 | 139,256 | 2.75 | 18.17 | 2.56 |
| | | | | Total | 139,256 | 2.75 | 18.17 | 2.56 |
| | | | | Average | 139,256 | 2.75 | 18.17 | 2.56 |
| | | | | | | | | |
| WA0031682 | **35** | City of Seattle | Lake Washington | 12/21/20 | 2,972 | 0.27 | 16.10 | 2.27 |
| | | | | Total | 2,972 | 0.27 | 16.10 | 2.27 |
| | | | | Average | 2,972 | 0.27 | 16.10 | 2.27 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| | | | | | | | | |
| WA0031682 | **36** | City of Seattle | Lake Washington | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **38** | City of Seattle | Lake Washington | 12/21/20 | 355,975 | 3.75 | 19.67 | 2.59 |
| | | | | Total | 355,975 | 3.75 | 19.67 | 2.59 |
| | | | | Average | 355,975 | 3.75 | 19.67 | 2.59 |
| | | | | | | | | |
| WA0031682 | **40** | City of Seattle | Lake Washington | 02/06/20 | 86,180 | 37.17 | 122.07 | 2.33 |
| | | | | 12/21/20 | 240,965 | 15.80 | 23.72 | 2.09 |
| | | | | Total | 327,145 | 52.97 | 145.79 | 4.42 |
| | | | | Average | 163,572 | 26.48 | 72.89 | 2.21 |
| | | | | | | | | |
| WA0031682 | **41** | City of Seattle | Lake Washington | 02/06/20 | 86,180 | 37.17 | 122.07 | 2.33 |
| | | | | 12/21/20 | 240,965 | 15.80 | 23.72 | 2.09 |
| | | | | Total | 327,145 | 52.97 | 145.79 | 4.42 |
| | | | | Average | 163,572 | 26.48 | 72.89 | 2.21 |
| | | | | | | | | |
| WA0031682 | **42** | City of Seattle | Lake Washington | 12/21/20 | 176,049 | 7.40 | 23.35 | 2.07 |
| | | | | Total | 176,049 | 7.40 | 23.35 | 2.07 |
| | | | | Average | 176,049 | 7.40 | 23.35 | 2.07 |
| | | | | | | | | |
| WA0031682 | **43** | City of Seattle | Lake Washington | 01/07/20 | 130 | 0.17 | 110.28 | 1.36 |
| | | | | 02/01/20 | 197,681 | 14.67 | 308.62 | 5.91 |
| | | | | 02/05/20 | 252,645 | 51.83 | 115.48 | 2.33 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| | | | | 12/21/20 | 334,786 | 14.75 | 23.72 | 2.09 |
| | | | | Total | 785,242 | 81.42 | 558.10 | 11.69 |
| | | | | Average | 196,311 | 20.36 | 139.52 | 2.92 |
| | | | | | | | | |
| WA0031682 | **44** | City of Seattle | Lake Washington | 12/21/20 | 3,068 | 0.40 | 16.43 | 1.41 |
| | | | | Total | 3,068 | 0.40 | 16.43 | 1.41 |
| | | | | Average | 3,068 | 0.40 | 16.43 | 1.41 |
| | | | | | | | | |
| WA0031682 | **45** | City of Seattle | Lake Washington | 12/21/20 | 113,592 | 2.43 | 18.62 | 1.80 |
| | | | | Total | 113,592 | 2.43 | 18.62 | 1.80 |
| | | | | Average | 113,592 | 2.43 | 18.62 | 1.80 |
| | | | | | | | | |
| WA0031682 | **46** | City of Seattle | Lake Washington | 11/14/20 | 220,000[2] | 12.92 | 20.30 | 0.52 |
| | | | | 12/21/20 | 85 | 0.23 | 16.75 | 1.48 |
| | | | | Total | 220,085 | 13.15 | 37.05 | 2.00 |
| | | | | Average | 110,043 | 6.57 | 18.53 | 1.00 |
| | | | | | | | | |
| WA0031682 | **47** | City of Seattle | Lake Washington | 02/01/20 | 37,696 | 3.33 | 269.13 | 6.13 |
| | | | | 12/21/20 | 1,107,141 | 5.23 | 211.63 | 3.79 |
| | | | | Total | 1,144,837 | 8.56 | 480.77 | 9.92 |
| | | | | Average | 572,419 | 4.28 | 240.38 | 4.96 |
| | | | | | | | | |
| WA0031682 | **48** | City of Seattle | Lake Washington | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| WA0031682 | **49** | City of Seattle | Lake Washington | 01/28/20 | 242,595 | 3.97 | 175.80 | 4.15 |
| | | | | 02/01/20 | 1,384,036 | 10.20 | 273.02 | 6.14 |
| | | | | 02/06/20 | 355,355 | 5.77 | 52.00 | 1.74 |
| | | | | 12/21/20 | 895,384 | 7.25 | 213.90 | 3.82 |
| | | | | Total | 2,877,370 | 27.19 | 714.72 | 15.85 |
| | | | | Average | 719,343 | 6.80 | 178.68 | 3.96 |
| | | | | | | | | |
| WA0031682 | **57** | City of Seattle | Puget Sound - Central | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **59** | City of Seattle | Salmon Bay | 12/21/20 | 119,284 | 0.92 | 15.28 | 1.89 |
| | | | | Total | 119,284 | 0.92 | 15.28 | 1.89 |
| | | | | Average | 119,284 | 0.92 | 15.28 | 1.89 |
| | | | | | | | | |
| WA0031682 | **60** | City of Seattle | Salmon Bay | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **61** | City of Seattle | Elliott Bay | 09/24/20 | 9,266 | 0.13 | 49.87 | 2.03 |
| | | | | 12/21/20 | 62,546 | 1.08 | 15.67 | 1.69 |
| | | | | Total | 71,812 | 1.21 | 49.87 | 2.03 |
| | | | | Average | 35,906 | 0.61 | 49.87 | 2.03 |
| | | | | | | | | |
| WA0031682 | **62** | City of Seattle | Elliott Bay | 09/24/20 | 717 | 0.08 | 49.82 | 1.98 |
| | | | | 12/21/20 | 7,870 | 0.42 | 15.08 | 1.45 |
| | | | | Total | 8,587 | 0.50 | 64.90 | 3.43 |
| | | | | Average | 4,294 | 0.25 | 32.45 | 1.72 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| | | | | | | | | |
| WA0031682 | **64** | City of Seattle | Elliott Bay | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **68** | City of Seattle | Elliott Bay | 09/24/20 | 273,324 | 4.58 | 53.65 | 2.17 |
| | | | | 12/21/20 | 387,214 | 3.93 | 17.38 | 1.95 |
| | | | | Total | 660,538 | 8.51 | 71.03 | 4.12 |
| | | | | Average | 330,269 | 4.26 | 35.52 | 2.06 |
| | | | | | | | | |
| WA0031682 | **69** | City of Seattle | Elliott Bay | 11/17/20 | 41,255 | 0.37 | 74.47 | 1.60 |
| | | | | 12/21/20 | 675,905 | 1.75 | 16.25 | 1.99 |
| | | | | Total | 717,160 | 2.12 | 90.72 | 3.59 |
| | | | | Average | 358,580 | 1.06 | 45.36 | 1.80 |
| | | | | | | | | |
| WA0031682 | **70** | City of Seattle | Elliott Bay | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **71** | City of Seattle | Elliott Bay | 12/21/20 | 309,386 | 1.40 | 16.03 | 1.95 |
| | | | | Total | 309,386 | 1.40 | 16.03 | 1.95 |
| | | | | Average | 309,386 | 1.40 | 16.03 | 1.95 |
| | | | | | | | | |
| WA0031682 | **72** | City of Seattle | Elliott Bay | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **78** | City of Seattle | Elliott Bay | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **80** | City of Seattle | Puget Sound | *No combined sewer overflows during 2020* | | | | |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| WA0031682 | **83** | City of Seattle | Puget Sound | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **85** | City of Seattle | Puget Sound | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **88** | City of Seattle | Puget Sound | 12/21/20 | 1,047,258 | 1.03 | 16.08 | 2.16 |
| | | | | Total | 1,047,258 | 1.03 | 16.08 | 2.16 |
| | | | | Average | 1,047,258 | 1.03 | 16.08 | 2.16 |
| | | | | | | | | |
| WA0031682 | **90** | City of Seattle | Puget Sound | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **91** | City of Seattle | Puget Sound | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **94** | City of Seattle | Puget Sound | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **95** | City of Seattle | Puget Sound | 01/24/20 | 1,076 | 0.42 | 159.03 | 3.27 |
| | | | | 12/21/20 | 27,726 | 2.65 | 18.27 | 2.15 |
| | | | | Total | 28,802 | 3.07 | 177.30 | 5.42 |
| | | | | Average | 14,401 | 1.53 | 88.65 | 2.71 |
| | | | | | | | | |
| WA0031682 | **99** | City of Seattle | West Waterway - Duwamish River | 02/01/20 | 370,454 | 4.50 | 309.32 | 6.80 |
| | | | | 12/21/20 | 774,319 | 7.52 | 23.68 | 2.40 |
| | | | | Total | 1,144,773 | 12.02 | 333.00 | 9.20 |
| | | | | Average | 572,386 | 6.01 | 166.50 | 4.60 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| WA0031682 | **107** | City of Seattle | East Waterway - Duwamish River | 12/21/20 | 90,815 | 4.57 | 19.35 | 2.41 |
| | | | | Total | 90,815 | 4.57 | 19.35 | 2.41 |
| | | | | Average | 90,815 | 4.57 | 19.35 | 2.41 |
| | | | | | | | | |
| WA0031682 | **111** | City of Seattle | Duwamish River | 12/21/20 | 292,182 | 4.47 | 19.42 | 2.41 |
| | | | | Total | 292,182 | 4.47 | 19.42 | 2.41 |
| | | | | Average | 292,182 | 4.47 | 19.42 | 2.41 |
| | | | | | | | | |
| WA0031682 | **120** | City of Seattle | Lake Union | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **121** | City of Seattle | Lake Union | 02/12/20 | 1,892[1] | 0.70 | 0.00 | 0.00 |
| | | | | Total | 1,892 | 0.70 | 0.00 | 0.00 |
| | | | | Average | 1,892 | 0.70 | 0.00 | 0.00 |
| | | | | | | | | |
| WA0031682 | **124** | City of Seattle | Lake Union | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **127** | City of Seattle | Lake Union | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **129** | City of Seattle | Lake Union | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **130** | City of Seattle | Lake Union | 12/21/20 | 86,940 | 0.92 | 15.35 | 1.86 |
| | | | | Total | 86,940 | 0.92 | 15.35 | 1.86 |
| | | | | Average | 86,940 | 0.92 | 15.35 | 1.86 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| | | | | | | | | |
| WA0031682 | **131** | City of Seattle | Lake Union | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **132** | City of Seattle | Lake Union | 09/24/20 | 54,898 | 0.33 | 49.83 | 1.57 |
| | | | | 12/21/20 | 386,851 | 1.17 | 15.58 | 1.93 |
| | | | | Total | 441,749 | 1.50 | 65.42 | 3.50 |
| | | | | Average | 220,875 | 0.75 | 32.71 | 1.75 |
| | | | | | | | | |
| WA0031682 | **134** | City of Seattle | Lake Union | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **135** | City of Seattle | Lake Union | 09/24/20 | 1,776 | 0.33 | 49.80 | 1.57 |
| | | | | 11/17/20 | 1,059 | 0.33 | 74.25 | 1.57 |
| | | | | 12/21/20 | 8,693 | 1.50 | 15.85 | 1.99 |
| | | | | Total | 11,528 | 2.16 | 139.90 | 5.13 |
| | | | | Average | 3,843 | 0.72 | 46.63 | 1.71 |
| | | | | | | | | |
| WA0031682 | **136** | City of Seattle | Lake Union | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **138** | City of Seattle | Portage Bay | 05/21/20 | 10,808[2] | 0.90 | 13.87 | 0.55 |
| | | | | 11/03/20 | 189,469 | 23.37 | 25.48 | 0.89 |
| | | | | 12/21/20 | 229,453 | 3.73 | 18.25 | 2.27 |
| | | | | Total | 429,730 | 28.00 | 57.60 | 3.71 |
| | | | | Average | 143,243 | 9.33 | 19.20 | 1.24 |
| | | | | | | | | |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| WA0031682 | **139** | City of Seattle | Portage Bay | 09/24/20 | 2,098 | 0.17 | 49.80 | 1.57 |
| | | | | 12/21/20 | 332,486 | 5.58 | 19.85 | 2.36 |
| | | | | Total | 334,584 | 5.75 | 69.65 | 3.93 |
| | | | | Average | 167,292 | 2.88 | 34.83 | 1.97 |
| | | | | | | | | |
| WA0031682 | **140** | City of Seattle | Portage Bay | 09/24/20 | 22,816 | 0.83 | 50.27 | 1.59 |
| | | | | 11/17/20 | 984 | 0.08 | 74.08 | 1.54 |
| | | | | 12/21/20 | 243,540 | 8.00 | 21.90 | 2.42 |
| | | | | Total | 267,340 | 8.91 | 146.25 | 5.55 |
| | | | | Average | 89,113 | 2.97 | 48.75 | 1.85 |
| | | | | | | | | |
| WA0031682 | **141** | City of Seattle | Portage Bay | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **144** | City of Seattle | Lake Union | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **145** | City of Seattle | Lake Union | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **146** | City of Seattle | Lake Union | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **147** | City of Seattle | Lake Union | 01/01/20 | 306,213 | 17.83 | 36.70 | 0.49 |
| | | | | 01/05/20 | 8,931 | 0.17 | 118.53 | 1.15 |
| | | | | 01/07/20 | 71 | 0.08 | 155.95 | 1.47 |
| | | | | 01/11/20 | 9,169 | 1.67 | 262.03 | 2.36 |
| | | | | 01/18/20 | 216,523 | 2.00 | 5.28 | 0.41 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| | | | | 01/21/20 | 1,086,571 | 17.08 | 58.93 | 1.08 |
| | | | | 01/23/20 | 887,221 | 39.50 | 131.85 | 2.63 |
| | | | | 01/26/20 | 19,478 | 1.00 | 160.27 | 2.96 |
| | | | | 01/27/20 | 1,712,386 | 15.83 | 214.18 | 4.23 |
| | | | | 01/29/20 | 34,768 | 0.33 | 245.85 | 4.51 |
| | | | | 01/31/20 | 2,676,279 | 16.17 | 308.77 | 5.97 |
| | | | | 02/05/20 | 6,916,674 | 37.33 | 53.85 | 2.32 |
| | | | | 02/07/20 | 531 | 10.00 | 89.35 | 2.62 |
| | | | | 02/13/20 | 59 | 0.08 | 7.52 | 0.12 |
| | | | | 02/15/20 | 186,140 | 1.33 | 25.68 | 0.42 |
| | | | | 02/23/20 | 146,227 | 0.42 | 2.33 | 0.22 |
| | | | | 03/06/20 | 51,370 | 1.67 | 7.98 | 0.43 |
| | | | | 03/28/20 | 361,480 | 1.83 | 43.10 | 0.66 |
| | | | | 03/30/20 | 79,276 | 2.33 | 72.27 | 1.21 |
| | | | | 04/22/20 | 1,419 | 2.42 | 7.48 | 0.42 |
| | | | | 04/25/20 | 37,149 | 2.83 | 3.22 | 0.29 |
| | | | | 05/02/20 | 19,763 | 0.25 | 14.85 | 0.30 |
| | | | | 05/16/20 | 303,417 | 3.25 | 18.77 | 0.61 |
| | | | | 05/21/20 | 417,021 | 1.75 | 12.65 | 0.50 |
| | | | | 05/30/20 | 1,128,683 | 10.83 | 11.62 | 1.02 |
| | | | | 06/13/20 | 243,942 | 6.58 | 33.77 | 0.41 |
| | | | | 06/27/20 | 319,964 | 2.33 | 14.70 | 0.63 |
| | | | | 09/18/20 | 1,144 | 0.50 | 1.28 | 0.15 |
| | | | | 09/19/20 | 214 | 0.25 | 28.12 | 0.25 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| | | | | 09/23/20 | 664,381 | 45.83 | 79.82 | 2.25 |
| | | | | 10/09/20 | 110,938 | 7.92 | 8.67 | 0.78 |
| | | | | 10/11/20 | 10,210 | 1.17 | 6.02 | 0.39 |
| | | | | 10/13/20 | 79,031 | 2.92 | 44.43 | 1.15 |
| | | | | 10/16/20 | 14,334 | 0.33 | 0.75 | 0.12 |
| | | | | 10/21/20 | 131,565 | 9.25 | 43.58 | 0.52 |
| | | | | 11/03/20 | 295,664 | 2.75 | 3.90 | 0.61 |
| | | | | 11/13/20 | 67,836 | 4.08 | 14.83 | 0.82 |
| | | | | 11/14/20 | 56,130 | 1.67 | 3.92 | 0.35 |
| | | | | 11/16/20 | 439,815 | 34.83 | 39.87 | 1.77 |
| | | | | 11/23/20 | 5,082 | 5.92 | 20.18 | 0.32 |
| | | | | 11/24/20 | 29,721 | 0.83 | 53.35 | 0.61 |
| | | | | 11/30/20 | 113,915 | 1.75 | 2.77 | 0.38 |
| | | | | 12/16/20 | 411 | 0.25 | 4.50 | 0.35 |
| | | | | 12/19/20 | 13,929 | 18.67 | 78.08 | 1.10 |
| | | | | 12/21/20 | 1,868,834 | 19.92 | 23.23 | 2.33 |
| | | | | 12/25/20 | 5,846 | 2.17 | 33.02 | 0.33 |
| | | | | 12/30/20 | 22,323 | 0.50 | 17.63 | 0.66 |
| | | | | Total | 21,102,048 | 358.40 | 2625.43 | 54.68 |
| | | | | Average | 448,980 | 7.63 | 55.86 | 1.16 |
| | | | | | | | | |
| WA0031682 | **148** | City of Seattle | Lake Washington - Ship Canal | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| WA0031682 | **150** | City of Seattle | Salmon Bay | 01/18/20 | 7,297 | 0.30 | 4.48 | 0.28 |
| | **151** | | | 01/24/20 | 66,353 | 0.80 | 112.50 | 2.42 |
| | | | | 01/28/20 | 39,808 | 0.77 | 211.87 | 4.01 |
| | | | | 02/01/20 | 16,033 | 2.50 | 305.47 | 5.85 |
| | | | | 02/23/20 | 42,076 | 0.40 | 3.03 | 0.26 |
| | | | | 03/24/20 | 123,805 | 2.13 | 24.23 | 0.70 |
| | | | | 03/28/20 | 3 | 1.30 | 8.25 | 0.43 |
| | | | | 03/30/20 | 191 | 0.33 | 34.58 | 0.78 |
| | | | | 03/31/20 | 45,433 | 0.43 | 71.05 | 1.36 |
| | | | | 06/13/20 | 39,548 | 0.47 | 32.85 | 0.38 |
| | | | | 08/06/20 | 5,499 | 0.10 | 1.40 | 0.17 |
| | | | | 09/23/20 | 12,090 | 53.88 | 84.63 | 2.05 |
| | | | | 10/13/20 | 5,226 | 2.85 | 44.23 | 1.05 |
| | | | | 10/21/20 | 42,954 | 0.97 | 74.60 | 0.68 |
| | | | | 11/03/20 | 1,686 | 0.78 | 25.58 | 0.29 |
| | | | | 11/13/20 | 11,451 | 0.42 | 27.35 | 0.91 |
| | | | | 11/14/20 | 63 | 1.25 | 3.37 | 0.39 |
| | | | | 11/16/20 | 33,922 | 28.15 | 33.10 | 1.30 |
| | | | | 11/30/20 | 4,811 | 1.25 | 51.50 | 0.54 |
| | | | | 12/21/20 | 1,548,256 | 11.48 | 17.18 | 2.20 |
| | | | | 12/30/20 | 10,020 | 0.45 | 16.33 | 0.59 |
| | | | | Total | 2,056,525 | 111.01 | 1187.60 | 26.64 |
| | | | | Average | 97,930 | 5.29 | 56.55 | 1.27 |
| | | | | | | | | |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| WA0031682 | **152** | City of Seattle | Salmon Bay | 01/05/20 | 9,365 | 0.37 | 117.30 | 0.94 |
| | | | | 01/07/20 | 106,140 | 2.92 | 157.43 | 1.48 |
| | | | | 01/10/20 | 31,051 | 52.10 | 288.37 | 2.21 |
| | | | | 01/18/20 | 464,278 | 4.18 | 7.78 | 0.55 |
| | | | | 01/21/20 | 1,229,446 | 16.70 | 58.77 | 0.98 |
| | | | | 01/23/20 | 1,675,868 | 71.03 | 162.73 | 2.97 |
| | | | | 01/27/20 | 2,157,203 | 16.57 | 215.07 | 4.20 |
| | | | | 01/29/20 | 85,438 | 6.37 | 245.77 | 4.50 |
| | | | | 01/31/20 | 2,928,455 | 34.58 | 327.23 | 5.51 |
| | | | | 02/05/20 | 1,711,273 | 76.20 | 83.77 | 2.12 |
| | | | | 02/13/20 | 35,571 | 0.63 | 7.98 | 0.11 |
| | | | | 02/15/20 | 196,868 | 2.03 | 24.93 | 0.35 |
| | | | | 02/23/20 | 291,177 | 0.77 | 3.03 | 0.26 |
| | | | | 03/06/20 | 114,044 | 1.72 | 8.27 | 0.44 |
| | | | | 03/24/20 | 1,314,843 | 13.42 | 35.03 | 1.09 |
| | | | | 03/28/20 | 191,695 | 3.68 | 9.15 | 0.52 |
| | | | | 03/30/20 | 523,683 | 39.22 | 72.68 | 1.40 |
| | | | | 04/18/20 | 11,156 | 2.50 | 3.40 | 0.24 |
| | | | | 04/22/20 | 9,878 | 3.40 | 7.95 | 0.40 |
| | | | | 04/25/20 | 58,905 | 3.25 | 3.45 | 0.23 |
| | | | | 04/26/20 | 5,828 | 0.43 | 2.37 | 0.16 |
| | | | | 05/02/20 | 92,075 | 0.87 | 11.02 | 0.22 |
| | | | | 05/16/20 | 289,729 | 3.15 | 16.62 | 0.55 |
| | | | | 05/21/20 | 156,032 | 1.63 | 10.68 | 0.39 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| | | | | 05/30/20 | 946,464 | 10.70 | 11.15 | 1.01 |
| | | | | 06/07/20 | 871 | 0.12 | 1.13 | 0.12 |
| | | | | 06/13/20 | 693,396 | 8.92 | 35.58 | 0.39 |
| | | | | 06/27/20 | 72,964 | 2.68 | 14.97 | 0.62 |
| | | | | 08/06/20 | 57,931 | 0.50 | 1.67 | 0.19 |
| | | | | 09/18/20 | 13,290 | 0.40 | 1.43 | 0.17 |
| | | | | 09/23/20 | 985,630 | 52.93 | 84.63 | 2.05 |
| | | | | 10/09/20 | 169,740 | 9.00 | 9.60 | 0.84 |
| | | | | 10/11/20 | 74,585 | 1.50 | 6.25 | 0.37 |
| | | | | 10/13/20 | 396,829 | 3.25 | 44.23 | 1.05 |
| | | | | 10/21/20 | 581,166 | 1.22 | 74.77 | 0.68 |
| | | | | 11/03/20 | 283,281 | 2.08 | 26.72 | 0.42 |
| | | | | 11/13/20 | 415,643 | 4.92 | 27.68 | 0.91 |
| | | | | 11/14/20 | 159,234 | 2.78 | 3.90 | 0.41 |
| | | | | 11/16/20 | 1,552,046 | 50.75 | 53.70 | 1.89 |
| | | | | 11/23/20 | 3,483 | 0.28 | 14.55 | 0.14 |
| | | | | 11/24/20 | 27,961 | 0.98 | 53.10 | 0.46 |
| | | | | 11/30/20 | 394,256 | 1.95 | 51.78 | 0.54 |
| | | | | 12/08/20 | 172,016 | 3.38 | 18.68 | 0.50 |
| | | | | 12/16/20 | 158,537 | 8.05 | 8.77 | 0.50 |
| | | | | 12/19/20 | 52,282 | 18.83 | 79.30 | 1.08 |
| | | | | 12/21/20 | 5,679,960 | 22.50 | 25.12 | 2.39 |
| | | | | 12/25/20 | 280,183 | 6.50 | 38.58 | 0.55 |
| | | | | 12/27/20 | 13,424 | 1.48 | 74.48 | 0.76 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| | | | | 12/29/20 | 282,651 | 15.95 | 17.00 | 0.60 |
| | | | | Total | 27,157,824 | 589.37 | 2659.57 | 50.46 |
| | | | | Average | 554,241 | 12.03 | 54.28 | 1.03 |
| | | | | | | | | |
| WA0031682 | **161** | City of Seattle | Lake Washington | *No combined sewer overflows during 2020* | | | | |
| | | | | | | | | |
| WA0031682 | **165** | City of Seattle | Lake Washington | 12/21/20 | 127,525 | 13.42 | 17.47 | 1.61 |
| | | | | Total | 127,525 | 13.42 | 17.47 | 1.61 |
| | | | | Average | 127,525 | 13.42 | 17.47 | 1.61 |
| | | | | | | | | |
| WA0031682 | **168** | City of Seattle | Lake Washington | 02/01/20 | 299,507 | 6.92 | 309.37 | 9.23 |
| | | | | 12/21/20 | 229,374 | 4.92 | 25.73 | 1.98 |
| | | | | Total | 528,881 | 11.84 | 335.10 | 11.21 |
| | | | | Average | 264,440 | 5.92 | 167.55 | 5.61 |
| | | | | | | | | |
| WA0031682 | **169** | City of Seattle | Lake Washington | 02/01/20 | 169,198 | 2.83 | 309.37 | 9.23 |
| | | | | 12/21/20 | 1,083,921 | 17.87 | 34.08 | 2.09 |
| | | | | Total | 1,253,119 | 20.70 | 343.45 | 11.32 |
| | | | | Average | 626,559 | 10.35 | 171.73 | 5.66 |
| | | | | | | | | |
| WA0031682 | **170** | City of Seattle | Lake Washington | 12/21/20 | 13,634 | 1.33 | 18.70 | 1.79 |
| | | | | Total | 13,634 | 1.33 | 18.70 | 1.79 |
| | | | | Average | 13,634 | 1.33 | 18.70 | 1.79 |
| | | | | | | | | |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| WA0031682 | **171** | City of Seattle | Lake Washington | 02/01/20 | 132,030 | 3.40 | 269.27 | 6.13 |
| | | | | 12/21/20 | 712,250 | 5.33 | 211.82 | 3.79 |
| | | | | Total | 844,280 | 8.73 | 481.08 | 9.92 |
| | | | | Average | 422,140 | 4.37 | 240.54 | 4.96 |
| | | | | | | | | |
| WA0031682 | **174** | City of Seattle | Lake Washington Canal | 01/21/20 | 219,608 | 1.25 | 58.52 | 1.08 |
| | | | | 01/27/20 | 127,833 | 1.33 | 204.68 | 3.73 |
| | | | | 02/01/20 | 672,225 | 3.67 | 307.43 | 5.92 |
| | | | | 02/05/20 | 2,387,776 | 30.58 | 52.10 | 2.29 |
| | | | | 09/24/20 | 275,797 | 1.67 | 58.07 | 1.69 |
| | | | | 12/21/20 | 1,915,914 | 14.75 | 22.40 | 2.29 |
| | | | | Total | 5,599,153 | 53.25 | 703.20 | 17.00 |
| | | | | Average | 933,192 | 8.88 | 117.20 | 2.83 |
| | | | | | | | | |
| WA0031682 | **175** | City of Seattle | Lake Union | 12/21/20 | 327,474 | 1.55 | 16.13 | 1.97 |
| | | | | Total | 327,474 | 1.55 | 16.13 | 1.97 |
| | | | | Average | 327,474 | 1.55 | 16.13 | 1.97 |
| | | | | 12/21/20 | 327,474 | 1.55 | 16.13 | 1.97 |
| | | | | | | | | |

Notes:

1. Dry Weather Overflow
2. Exacerbated CSO

| Table 5-5. Comparison of 2020 and Baseline CSOs by Outfall | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Outfall Number | 2016 - 2020 Average CSO Frequency (No./year) | 2020 CSO Discharge Events | | | Receiving Water | 2010 Baseline CSO | | 2020 CSOs Compared to 2010 Baseline CSOs |
| | | Frequency (No./year) | Duration (hours) | Volume (gallons) | | Frequency (No./year) | Volume (MG/year) | |
| **12** | 0 | 0 | 0.00 | 0 | Lake Washington | 0 | 0 | Equals |
| **13** | 2.8 | 5 | 36.11 | 7,707,124 | Lake Washington | 12 | 6.7 | Frequency Below, Volume Above |
| **14** | 0.6 | 1 | 1.00 | 5,005 | Lake Washington | 0 | 0 | Above |
| **15** | 2.2 | 1 | 3.73 | 372,636 | Lake Washington | 1.2 | 0.3 | Frequency Below, Volume Above |
| **16** | 0.4 | 1 | 0.33 | 575 | Lake Washington | 0 | 0 | Above |
| **18** | 1.4 | 2 | 25.75 | 2,421,116 | Union Bay | 6.6 | 0.5 | Frequency Below, Volume Above |
| **19** | 0.2 | 1 | 0.16 | 215 | Union Bay | 0.2 | 0 | Above |
| **20** | 3.4 | 3 | 30.57 | 834,150 | Union Bay | 2.6 | 0.1 | Above |
| **22** | 0.4 | 1 | 0.95 | 461 | Union Bay | 0.7 | 0.1 | Frequency Above, Volume Below |
| **24** | 0.8 | 1 | 2.33 | 540,526 | Lake Washington | 0.2 | 0 | Above |
| **25** | 0.8 | 1 | 2.30 | 812,813 | Lake Washington | 2.8 | 1.6 | Below |
| **27** | 0 | 0 | 0.00 | 0 | Lake Washington | 0 | 0 | Equals |
| **28** | 3.6 | 4 | 2.71 | 55,823 | Lake Washington | 15 | 0.4 | Below |
| **29** | 3.8 | 2 | 3.70 | 105,678 | Lake Washington | 4.7 | 0.3 | Below |
| **30** | 2.6 | 3 | 4.51 | 89,469 | Lake Washington | 5.4 | 0.7 | Below |
| **31** | 5.4 | 6 | 42.16 | 864,078 | Lake Washington | 9.3 | 0.5 | Frequency Below, Volume Above |
| **32** | 2.8 | 3 | 12.63 | 279,919 | Lake Washington | 8.4 | 0.3 | Below |
| **33** | NA | NA | NA | NA | Lake Washington | NA | NA | Removed from service 2016 |
| **34** | 0.8 | 1 | 2.75 | 139,256 | Lake Washington | 1.4 | 0.5 | Below |
| **35** | 0.2 | 1 | 0.27 | 2,972 | Lake Washington | 2 | 0.3 | Below |
| **36** | 0.4 | 0 | 0.00 | 0 | Lake Washington | 2.7 | 0.1 | Below |
| **38** | 1.2 | 1 | 3.75 | 355,975 | Lake Washington | 0.7 | 0.4 | Frequency Above, Volume Below |
| **40** | 1.6 | 2 | 52.97 | 327,145 | Lake Washington | 6 | 0.8 | Below |
| **41** | 2 | 2 | 52.97 | 327,145 | Lake Washington | 7.5 | 0.9 | Below |
| **42** | 1 | 1 | 7.40 | 176,049 | Lake Washington | 0.6 | 0.02 | Above |
| **43** | 4 | 4 | 81.42 | 785,242 | Lake Washington | 7 | 0.7 | Frequency Below, Volume Above |
| **44** | 9.6 | 1 | 0.40 | 3,068 | Lake Washington | 13 | 9.3 | Below |
| **45** | 3.8 | 1 | 2.43 | 113,592 | Lake Washington | 5.9 | 1.1 | Below |
| **46** | 0.4 | 2 | 13.15 | 220,085 | Lake Washington | 6.5 | 0.9 | Below |

| Outfall Number | 2016 - 2020 Average CSO Frequency (No./year) | 2020 CSO Discharge Events | | | Receiving Water | 2010 Baseline CSO | | 2020 CSOs Compared to 2010 Baseline CSOs |
|---|---|---|---|---|---|---|---|---|
| | | Frequency (No./year) | Duration (hours) | Volume (gallons) | | Frequency (No./year) | Volume (MG/year) | |
| **47** | 2.2 | 2 | 8.56 | 1,144,837 | Lake Washington | 5.6 | 1.8 | Below |
| **48** | 0 | 0 | 0.00 | 0 | Lake Washington | 0 | 0 | Equals |
| **49** | 3.6 | 4 | 27.19 | 2,877,370 | Lake Washington | 1.6 | 0.8 | Above |
| **57** | 0 | 0 | 0.00 | 0 | Puget Sound | 0 | 0 | Equals |
| **59** | 3 | 1 | 0.92 | 119,284 | Salmon Bay | 0.2 | 0.4 | Frequency Above, Volume Below |
| **60** | 1.4 | 0 | 0.00 | 0 | Salmon Bay | 1.7 | 0.8 | Below |
| **61** | 1 | 2 | 1.21 | 71,812 | Elliott Bay | 0 | 0 | Above |
| **62** | 1.4 | 2 | 0.50 | 8,674 | Elliott Bay | 0.7 | 0 | Above |
| **64** | 0 | 0 | 0.00 | 0 | Elliott Bay | 0.1 | 0 | Frequency Below, Volume Equals |
| **68** | 1.6 | 2 | 8.51 | 660,538 | Elliott Bay | 1.4 | 1.3 | Frequency Above, Volume Below |
| **69** | 1.8 | 2 | 2.12 | 717,160 | Elliott Bay | 4.4 | 1.4 | Below |
| **70** | 0 | 0 | 0.00 | 0 | Elliott Bay | 0.9 | 0.2 | Removed from service 2020 |
| **71** | 2.4 | 1 | 1.40 | 309,386 | Elliott Bay | 4.3 | 1.3 | Below |
| **72** | 0 | 0 | 0.00 | 0 | Elliott Bay | 1.2 | 0.3 | Removed from service 2020 |
| **78** | 0 | 0 | 0.00 | 0 | Elliott Bay | 0.3 | 0.2 | Below |
| **80** | 0 | 0 | 0.00 | 0 | Elliott Bay | 0 | 0 | Equals |
| **83** | 0 | 0 | 0.00 | 0 | Puget Sound | 0 | 0 | Equals |
| **85** | 0 | 0 | 0.00 | 0 | Puget Sound | 0 | 0 | Equals |
| **88** | 0.4 | 1 | 1.03 | 1,047,258 | Puget Sound | 0.3 | 0.2 | Above |
| **90** | 0 | 0 | 0.00 | 0 | Puget Sound | 0.2 | 0 | Frequency Below, Volume Equals |
| **91** | 0 | 0 | 0.00 | 0 | Puget Sound | 0 | 0 | Equals |
| **94** | 0 | 0 | 0.00 | 0 | Puget Sound | 0.1 | 0 | Frequency Below, Volume Equals |
| **95** | 1.2 | 2 | 3.07 | 28,802 | Puget Sound | 3 | 0.4 | Below |
| **99** | 3.2 | 2 | 12.02 | 1,144,773 | W Waterway - Duwamish River | 0.5 | 2.8 | Frequency Above, Volume Below |
| **107** | 3 | 1 | 4.57 | 90,815 | E Waterway - Duwamish River | 3.8 | 1.9 | Below |
| **111** | 1 | 1 | 4.47 | 292,182 | Duwamish River | 3 | 7.9 | Below |
| **120** | 0 | 0 | 0.00 | 0 | Lake Union | 0 | 0 | Equals |
| **121** | 0 | 0 | 0.00 | 0 | Lake Union | 0.1 | 0 | Frequency Below, Volume Equals |
| **124** | 0 | 0 | 0.00 | 0 | Lake Union | 0 | 0 | Equals |

| Outfall Number | 2016 - 2020 Average CSO Frequency (No./year) | 2020 CSO Discharge Events | | | Receiving Water | 2010 Baseline CSO | | 2020 CSOs Compared to 2010 Baseline CSOs |
|---|---|---|---|---|---|---|---|---|
| | | Frequency (No./year) | Duration (hours) | Volume (gallons) | | Frequency (No./year) | Volume (MG/year) | |
| **127** | 0 | 0 | 0.00 | 0 | Lake Union | 0.7 | 0.1 | Below |
| **129** | 0 | 0 | 0.00 | 0 | Lake Union | 0.1 | 0 | Frequency Below, Volume Equals |
| **130** | 0.2 | 1 | 0.92 | 86,940 | Lake Union | 0 | 0 | Above |
| **131** | 0 | 0 | 0.00 | 0 | Lake Union | 0.1 | 0 | Frequency Below, Volume Equals |
| **132** | 0.4 | 2 | 1.50 | 441,749 | Lake Union | 0.7 | 0 | Above |
| **134** | 0 | 0 | 0.00 | 0 | Lake Union | 0 | 0 | Equals |
| **135** | 0.6 | 3 | 2.16 | 11,528 | Lake Union | 0.3 | 0 | Above |
| **136** | 0 | 0 | 0.00 | 0 | Lake Union | 0 | 0 | Equals |
| **138** | 2 | 3 | 28.00 | 429,730 | Portage Bay | 2.3 | 2 | Above |
| **139** | 2.2 | 2 | 5.75 | 334,584 | Portage Bay | 0.7 | 1.4 | Frequency Above, Volume Below |
| **140** | 5.8 | 3 | 8.91 | 267,340 | Portage Bay | 4.1 | 0.3 | Below |
| **141** | 0 | 0 | 0.00 | 0 | Portage Bay | 0.1 | 0 | Frequency Below, Volume Equals |
| **144** | 0 | 0 | 0.00 | 0 | Lake Union | 0.1 | 0.2 | Below |
| **145** | 0 | 0 | 0.00 | 0 | Lake Union | 0 | 0 | Equals |
| **146** | 0 | 0 | 0.00 | 0 | Lake Union | 0 | 0 | Equals |
| **147** | 43.6 | 47 | 358.40 | 21,102,048 | Lake Union | 33 | 19 | Above |
| **148** | 0.2 | 0 | 0.00 | 0 | Lake Washington Ship Canal | 0 | 0 | Equals |
| **150/151** | 22.4 | 21 | 111.01 | 2,056,525 | Salmon Bay | 15 | 2 | Above |
| **152** | 48 | 49 | 589.37 | 27,157,824 | Salmon Bay | 15 | 9.7 | Above |
| **161** | 0 | 0 | 0.00 | 0 | Lake Washington | 0 | 0 | Equals |
| **165** | 1 | 1 | 13.42 | 127,525 | Lake Washington | 1.1 | 0.02 | Frequency Below, Volume Above |
| **168** | 1.2 | 2 | 11.84 | 528,881 | Longfellow Creek | 3.9 | 1.6 | Below |
| **169** | 1.4 | 2 | 20.70 | 1,253,119 | Longfellow Creek | 2.2 | 49 | Below |
| **170** | 0.6 | 1 | 1.33 | 13,634 | Longfellow Creek | 0.4 | 0.1 | Frequency Above, Volume Below |
| **171** | 2.2 | 2 | 8.73 | 844,280 | Lake Washington | 4.1 | 0.75 | Frequency Below, Volume Above |
| **174** | 6.6 | 6 | 53.25 | 5,599,153 | Lake Washington Ship Canal | 11 | 5.9 | Below |
| **175** | 0.4 | 1 | 1.55 | 327,474 | Lake Union | 0.7 | 0 | Above |
| **Total** | **222** | **220** | **1678.86** | **85,635,340** | | **251** | **140** | |

## Table 5-6. 2016-2020 Summary Comparison of CSOs by Outfall

| Outfall No. | Frequency (Number per Year) | | | | | Duration (Hours per Year) | | | | | Volume (Gallons per Year) | | | | | Receiving Water |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2016 | 2017 | 2018 | 2019 | 2020 | 2016 | 2017 | 2018 | 2019 | 2020 | 2016 | 2017 | 2018 | 2019 | 2020 | |
| 12 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Lake Washington |
| 13 | 2 | 4 | 1 | 2 | 5 | 22.93 | 35.90 | 4.17 | 30.87 | 36.11 | 389,145 | 4,106,126 | 360,187 | 10,525,382 | 7,707,124 | Lake Washington |
| 14 | 1 | 1 | 0 | 0 | 1 | 0.42 | 0.08 | 0.00 | 0.00 | 1.00 | 14 | 1 | 0 | 0 | 5,005 | Lake Washington |
| 15 | 3 | 4 | 2 | 1 | 1 | 5.30 | 5.00 | 1.97 | 20.17 | 3.73 | 43,665 | 135,288 | 19,287 | 162,483 | 372,636 | Lake Washington |
| 16 | 0 | 0 | 0 | 1 | 1 | 0.00 | 0.00 | 0.00 | 0.18 | 0.33 | 0 | 0 | 0 | 1,269 | 575 | Lake Washington |
| 18 | 3 | 1 | 1 | 1 | 2 | 79.17 | 1.47 | 4.97 | 26.10 | 25.75 | 1,703,725 | 44,582 | 392,952 | 3,225,836 | 2,421,116 | Union Bay |
| 19 | 0 | 0 | 0 | 0 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0 | 0 | 0 | 0 | 215 | Union Bay |
| 20 | 4 | 6 | 3 | 1 | 3 | 18.50 | 68.47 | 14.80 | 39.00 | 30.56 | 277,377 | 1,693,470 | 530,191 | 1,595,375 | 834,150 | Union Bay |
| 22 | 1 | 0 | 0 | 0 | 1 | 0.73 | 0.00 | 0.00 | 0.00 | 0.95 | 1,002 | 0 | 0 | 0 | 461 | Union Bay |
| 24 | 1 | 1 | 0 | 1 | 1 | 0.67 | 6.50 | 0.00 | 2.13 | 2.33 | 39,762 | 877,185 | 0 | 41,198 | 540,526 | Lake Washington |
| 25 | 1 | 1 | 0 | 1 | 1 | 0.60 | 5.67 | 0.00 | 2.33 | 2.30 | 48,394 | 459,487 | 0 | 116,115 | 812,813 | Lake Washington |
| 27 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Lake Washington |
| 28 | 4 | 4 | 1 | 5 | 4 | 0.53 | 5.37 | 1.87 | 14.02 | 2.52 | 4,174 | 24,045 | 6,611 | 21,771 | 55,823 | Lake Washington |
| 29 | 9 | 5 | 1 | 2 | 2 | 13.33 | 75.60 | 3.40 | 7.72 | 3.70 | 23,043 | 297,430 | 53,616 | 157,589 | 105,678 | Lake Washington |
| 30 | 5 | 3 | 1 | 1 | 3 | 3.85 | 14.38 | 3.12 | 7.30 | 4.51 | 2,380 | 24,363 | 14,492 | 39,810 | 89,469 | Lake Washington |
| 31 | 10 | 7 | 3 | 1 | 6 | 63.26 | 86.10 | 3.00 | 28.67 | 42.16 | 689,411 | 1,271,673 | 213,963 | 547,576 | 864,078 | Lake Washington |
| 32 | 4 | 3 | 3 | 1 | 3 | 3.07 | 50.10 | 3.80 | 11.23 | 12.63 | 20,455 | 251,033 | 54,332 | 232,294 | 279,919 | Lake Washington |
| 33 | 0 | NA | NA | NA | NA | 0.00 | NA | NA | NA | NA | 0 | NA | NA | NA | N/A | Lake Washington |
| 34 | 0 | 1 | 1 | 1 | 1 | 0.00 | 4.23 | 6.90 | 3.23 | 2.75 | 0 | 98,569 | 347,045 | 27,359 | 139,256 | Lake Washington |
| 35 | 0 | 0 | 0 | 0 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0 | 0 | 0 | 0 | 2,972 | Lake Washington |
| 36 | 2 | 0 | 0 | 0 | 0 | 2.70 | 0.00 | 0.00 | 0.00 | 0.00 | 8,215 | 0 | 0 | 0 | 0 | Lake Washington |
| 38 | 0 | 3 | 1 | 1 | 1 | 0.00 | 12.53 | 6.43 | 9.60 | 3.75 | 0 | 587,079 | 113,752 | 409,725 | 355,975 | Lake Washington |
| 40 | 1 | 3 | 1 | 1 | 2 | 67.22 | 73.92 | 15.42 | 38.23 | 52.97 | 455,337 | 2,052,156 | 232,494 | 915,369 | 327,145 | Lake Washington |
| 41 | 3 | 3 | 1 | 1 | 2 | 67.22 | 73.92 | 15.42 | 38.23 | 52.97 | 455,337 | 2,052,156 | 232,494 | 915,369 | 327,145 | Lake Washington |
| 42 | 0 | 2 | 1 | 1 | 1 | 0.00 | 12.20 | 9.10 | 14.00 | 7.40 | 0 | 250,946 | 199,773 | 258,181 | 176,049 | Lake Washington |

| Outfall No. | Frequency (Number per Year) | | | | | Duration (Hours per Year) | | | | | Volume (Gallons per Year) | | | | | Receiving Water |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2016 | 2017 | 2018 | 2019 | 2020 | 2016 | 2017 | 2018 | 2019 | 2020 | 2016 | 2017 | 2018 | 2019 | 2020 | |
| 43 | 5 | 5 | 3 | 3 | 4 | 57.17 | 71.00 | 26.25 | 67.42 | 81.42 | 1,687,465 | 2,837,201 | 173,312 | 1,217,192 | 785,242 | Lake Washington |
| 44 | 34 | 11 | 1 | 1 | 1 | 452.47 | 302.23 | 13.75 | 57.67 | 0.40 | 9,129,326 | 16,067,339 | 566,412 | 5,435,510 | 3,068 | Lake Washington |
| 45 | 12 | 5 | 0 | 1 | 1 | 68.85 | 85.27 | 0.00 | 9.70 | 2.43 | 322,189 | 1,131,582 | 0 | 52,700 | 113,592 | Lake Washington |
| 46 | 0 | 0 | 0 | 0 | 2 | 0.00 | 0.00 | 0.00 | 0.00 | 13.15 | 0 | 0 | 0 | 0 | 220,085 | Lake Washington |
| 47 | 2 | 3 | 1 | 3 | 2 | 1.92 | 18.08 | 7.77 | 19.42 | 8.56 | 109,548 | 2,094,545 | 520,612 | 2,477,342 | 1,144,837 | Lake Washington |
| 48 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Lake Washington |
| 49 | 4 | 5 | 3 | 2 | 4 | 15.19 | 70.90 | 17.70 | 40.70 | 27.19 | 819,793 | 6,726,873 | 1,391,210 | 6,930,074 | 2,877,370 | Lake Washington |
| 57 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Puget Sound |
| 59 | 1 | 8 | 4 | 1 | 1 | 0.42 | 26.07 | 21.42 | 0.75 | 0.92 | 76,208 | 236,432 | 591,114 | 195,533 | 119,284 | Salmon Bay |
| 60 | 2 | 3 | 0 | 2 | 0 | 4.70 | 7.60 | 0.00 | 3.37 | 0.00 | 20,813 | 39,088 | 0 | 25,117 | 0 | Salmon Bay |
| 61 | 0 | 2 | 0 | 1 | 2 | 0.00 | 0.40 | 0.00 | 0.67 | 1.21 | 0 | 14,854 | 0 | 37,629 | 71,812 | Elliott Bay |
| 62 | 1 | 4 | 0 | 0 | 2 | 4.42 | 0.92 | 0.00 | 0.00 | 0.50 | 1,868 | 3,434 | 0 | 0 | 8,674 | Elliott Bay |
| 64 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Elliott Bay |
| 68 | 1 | 2 | 1 | 2 | 2 | 2.10 | 0.63 | 0.13 | 26.94 | 8.51 | 134,668 | 14,620 | 766 | 983,018 | 660,538 | Elliott Bay |
| 69 | 4 | 2 | 0 | 1 | 2 | 0.90 | 1.18 | 0.00 | 13.43 | 2.12 | 65,281 | 146,360 | 0 | 47,509 | 717,160 | Elliott Bay |
| 70 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Elliott Bay |
| 71 | 2 | 5 | 2 | 2 | 1 | 1.77 | 7.83 | 3.40 | 20.03 | 1.40 | 140,046 | 400,921 | 84,372 | 620,074 | 309,386 | Elliott Bay |
| 72 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Elliott Bay |
| 78 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Elliott Bay |
| 80 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Elliott Bay |
| 83 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Puget Sound |
| 85 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Puget Sound |
| 88 | 0 | 1 | 0 | 0 | 1 | 0.00 | 1.43 | 0.00 | 0.00 | 1.03 | 0 | 51,735 | 0 | 0 | 1,047,258 | Puget Sound |
| 90 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Puget Sound |
| 91 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Puget Sound |
| 94 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Puget Sound |
| 95 | 0 | 2 | 0 | 2 | 2 | 0.00 | 1.14 | 0.00 | 6.73 | 3.07 | 0 | 14,958 | 0 | 6,673 | 28,802 | Puget Sound |
| 99 | 5 | 5 | 3 | 1 | 2 | 23.00 | 74.23 | 13.30 | 10.20 | 12.02 | 1,053,542 | 4,548,780 | 1,083,831 | 740,333 | 1,144,773 | W Waterway - Duwamish River |

| Outfall No. | Frequency (Number per Year) | | | | | Duration (Hours per Year) | | | | | Volume (Gallons per Year) | | | | | Receiving Water |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2016 | 2017 | 2018 | 2019 | 2020 | 2016 | 2017 | 2018 | 2019 | 2020 | 2016 | 2017 | 2018 | 2019 | 2020 | |
| 107 | 5 | 6 | 2 | 1 | 1 | 42.58 | 63.15 | 3.77 | 39.03 | 4.57 | 427,231 | 947,028 | 29,605 | 176,732 | 90,815 | E Waterway - Duwamish River |
| 111 | 0 | 2 | 1 | 1 | 1 | 0.00 | 5.93 | 2.77 | 7.97 | 4.47 | 0 | 317,148 | 56,370 | 1,401,251 | 292,182 | Duwamish River |
| 120 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Lake Union |
| 121 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0 | Lake Union |
| 124 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Lake Union |
| 127 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Lake Union |
| 129 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Lake Union |
| 130 | 0 | 0 | 0 | 0 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.92 | 0 | 0 | 0 | 0 | 86,940 | Lake Union |
| 131 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Lake Union |
| 132 | 0 | 0 | 0 | 0 | 2 | 0.00 | 0.00 | 0.00 | 0.00 | 1.50 | 0 | 0 | 0 | 0 | 441,749 | Lake Union |
| 134 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Lake Union |
| 135 | 0 | 0 | 0 | 0 | 3 | 0.00 | 0.00 | 0.00 | 0.00 | 2.16 | 0 | 0 | 0 | 0 | 11,528 | Lake Union |
| 136 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Lake Union |
| 138 | 3 | 3 | 1 | 0 | 3 | 3.23 | 22.00 | 6.83 | 0.00 | 28.00 | 85,056 | 392,526 | 65,996 | 0 | 429,730 | Portage Bay |
| 139 | 0 | 3 | 3 | 3 | 2 | 0.00 | 10.50 | 12.53 | 37.11 | 5.75 | 0 | 389,283 | 443,323 | 1,849,563 | 334,584 | Portage Bay |
| 140 | 10 | 7 | 4 | 5 | 3 | 3.29 | 36.90 | 9.28 | 26.67 | 8.91 | 48,134 | 415,391 | 103,400 | 569,810 | 267,340 | Portage Bay |
| 141 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Portage Bay |
| 144 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Lake Union |
| 145 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Lake Union |
| 146 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Lake Union |
| 147 | 58 | 42 | 37 | 34 | 47 | 531.66 | 537.67 | 520.08 | 179.12 | 358.40 | 13,068,417 | 25,042,017 | 15,031,921 | 21,385,295 | 21,102,048 | Lake Union |
| 148 | 0 | 0 | 0 | 1 | 0 | 0.00 | 0.00 | 0.00 | 1.25 | 0.00 | 0 | 0 | 0 | 23,649 | 0 | Lake Washington Ship Canal |
| 150/151 | 31 | 29 | 22 | 9 | 21 | 249.07 | 159.87 | 152.14 | 22.17 | 111.01 | 2,226,176 | 4,695,385 | 2,916,004 | 2,349,832 | 2,056,525 | Salmon Bay |
| 152 | 63 | 50 | 45 | 33 | 49 | 1052.89 | 879.15 | 777.04 | 291.33 | 589.37 | 42,062,058 | 56,062,735 | 22,660,613 | 19,992,281 | 27,157,824 | Salmon Bay |
| 161 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Lake Washington |
| 165 | 0 | 2 | 1 | 1 | 1 | 0.00 | 4.60 | 0.73 | 0.17 | 13.42 | 0 | 31,973 | 732 | 1,754 | 127,525 | Lake Washington |
| 168 | 0 | 2 | 1 | 1 | 2 | 0.00 | 30.33 | 3.92 | 24.82 | 11.84 | 0 | 3,932,249 | 52,250 | 1,477,082 | 528,881 | Longfellow Creek |

| Outfall No. | Frequency (Number per Year) | | | | | Duration (Hours per Year) | | | | | Volume (Gallons per Year) | | | | | Receiving Water |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2016 | 2017 | 2018 | 2019 | 2020 | 2016 | 2017 | 2018 | 2019 | 2020 | 2016 | 2017 | 2018 | 2019 | 2020 | |
| **169** | 1 | 3 | 0 | 1 | 2 | 6.27 | 22.10 | 0.00 | 27.38 | 20.70 | 664,680 | 1,783,155 | 0 | 1,335,434 | 1,253,119 | Longfellow Creek |
| **170** | 0 | 1 | 0 | 1 | 1 | 0.00 | 3.53 | 0.00 | 2.32 | 1.33 | 0 | 15,194 | 0 | 13,333 | 13,634 | Longfellow Creek |
| **171** | 2 | 3 | 1 | 3 | 2 | 1.53 | 9.90 | 3.77 | 18.90 | 8.73 | 90,094 | 481,749 | 266,958 | 1,759,209 | 844,280 | Lake Washington |
| **174** | 12 | 7 | 6 | 2 | 6 | 83.34 | 50.67 | 27.17 | 43.50 | 53.25 | 9,106,686 | 4,176,148 | 3,845,179 | 5,368,115 | 5,599,153 | Lake Washington Ship Canal |
| **175** | 0 | 0 | 1 | 0 | 1 | 0.00 | 0.00 | 3.08 | 0.00 | 1.55 | 0 | 0 | 366,058 | 0 | 327,474 | Lake Union |
| **Total** | **312** | **275** | **164** | **141** | **220** | **2,956** | **3,037** | **1,721** | **1,292** | **1,679** | **85,500,716** | **147,236,290** | **53,021,226** | **95,664,745** | **85,635,340** | |

| Table 5-7. 2016-2020 Summary Comparison of CSOs by Receiving Water | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Receiving Water | Frequency (Number per Year) | | | | | Duration (Hours per Year) | | | | | Volume (Gallons per Year) | | | | |
| | 2016 | 2017 | 2018 | 2019 | 2020 | 2016 | 2017 | 2018 | 2019 | 2020 | 2016 | 2017 | 2018 | 2019 | 2020 |
| Duwamish River | 0 | 2 | 1 | 1 | 1 | 0 | 6 | 3 | 8 | 5 | 0 | 317,148 | 56,370 | 1,401,251 | 292,182 |
| East Waterway | 5 | 6 | 2 | 1 | 1 | 43 | 63 | 4 | 39 | 5 | 427,231 | 947,028 | 29,605 | 176,732 | 90,815 |
| Elliott Bay | 8 | 15 | 3 | 6 | 9 | 9 | 11 | 4 | 61 | 14 | 341,862 | 580,189 | 85,138 | 1,688,230 | 1,767,570 |
| Lake Union | 58 | 42 | 39 | 34 | 54 | 532 | 538 | 523 | 179 | 364 | 13,068,417 | 25,042,017 | 15,397,980 | 21,385,295 | 21,969,739 |
| Lake Washington | 105 | 79 | 27 | 35 | 53 | 848 | 1,023 | 155 | 442 | 387 | 14,337,749 | 41,858,799 | 4,767,281 | 32,245,270 | 18,278,186 |
| Lake Washington - Ship Canal | 12 | 7 | 6 | 3 | 6 | 83 | 51 | 27 | 45 | 53 | 9,106,686 | 4,176,148 | 3,845,179 | 5,391,764 | 5,599,153 |
| Longfellow Creek | 1 | 6 | 1 | 3 | 5 | 6 | 56 | 4 | 55 | 34 | 664,680 | 5,730,598 | 52,250 | 2,825,850 | 1,795,633 |
| Portage Bay | 13 | 13 | 8 | 8 | 8 | 7 | 69 | 29 | 64 | 43 | 133,190 | 1,197,199 | 612,719 | 2,419,373 | 1,031,654 |
| Puget Sound | 0 | 3 | 0 | 2 | 3 | 0 | 3 | 0 | 7 | 4 | 0 | 66,693 | 0 | 6,673 | 1,076,060 |
| Salmon Bay | 97 | 90 | 64 | 45 | 71 | 1,307 | 1,073 | 950 | 318 | 701 | 44,385,255 | 61,033,640 | 26,167,731 | 22,562,763 | 29,333,633 |
| Union Bay | 8 | 7 | 4 | 2 | 7 | 98 | 70 | 20 | 65 | 57 | 1,982,104 | 1,738,052 | 923,143 | 4,821,211 | 3,255,942 |
| West Waterway | 5 | 5 | 3 | 1 | 2 | 23 | 74 | 13 | 10 | 12 | 1,053,542 | 4,548,780 | 1,083,831 | 740,333 | 1,144,773 |
| TOTAL: | 312 | 275 | 158 | 141 | 220 | 2,956 | 3,037 | 1,732 | 1,292 | 1,679 | 85,500,716 | 147,236,290 | 53,021,226 | 95,664,745 | 85,635,340 |

**Table 5-8. Outfalls Meeting Performance Standard for Controlled CSOs Based on Flow Monitoring Results and Modeling**

| Outfall Number | Number of Combined Sewer Overflows Per Year [1] | | | | | | | | | | | | | | | | | | | | Average Annual Overflow Frequency | Meets Performance Standard? [2] | Long-Term Simulation Source | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | | | | |
| **12** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | Yes | N/A | 3 |
| **13** | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 0 | 2 | 1 | 0 | 1 | 1 | 4 | 5 | 2 | 4 | 1 | 2 | 5 | 1.9 | No | Mike URBAN results, March 2017 | 4 |
| **14** | | | | | | | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0.4 | Yes | N/A | 5 |
| **15** | 1 | 1 | 2 | 1 | 1 | 3 | 1 | 0 | 2 | 1 | 1 | 1 | 2 | 6 | 7 | 3 | 4 | 2 | 1 | 1 | 2.1 | No | Mike URBAN results, March 2017 | 4 |
| **16** | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.2 | Yes | N/A | 3 |
| **18** | 0 | 0 | 0 | 2 | 1 | 0 | 3 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 2 | 0.8 | Yes | Mike URBAN results, October 2019 | 6 |
| **19** | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.2 | Yes | N/A | 3 |
| **20** | 0 | 0 | 2 | 1 | 0 | 3 | 1 | 0 | 3 | 3 | 3 | 2 | 2 | 5 | 8 | 4 | 6 | 3 | 1 | 3 | 2.5 | No | LTCP Long Term Simulation Results February 2013 | 7 |
| **22** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0.2 | Yes | EPA-SWMM results, February 2019 | 8 |
| **24** | 0 | 0 | 2 | 2 | 0 | 4 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0.9 | Yes | LTCP Long Term Simulation Results February 2013 | 7 |
| **25** | 0 | 0 | 2 | 1 | 0 | 3 | 1 | 1 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0.9 | Yes | LTCP Long Term Simulation Results February 2013 | 9 |
| **27** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | Mike URBAN results, January 2019 | 10 |
| **28** | 0 | 2 | 1 | 2 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 3 | 1 | 5 | 4 | 1.5 | No | Mike URBAN results, January 2019 | 10 |
| **29** | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 2 | 2 | 0.6 | Yes | Mike URBAN results, January 2019 | 10 |
| **30** | 1 | 1 | 2 | 2 | 1 | 4 | 1 | 1 | 2 | 1 | 1 | 3 | 3 | 5 | 5 | 3 | 4 | 1 | 1 | 3 | 2.3 | No | Mike URBAN results, January 2019 | 10 |
| **31** | 2 | 2 | 2 | 3 | 2 | 4 | 1 | 1 | 5 | 2 | 2 | 4 | 3 | 9 | 9 | 6 | 7 | 3 | 1 | 6 | 3.7 | No | Mike URBAN results, January 2019 | 10 |
| **32** | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 2 | 1 | 3 | 1 | 3 | 1.2 | No | Mike URBAN results, January 2019 | 10 |
| **33** | | | | | | | | | | | | | | | | | | | | 0 | NA | NA | NA | 11 |
| **34** | 0 | 1 | 2 | 1 | 0 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1.0 | Yes | Mike URBAN results, January 2019 | 10 |
| **35** | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.2 | Yes | Mike URBAN results, January 2019 | 10 |

| Outfall Number | Number of Combined Sewer Overflows Per Year [1] | | | | | | | | | | | | | | | | | | | | Average Annual Overflow Frequency | Meets Performance Standard? [2] | Long-Term Simulation Source | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | | | | |
| **36** | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | Yes | Mike URBAN results, January 2019 | 10 |
| **38** | 1 | 1 | 0 | 0 | 0 | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 3 | 1 | 1 | 1 | 0.8 | Yes | Mike URBAN results, June 2018 | 12 |
| **40** | 3 | 2 | 2 | 1 | 1 | 5 | 1 | 0 | 3 | 1 | 2 | 2 | 1 | 2 | 3 | 1 | 3 | 1 | 1 | 2 | 1.9 | No | Mike URBAN results, June 2018 | 12 |
| **41** | 3 | 2 | 2 | 1 | 1 | 5 | 1 | 0 | 3 | 1 | 2 | 2 | 1 | 2 | 3 | 1 | 3 | 1 | 1 | 2 | 1.9 | No | Mike URBAN results, June 2018 | 12 |
| **42** | 3 | 0 | 2 | 0 | 0 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 3 | 0 | 2 | 1 | 1 | 1 | 1.2 | No | Mike URBAN results, June 2018 | 12 |
| **43** | 3 | 3 | 2 | 1 | 2 | 6 | 1 | 1 | 5 | 3 | 2 | 5 | 2 | 4 | 5 | 4 | 5 | 3 | 3 | 4 | 3.2 | No | Mike URBAN results, June 2018 | 12 |
| **44** | 2 | 0 | 2 | 0 | 0 | 2 | 1 | 0 | 0 | 1 | 1 | 3 | 0 | 0 | 3 | 0 | 2 | 1 | 1 | 1 | 1.0 | Yes | Mike URBAN results, July 2018 | 13 |
| **45** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.1 | Yes | Mike URBAN results, July 2018 | 13 |
| **46** | 2 | 0 | 3 | 1 | 0 | 1 | 1 | 0 | 3 | 1 | 1 | 2 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 2 | 1.0 | Yes | InfoWorks results, December 2016 | 14 |
| **47** | 2 | 2 | 3 | 0 | 4 | 5 | 3 | 2 | 6 | 4 | 2 | 5 | 3 | 4 | 6 | 4 | 2 | 1 | 3 | 2 | 3.2 | No | Mike URBAN results, December 2018 | 15 |
| **48** | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | N/A | 7 |
| **49** | 2 | 5 | 3 | 1 | 3 | 8 | 3 | 1 | 4 | 5 | 4 | 7 | 3 | 6 | 5 | 4 | 5 | 3 | 2 | 4 | 3.9 | No | Mike URBAN results, February 2018 | 7 |
| **57** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | N/A | 3 |
| **59** | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 1 | 8 | 4 | 1 | 1 | 1.1 | No | N/A | 3, 16 |
| **60** | 2 | 0 | 2 | 1 | 4 | 4 | 3 | 0 | 3 | 4 | 2 | 6 | 1 | 2 | 4 | 2 | 3 | 0 | 2 | 0 | 2.3 | No | LTCP Long Term Simulation Results February 2013 | 7 |
| **61** | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 2 | 0 | 0 | 0 | 1 | 2 | 0.7 | Yes | N/A | 7 |
| **62** | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 0.5 | Yes | EPA-SWMM results, February 2021 | 17 |
| **64** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | N/A | 7 |
| **68** | 1 | 0 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 2 | 4 | 1 | 2 | 1 | 2 | 2 | 1.2 | No | LTCP Long Term Simulation Results February 2013 | 7, 18 |
| **69** | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 3 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 2 | 0 | 1 | 2 | 1.9 | No | LTCP Long Term Simulation Results February 2013 | 7 |
| **70** | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.4 | Yes | AWVSRP Modeling Support Alternative | 7 |

| Outfall Number | Number of Combined Sewer Overflows Per Year [1] | | | | | | | | | | | | | | | | | | | Average Annual Overflow Frequency | Meets Performance Standard? [2] | Long-Term Simulation Source | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | | | | |
| | | | | | | | | | | | | | | | | | | | | | | Modeling Report May 2012, Appendix D | |
| **71** | 1 | 0 | 3 | 1 | 1 | 2 | 1 | 2 | 9 | 7 | 3 | 5 | 3 | 2 | 5 | 2 | 5 | 2 | 2 | 1 | 2.9 | No | AWVSRP Modeling Support Alternative Modeling Report May 2012, Appendix D | 7 |
| **72** | 0 | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | Yes | AWVSRP Modeling Support Alternative Modeling Report May 2012, Appendix D | 7 |
| **78** | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | Yes | N/A | 3 |
| **80** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | N/A | 3 |
| **83** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | N/A | 3 |
| **85** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | N/A | 3 |
| **88** | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0.3 | Yes | N/A | 3 |
| **90** | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | Yes | N/A | 3 |
| **91** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | N/A | 3 |
| **94** | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | Yes | N/A | 3 |
| **95** | 0 | 0 | 1 | 0 | 0 | 2 | 1 | 1 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 2 | 2 | 0.8 | Yes | EPA-SWMM results, February 2019 | 19 |
| **99** | 3 | 0 | 1 | 1 | 2 | 1 | 1 | 0 | 1 | 2 | 3 | 5 | 1 | 6 | 4 | 5 | 5 | 3 | 1 | 2 | 2.4 | No | LTCP Long Term Simulation Results February 2013 | 7 |
| **107** | | | | | | 9 | 3 | 1 | 9 | 11 | 4 | 4 | 2 | 4 | 5 | 5 | 5 | 2 | 1 | 1 | 4.4 | No | EPA-SWMM results, February 2019 | 20 |
| **111** | 1 | 0 | 3 | 0 | 2 | 2 | 1 | 0 | 1 | 1 | 0 | 1 | 3 | 2 | 3 | 0 | 2 | 1 | 1 | 1 | 1.3 | No | EPA-SWMM results, February 2019 | 21 |
| **120** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | N/A | 3 |
| **121** | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.1 | Yes | N/A | 3 |
| **124** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | N/A | 3 |
| **127** | 0 | 0 | 0 | 1 | 0 | 3 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.4 | Yes | N/A | 3 |
| **129** | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.1 | Yes | N/A | 3 |
| **130** | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 1 | 0.3 | Yes | N/A | 5 |
| **131** | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | Yes | N/A | 3 |
| **132** | | | | | | | | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 3 | 0 | 0 | 0 | 0 | 2 | 0.6 | Yes | N/A | 5 |
| **134** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | N/A | 3 |
| **135** | | | | | | | | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 3 | 0.5 | Yes | N/A | 5 |
| **136** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | N/A | 3 |

| Outfall Number | Number of Combined Sewer Overflows Per Year [1] | | | | | | | | | | | | | | | | | | | Average Annual Overflow Frequency | Meets Performance Standard? [2] | Long-Term Simulation Source | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | | | | |
| **138** | 1 | 0 | 2 | 3 | 0 | 3 | 1 | 1 | 2 | 1 | 3 | 2 | 2 | 3 | 7 | 3 | 3 | 1 | 0 | 3 | 2.1 | No | LTCP Long Term Simulation Results February 2013 | 7 |
| **139** | 0 | 0 | 1 | 3 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 4 | 0 | 3 | 0 | 3 | 3 | 3 | 2 | 1.4 | No | EPA-SWMM results, February 2019 | 22 |
| **140** | 2 | 3 | 6 | 5 | 6 | 5 | 1 | 1 | 7 | 8 | 2 | 4 | 5 | 13 | 10 | 10 | 7 | 4 | 5 | 3 | 5.4 | No | LTCP Long Term Simulation Results February 2013 | 7 |
| **141** | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | Yes | N/A | 3 |
| **144** | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | Yes | N/A | 3 |
| **145** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | N/A | 3 |
| **146** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | N/A | 3 |
| **147** | 26 | 29 | 31 | 29 | 37 | 45 | 35 | 50 | 45 | 63 | 40 | 47 | 27 | 49 | 32 | 58 | 42 | 37 | 34 | 47 | 40.2 | No | LTCP Long Term Simulation Results February 2013 | 7 |
| **148** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0.3 | Yes | N/A | 3 |
| **150/151** | 16 | 10 | 14 | 6 | 15 | 23 | 11 | 2 | 22 | 29 | 25 | 31 | 14 | 34 | 28 | 31 | 29 | 22 | 9 | 21 | 19.6 | No | LTCP Long Term Simulation Results February 2013 | 7, 23 |
| **152** | 47 | 39 | 53 | 44 | 46 | 42 | 43 | 11 | 29 | 63 | 48 | 57 | 44 | 53 | 34 | 63 | 50 | 45 | 33 | 49 | 44.7 | No | LTCP Long Term Simulation Results February 2013 | 7 |
| **161** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | N/A | 3 |
| **165** | 0 | 0 | 2 | 0 | 0 | 1 | 2 | 0 | 0 | 2 | 1 | 2 | 2 | 0 | 2 | 0 | 2 | 1 | 1 | 1 | 1.0 | Yes | Mike URBAN results, June 2018 | 12 |
| **168** | 3 | 1 | 2 | 1 | 2 | 5 | 2 | 0 | 1 | 1 | 0 | 2 | 0 | 2 | 2 | 0 | 2 | 1 | 1 | 2 | 1.5 | No | EPA-SWMM results, February 2019 | 24 |
| **169** | 3 | 1 | 3 | 1 | 3 | 5 | 2 | 1 | 1 | 2 | 2 | 3 | 0 | 2 | 3 | 1 | 3 | 0 | 1 | 2 | 2.0 | No | EPA-SWMM results, February 2019 | 24 |
| **170** | | | | | | | | 0 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0.5 | Yes | N/A | 6 |
| **171** | 1 | 1 | 2 | 0 | 3 | 5 | 2 | 1 | 6 | 4 | 2 | 4 | 2 | 4 | 6 | 3 | 1 | 1 | 3 | 2 | 2.7 | No | Mike URBAN results, December 2018 | 15 |
| **174** | 8 | 3 | 5 | 6 | 10 | 21 | 6 | 6 | 14 | 13 | 10 | 17 | 7 | 20 | 15 | 12 | 7 | 6 | 2 | 6 | 9.7 | No | LTCP Long Term Simulation Results February 2013 | 7 |
| **175** | | | | | | | | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 4 | 0 | 0 | 1 | 0 | 1 | 0.7 | Yes | N/A | 7 |

Notes:

1. Per Section S4.B of the NPDES Permit, the determination of whether an outfall is meeting the performance standard for controlled outfalls has been made based on up to 20 years of data and modeling. Numbers in the colorless cells were obtained from flow monitoring. Numbers in blue-shaded cells were obtained using precipitation data and basin-specific models and are used in the long-term average annual overflow calculation for years when flow monitoring data either is not available or the accuracy of the flow monitoring data cannot be confirmed.
2. Responses in this column are “Yes” if the calculated Average Annual Overflow Frequency is no more than 1 per year and “No” if the calculated Average Annual Overflow Frequency is more than 1 per year.
3. The flow monitoring configuration prior to 2001 cannot be confirmed and the pre-2001 data accuracy is questionable, so the calculated Average Annual Overflow Frequency uses data from flow monitoring conducted between 2001 and 2019.
4. The Basin 13 storage tank was operationally complete on July 21, 2015. Due to the hydraulic connectivity between Basin 13 and Basin 15 via the Lake Line, flow modeling data is used to estimate overflow events from both basins prior to this date.
5. The flow monitoring configuration prior to 2007 cannot be confirmed and the pre-2007 data accuracy is questionable, so the calculated Average Annual Overflow Frequency uses data from flow monitoring conducted between 2007 and 2019.
6. In October 2012, SPU completed sewer system improvements in Sub-Basin 18A. Flow modeling is used to predict Sub-Basin 18A overflows prior to this date. In April 2017, SPU completed sewer system improvements in Sub-Basin 18B. Flow modeling is used to predict Sub-Basin 18B overflows prior to this date.
7. The flow monitoring configuration prior to 2008 cannot be confirmed and the pre-2008 data accuracy is questionable, so the calculated Average Annual Overflow Frequency uses data from flow monitoring conducted between 2008 and 2019.
8. Several exacerbated CSOs occurred at Outfall 22 in recent years because of the deteriorating performance of WWPS 50. The pump station was rehabilitated and existing air-lift style pumps replaced with submersible pumps. WWPS 50 began pumping at its design rate on December 20, 2016. Flow modeling data is used prior to this date.
9. SPU raised the weir at Outfall 25 in early 2008, so the calculated Average Annual Overflow Frequency uses flow modeling through 2008 and flow monitoring for subsequent years.
10. The weir at Outfall 34 was lowered on February 15, 2017 to protect WWPS 2 from an elevated grade line. Due to the hydraulic connectivity of the Leschi basins along the Lake Line, flow modeling data is used for all Leschi outfalls prior to this date.
11. The CSO overflow pipe to Outfall 33 was sealed and the outfall was removed from CSO service on July 22, 2016.
12. The Lake Line connecting the Genesee CSO basins was jet cleaned on March 17, 2016, allowing for maximum hydraulic conveyance capacity. Due to the connectivity of the Genesee CSO basins along the Lake Line, flow modeling data is used for all Genesee outfalls prior to this date.
13. The hydraulic model for Basins 44 and 45 was updated in July 2018 to reflect the constructed North Henderson CSO Reduction Project. Hydraulic modeling results are presented through this date.
14. SPU completed the Pump Station 9 Rehabilitation Project in 2016 and subsequently updated the hydraulic model for Basin 46 to reflect the constructed facilities.
15. On July 19, 2013, SPU replaced a HydroBrake in South Henderson Basin 49 with an orifice plate. Flow modeling is used to predict Basin 49 CSOs prior to this date. SPU completed the South Henderson CSO Reduction Projects (weir retrofits and 52nd Ave Conveyance Project) in August 2015 and, on November 9, 2017, removed the orifice in the 52nd Avenue South flow control structure that was restricting flows. Flow modeling is used to predict Basin 47 and 171 flows prior to this date.
16. During repair of the WWPS 43 force main, flows were temporarily bypassed around WWPS 43. Because of unavoidable bypass system constraints, there were six exacerbated CSOs at Outfall 59 in 2017, four exacerbated CSOs at Outfall 59 in 2018, and one exacerbated CSO at Outfall 59 in 2019. The bypass was removed in September 2019.
17. The Basin 62 overflow weir was raised on August 27, 2018, optimizing use of the existing sewer system. Hydraulic modeling data is used for January 1, 2001 through August 27, 2018, with flow monitoring data used thereafter.
18. In 2015 and 2016, Basin 68 CSOs were likely exacerbated by a partially clogged HydroBrake.
19. The Basin 95 retrofit project was substantially complete on April 4, 2013. Flow modeling is used prior to this date.
20. Basin 107 overflows are induced by an elevated hydraulic grade line (HGL) in the Elliot Bay Interceptor. Reliable HGL data, necessary for flow modeling, is available from 2006 to present. The backwater valve retrofit was installed on August 19, 2017. Therefore, flow modeling data is used for January 1, 2006 through August 19, 2017, with flow monitoring data used thereafter.
21. The last hydraulic modification in Basin 111 was performed on December 1, 2014. Flow modeling data is used prior to this date.
22. The Basin 139 sewer system improvement project was completed in July 2016. Hydraulic modeling data is used prior to that date and flow monitoring data is used thereafter.
23. SPU removed Outfall 150 from service on February 27, 2019. Any Basin 150/151 CSOs now discharge from Outfall 151.
24. SPU completed the valve retrofit on November 5, 2015. Flow modeling data is used prior to this date.

| Table 5-9. Integrated Plan Performance Targets and Results to Date | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Status** | **Project Name** | **Average volume treated or removed (MG/year)** | **Fecal coliform (billion CFU/year)[1]** | **PCB (g/year)[1]** | **Total phosphorus (kg/year)[1]** | **Total copper (kg/year)[1]** | **TSS (kg/year)[1]** | **Total zinc (kg/year)[1]** |
| **Target** | NDS Partnering | 32[1] | 10,649 | 1.3 | 11 | 1.1 | 6,478 | 9.2 |
| | South Park Water Quality Facility | 67[1] | 31,000 | 5.2 | 38 | 3.8 | 20,935 | 25 |
| | Expanded Arterial Street Sweeping | 1,477[1,2] | 1,380 | 2.0 | 14 | 3.3 | 20,700 | 6.3 |
| | Total | 1,576 | 43,029 | 9 | 63 | 8.2 | 48,113 | 41 |
| **2017 Interim Results** | Expanded Arterial Street Sweeping[3] | 1,900 | 1,464 | 4.0 | 44 | 9.1 | 59,000 | 20 |
| **2018 Interim Results** | Expanded Arterial Street Sweeping[3] | 1,700 | 801 | 2.6 | 41 | 8.4 | 53,000 | 18 |

Notes:

1. These values represent the 95% lower confidence limits (LCL) from the Integrated Plan pollutant load model (PLM) results.
2. Volume of runoff from swept streets.
3. Data is only available for the Expanded Arterial Street Sweeping Program. Monitoring for NDS Partnering and South Park Water Quality Facility has not begun. Post-construction monitoring results will not be compared to the total performance monitoring targets until monitoring has been completed for all three stormwater projects because the goals are based on the total load reductions for the three projects combined.

# Appendix A:  Additional CMOM Information

| Table A-1. 2020 Sewer Overflow (SSO) Details | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **2018 SSO Number** | **ERTS Number** | **Date** | **Address** | **SSO Volume (gallons)** | **Volume to Surface Water (gallons)** | **Surface Water** | **Primary Cause** | **Secondary Cause** |
| 20001 | 695915 | 1/23/20 12:50 PM | 1406 38th Ave E | 2,600 | 0 | | Roots | |
| 20002 | 696051 | 1/27/20 9:00 PM | 9th Ave & Alder St | 500 | 0 | | Private Construction | |
| 20003 | 697317 | 3/24/20 8:47 AM | 4400 Beach Dr SW | 10 | 0 | | Debris | |
| 20004 | 697861 | 4/22/20 12:21 PM | 3042 37th Ave SW | 5 | 0 | | Structural Failure-gravity | |
| 20005 | 697911 | 4/26/20 9:40 AM | 2206 28th Ave W | 15 | 0 | | Structural Failure-gravity | |
| 20006 | 698012 | 5/3/20 4:00 PM | 4405 Montana Circle W | 60 | 0 | | Roots | |
| 20007 | 698154 | 5/11/20 7:59 PM | 415 W Mercer St | 120 | 0 | | Roots | |
| 20008 | 698408 | 5/24/20 10:11 AM | 1414 Seneca St | 7,200 | 7,000 | Lake Union | Roots | |
| 20009 | 698611 | 6/3/20 8:00 AM | 1327 Minor Ave | 12 | 0 | | Roots | |
| 20010 | 698676 | 6/5/20 12:49 PM | 3809 S Willow St | 1,500 | 0 | | Private Construction | |
| 20011 | 698816 | 6/13/20 8:39 PM | 8015 Jones Ave NW | 25 | 0 | | Capacity-gravity main | |
| 20012 | 698808 | 6/15/20 1:05 AM | 3111 SW 97th St | 200 | 195 | Puget Sound | Roots | |
| 20013 | 639696 | 6/19/20 11:40 AM | 1103 E Republican Street | 1,100 | 800 | Lake Union | Roots | |
| 20014 | 699012 | 6/23/20 1:19 PM | 5153 S 117th St | 300 | 0 | | Roots | |
| 20015 | 699129 | 6/30/20 6:44 PM | Meridian Ave N/N 34th St | 1,000 | 500 | Lake Union | Structural Failure-gravity | |
| 20016 | 699190 | 7/4/20 7:47 PM | NW 61st St/38th Ave NW | 2,200 | 2,150 | Salmon Bay | Private Construction | |
| 20017 | 700556 | 9/6/20 7:35 PM | 1601 E Mercer St | 400 | 0 | | Roots | |

| 2018 SSO Number | ERTS Number | Date | Address | SSO Volume (gallons) | Volume to Surface Water (gallons) | Surface Water | Primary Cause | Secondary Cause |
|---|---|---|---|---|---|---|---|---|
| 20018 | 700754 | 9/18/20 12:43 PM | 1808 N 46th St | 613 | 0 | | Roots | FOG |
| 20019 | 700781 | 9/21/20 2:37 PM | 5405 Delridge Way SW | 5,984 | 0 | | City Construction | |
| 20050 | 700930 | 9/24/20 12:00 AM | 2502 26th Ave W | Unknown | 0 | | Debris | |
| 20024 | 700930 | 9/24/20 11:10 AM | 2831 14th Ave W | Unknown | 0 | | Extreme Weather Event | |
| 20023 | 700930 | 9/24/20 11:23 AM | 2337 W Smith St | 200 | 0 | | Extreme Weather Event | |
| 20048 | 700930 | 9/24/20 12:14 PM | 4921 SW Charlestown St | Unknown | 0 | | Extreme Weather Event | |
| 20047 | 700930 | 9/24/20 12:21 PM | 2550 Thorndyke Ave W | Unknown | 0 | | Extreme Weather Event | |
| 20046 | 700930 | 9/24/20 12:35 PM | 3206 SW Spokane St | Unknown | 0 | | Extreme Weather Event | |
| 20053 | 700930 | 9/24/20 12:35 PM | 2502 26th Ave W | Unknown | 0 | | Extreme Weather Event | |
| 20054 | 700930 | 9/24/20 12:35 PM | 2105 N 40th St | Unknown | 0 | | Roots | Extreme Weather Event |
| 20056 | 700930 | 9/24/20 12:35 PM | 4700 Brooklyn Ave NE | Unknown | 0 | | Extreme Weather Event | |
| 20057 | 700930 | 9/24/20 12:35 PM | 2015 W Dravus St | Unknown | 0 | | Extreme Weather Event | |
| 20058 | 700930 | 9/24/20 12:35 PM | 2838 22nd Ave W | Unknown | 0 | | Extreme Weather Event | |

| 2018 SSO Number | ERTS Number | Date | Address | SSO Volume (gallons) | Volume to Surface Water (gallons) | Surface Water | Primary Cause | Secondary Cause |
|---|---|---|---|---|---|---|---|---|
| 20027 | 700930 | 9/24/20 12:47 PM | 2430 W Lynn St | 100 | 0 | | Extreme Weather Event | |
| 20025 | 700930 | 9/24/20 1:26 PM | 3307 3rd Ave W | Unknown | 0 | | Extreme Weather Event | |
| 20045 | 700930 | 9/24/20 1:44 PM | 2502 24th Ave W | 100 | 0 | | Extreme Weather Event | |
| 20044 | 700930 | 9/24/20 2:11 PM | 2209 N 38th St | Unknown | 0 | | Extreme Weather Event | |
| 20043 | 700930 | 9/24/20 2:17 PM | 107 NE 43rd St | Unknown | 0 | | Roots | Extreme Weather Event |
| 20042 | 700930 | 9/24/20 2:39 PM | 6114 12th Ave NE | Unknown | 0 | | Extreme Weather Event | |
| 20041 | 700930 | 9/24/20 3:15 PM | 1422 N 54th St | Unknown | 0 | | Extreme Weather Event | |
| 20040 | 700930 | 9/24/20 3:26 PM | 2656 Thorndyke Ave W | Unknown | 0 | | Extreme Weather Event | |
| 20039 | 700930 | 9/24/20 3:26 PM | 2626 Thorndyke Ave W | Unknown | 0 | | Extreme Weather Event | |
| 20038 | 700930 | 9/24/20 3:28 PM | 2109 W Raye St | Unknown | 0 | | Extreme Weather Event | |
| 20020 | 700897 | 9/24/20 3:40 PM | Stoneway N & N 34th St | Unknown | Unknown | Lake Union | Extreme Weather Event | |
| 20037 | 700930 | 9/24/20 4:27 PM | 1910 N 38th St | Unknown | 0 | | Extreme Weather Event | |

| 2018 SSO Number | ERTS Number | Date | Address | SSO Volume (gallons) | Volume to Surface Water (gallons) | Surface Water | Primary Cause | Secondary Cause |
|---|---|---|---|---|---|---|---|---|
| 20036 | 700930 | 9/24/20 5:01 PM | 2838 21st Ave W | Unknown | 0 | | Extreme Weather Event | |
| 20035 | 700930 | 9/24/20 5:06 PM | 4669 1st Ave NE | Unknown | 0 | | Extreme Weather Event | |
| 20026 | 700930 | 9/24/20 6:54 PM | 2924 27th Ave W | Unknown | 0 | | Extreme Weather Event | |
| 20028 | 700930 | 9/24/20 6:57 PM | 3612 Burke Ave N | Unknown | 0 | | Extreme Weather Event | |
| 20034 | 700930 | 9/24/20 8:18 PM | 4401 Densmore Ave N | Unknown | 0 | | Extreme Weather Event | |
| 20033 | 700930 | 9/24/20 8:42 PM | 3928 Meridian Ave N | Unknown | 0 | | Extreme Weather Event | |
| 20032 | 700930 | 9/25/20 7:35 AM | 7122 58th Ave NE | 150 | 0 | | Extreme Weather Event | |
| 20031 | 700930 | 9/25/20 8:54 AM | 3401 Thorndyke Ave W | Unknown | 0 | | Extreme Weather Event | |
| 20030 | 700930 | 9/25/20 9:10 AM | 628 W Nickerson St | Unknown | 0 | | Extreme Weather Event | |
| 20029 | 700930 | 9/25/20 12:29 PM | 4431 Wallingford Ave N | Unknown | 0 | | Extreme Weather Event | |
| 20021 | 700931 | 9/27/20 9:15 AM | 3201 S Washington St | 1 | 0 | | Private Side Sewer Issue | |
| 20022 | 700969 | 9/28/20 12:10 PM | 5252 20th Ave NE | 5 | 0 | | Structural Failure-gravity | |

| 2018 SSO Number | ERTS Number | Date | Address | SSO Volume (gallons) | Volume to Surface Water (gallons) | Surface Water | Primary Cause | Secondary Cause |
|---|---|---|---|---|---|---|---|---|
| 20049 | 701312 | 10/11/20 12:00 AM | 108 S Washington St | 200 | 0 | | FOG | |
| 20051 | 701509 | 10/26/20 6:00 PM | 7609 PERIMETER RD S (Corrected) | 90,000 | Unknown | Duwamish River | Private Construction | |
| 20052 | 701571 | 10/29/20 10:03 AM | 1420 35th Ave S | 3,000 | 1,500 | Lake Washington | Vandalism | |
| 20055 | 701783 | 11/6/20 2:59 PM | 12320 3rd Ave NE | 600 | 0 | | Debris | |
| 20059 | 701925 | 11/16/20 8:43 AM | 337 NE 56th St | 780 | 0 | | Roots | |
| 20060 | 702029 | 11/19/20 12:49 PM | 9601 50th Ave SW | 2,500 | 2,500 | Puget Sound | Debris | |
| 20061 | 702071 | 11/21/20 11:35 PM | 1821 Harvard Ave | 80 | 0 | | Roots | |
| 20062 | 702302 | 12/6/20 9:32 AM | 3600 3rd Ave NW | 200 | Unknown | Ship Canal/Lake Union | City Construction | |
| 20081 | 702720 | 12/21/20 12:00 AM | 2450 Delmar Dr E | Unknown | 0 | | Roots | Extreme Weather Event |
| 20082 | 702720 | 12/21/20 12:00 AM | 1218 17th Ave E | Unknown | 0 | | Extreme Weather Event | |
| 20083 | 702720 | 12/21/20 12:00 AM | 402 30th Ave E | Unknown | 0 | | Debris | Extreme Weather Event |
| 20084 | 702720 | 12/21/20 12:00 AM | 6521 48th Ave NE | Unknown | 0 | | Roots | Extreme Weather Event |
| 20076 | 702675 | 12/21/20 3:09 PM | 701 5th Ave N | Unknown | 0 | | Roots | Extreme Weather Event |
| 20066 | 702720 | 12/21/20 3:55 PM | 1041 Summit Ave E | Unknown | 0 | | Roots | Extreme Weather Event |
| 20067 | 702623 | 12/21/20 4:02 PM | 1146 19th Ave E | Unknown | 0 | | Roots | Extreme Weather Event |

| 2018 SSO Number | ERTS Number | Date | Address | SSO Volume (gallons) | Volume to Surface Water (gallons) | Surface Water | Primary Cause | Secondary Cause |
|---|---|---|---|---|---|---|---|---|
| 20069 | 702627 | 12/21/20 4:09 PM | 1561 Alaskan Way S | Unknown | 0 | | Capacity-King County | Extreme Weather Event |
| 20074 | 702699 | 12/21/20 4:52 PM | 522 17th Ave E | Unknown | 0 | | Roots | Extreme Weather Event |
| 20068 | 702624 | 12/21/20 4:54 PM | 1516 18th Ave | Unknown | 0 | | Roots | Extreme Weather Event |
| 20072 | 702677 | 12/21/20 5:17 PM | 4051 30th Ave S | Unknown | 0 | | Debris | |
| 20065 | 702681 | 12/21/20 6:02 PM | 8039 20th Ave NE | Unknown | 0 | | Roots | |
| 20071 | 702720 | 12/21/20 6:16 PM | 3712 19th Ave SW | Unknown | 0 | | Extreme Weather Event | |
| 20070 | 702720 | 12/21/20 7:18 PM | 1630 25th Ave | Unknown | 0 | | Roots | Extreme Weather Event |
| 20075 | 702628 | 12/21/20 7:22 PM | 600 5th Ave S | Unknown | 0 | | Capacity-King County | Extreme Weather Event |
| 20085 | 702931 | 12/21/2020 2:30pm | 2020 NE 85th St | Unknown | 0 | | Roots | |
| 20073 | 702720 | 12/21/20 7:47 PM | 4446 38th Ave SW | Unknown | 0 | | Extreme Weather Event | |
| 20064 | 702626 | 12/21/20 9:56 PM | 228 27th Ave E | Unknown | 0 | | Roots | Extreme Weather Event |
| 20080 | 702720 | 12/22/20 12:46 PM | 530 1st Ave S | Unknown | 0 | | Extreme Weather Event | |
| 20063 | 702670 | 12/22/20 2:33 PM | 2802 E Park Dr | 50 | 0 | | City Construction | |
| 20079 | 702720 | 12/22/20 5:00 PM | 1208 E Jefferson St | Unknown | 0 | | Extreme Weather Event | |

| 2018 SSO Number | ERTS Number | Date | Address | SSO Volume (gallons) | Volume to Surface Water (gallons) | Surface Water | Primary Cause | Secondary Cause |
|---|---|---|---|---|---|---|---|---|
| 20078 | 702720 | 12/22/20 5:56 PM | 1007 14th Ave E | Unknown | 0 | | Extreme Weather Event | |
| 20077 | 702720 | 12/22/20 6:47 PM | 1572 Parkside Dr | Unknown | 0 | | Extreme Weather Event | |
| 20088 | 702954 | 12/29/20 2:12 PM | 558 1st Ave S | Unknown | 0 | | Capacity-gravity main | |
| 20087 | 702954 | 12/30/20 10:22 AM | 5503 4th Ave NW | Unknown | 0 | | Roots | |
| 20086 | 702818 | 12/30/20 10:52 AM | Corson Ave S/S Dawson St | 57,000 | 0 | | City Construction | |

| Table A-2. Pump Station Location and Capacity | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Number | Name | Address | Type [1] | Basin Area (acres) | Average Annual Inflow (gpm) | Average Wet Weather Inflow (gpm) | Number of Pumps and Rating | Static Head (feet) | Average Annual Storage Time (hours) | Average Wet Weather Storage Time (hours) |
| 1 | Lawton Wood | 5645 45th Ave West | WW/DW | 31.8 | 10 | 27 | 2 at 350 gpm each | 60.5 | 25.7 | 9.5 |
| 2 | Charles Street | 901 Lakeside Dr | WW/DW | 108.1 | 180 | 303 | 2 at 450 gpm each | 20 | 7.6 | 4.5 |
| 4 | South Director Street | 5135 South Director St | Air Lift | 3.1 | 33 | 48 | 2 at 150 gpm each | 28.5 | 2.1 | 1.4 |
| 5 | 46th Avenue South | 3800 Lake Washington Blvd | WW/DW | 198.2 | 250 | 715 | 2 at 1000 gpm each | 13.9 | 4.7 | 1.7 |
| 6 | South Alaska Street | 4645 Lake Washington Blvd | WW/DW | 10.2 | 24 | 88 | 2 at 300 gpm each | 14 | 3.0 | 0.82 |
| 7 | East Lee Street | 4214 East Lee St | WW/DW | 227 | 373 | 961 | 2 at 2800 gpm each | 50 | 11.8 | 4.6 |
| 9 | South Grattan Street | 8400 55th Ave South | WW/DW | 422.2 | 372 | 1074 | 2 at 2700 gpm each | 13.9 | 2.8 | 1.1 |
| 10 | South Holly Street | 5711 South Holly St | WW/DW | 188.4 | 201 | 494 | 2 at 1000 gpm each | 13.5 | 1.7 | 0.70 |
| 11 | North Sand Point | 63rd Ave NE and NE 78th St | Submersible | 32.8 | 45 | 80 | 2 at 180 gpm each | 23 | 6.9 | 3.9 |
| 13 | Montlake | 2160 East Shelby St | WW/DW | 64.9 | 49 | 154 | 2 at 600 gpm each | 29.7 | 44.2 | 14.0 |
| 17 | Empire Way | 42nd Ave South and South Norfolk St | WW/DW | 395 | 546 | 804 | 2 at 2000 gpm each | 27.7 | 4.5 | 3.0 |
| 18 | South 116th Place | 6700 South 116th Pl | Submersible | 2.5 | 2.8 | 3.7 | 2 at 150 gpm each | 45 | 21.7 | 16.4 |
| 19 | Leroy Place South | 9400 Leroy Pl South | Submersible | 6.84 | 4.3 | 5.5 | 2 at 150 gpm each | 45 | 14.9 | 11.6 |
| 20 | East Shelby Street | 1205 East Shelby St | WW/DW | 48.6 | 94 | 278 | 2 at 600 gpm each | 45 | 20.5 | 6.9 |
| 21 | 21st Avenue West | 2557 21st Ave West | Submersible | 3.55 | 6.7 | 7.2 | 2 at 150 gpm each | 45 | 9.8 | 9.2 |
| 22 | West Cramer Street | 5400 38th Ave West | WW/DW | 26.9 | 44 | 224 | 2 at 750 gpm each | 62 | 6.0 | 1.2 |
| 25 | Calhoun Street | 1812 East Calhoun St | WW/DW | 52.2 | 123 | 328 | 2 at 850 gpm each | 36 | 2.9 | 1.1 |
| 28 | North Beach | 9001 View Ave NW | Submersible | 4.8 | 2.7 | 6.0 | 2 at 150 gpm each | 40.7 | 17.5 | 7.9 |
| 30 | Esplanade | 3206 NW Esplanade St | Submersible | 5.7 | 8.7 | 19 | 2 at 150 gpm each | 63 | 14.0 | 6.6 |
| 31 | 11th Avenue NW | 12007 11th Ave NW | Submersible | 2 | 0.81 | 1.1 | 2 at 150 gpm each | 20 | 41.0 | 30.8 |
| 35 | 25th Avenue NE | 2734 NE 45th St | WW/DW | 71 | 170 | 202 | 2 at 600 gpm each<br>1 at 900 gpm | 39.8 | 1.2 | 0.98 |

| Number | Name | Address | Type [1] | Basin Area (acres) | Average Annual Inflow (gpm) | Average Wet Weather Inflow (gpm) | Number of Pumps and Rating | Static Head (feet) | Average Annual Storage Time (hours) | Average Wet Weather Storage Time (hours) |
|---|---|---|---|---|---|---|---|---|---|---|
| 36 | Maryland | 1122 Harbor Ave SW | Air Lift | 12.2 | 60 | 83 | 2 at 150 gpm each | 10 | 5.0 | 3.6 |
| 37 | Fairmont | 1751 Harbor Ave SW | WW/DW | 281.5 | 275 | 744 | 2 at 3000 gpm each | 12.8 | 5.1 | 1.9 |
| 38 | Arkansas | 1411 Alki Ave SW | Air Lift | 46.5 | 108 | 164 | 2 at 300 gpm each | 10 | 5.4 | 3.6 |
| 39 | Dawson | 5080 Beach Dr SW | WW/DW | 55 | 114 | 340 | 2 at 850 gpm each | 36.7 | 5.4 | 1.8 |
| 42 | Lincoln Park | 8617 Fauntleroy Way SW | WW/DW | 6.5 | 18 | 35 | 2 at 200 gpm each | 55.5 | 6.3 | 3.2 |
| 43 | Seaview No. 1 | 5635 Seaview Ave NW | WW/DW | 177.4 | 82 | 211 | 2 at 2750 gpm each | 40.4 | 19.7 | 7.7 |
| 44 | Boeing No. 1 | 6820 Perimeter Rd S | WW/DW | 168.5 | 196 | 361 | 2 at 800 gpm each | 19 | 2.4 | 1.3 |
| 45 | Boeing No. 2 | 7609 Perimeter Rd S | WW/DW | 133.5 | 92 | 167 | 2 at 350 gpm each | 16.5 | 3.8 | 2.1 |
| 46 | Seaview No. 2 | 6541 Seaview Ave NW | Air Lift | 52.6 | 64 | 96 | 2 at 150 gpm each | 14.6 | 1.9 | 1.2 |
| 47 | Seaview No. 3 | 7242 Seaview Ave NW | Air Lift | 11 | 14 | 17 | 2 at 150 gpm each | 9.5 | 6.8 | 5.6 |
| 48 | Brooklyn | 3701 Brooklyn Ave NE | WW/DW | 31.4 | 91 | 108 | 2 at 1000 gpm each | 53.3 | 3.8 | 3.2 |
| 49 | Latona | 3750 Latona Ave NE | WW/DW | 22.4 | 20 | 40 | 2 at 250 gpm each | 33.3 | 19.0 | 9.6 |
| 50 | 39th Avenue East | 2534 39th Ave East | Submersible | 10.6 | 5.3 | 14 | 2 at 120 gpm each | 17 | 19.6 | 7.3 |
| 51 | NE 60th Street | 6670 NE 60th St | WW/DW | 44.5 | 38 | 94 | 2 at 325 gpm each | 126.3 | 3.5 | 1.4 |
| 53 | SW Hinds Street | 4951 SW Hinds St | WW/DW | 10.6 | 7.1 | 22 | 2 at 150 gpm each | 66 | 10.9 | 3.5 |
| 54 | NW 41st Street | 647 NW 41st St | WW/DW | 24.5 | 50 | 149 | 2 at 350 gpm each | 27 | 5.1 | 1.7 |
| 55 | Webster Street | 3021 West Laurelhurst NE | Air Lift | 2.4 | 5.6 | 8.8 | 2 at 150 gpm each | 31 | 1.1 | 0.7 |
| 56 | Bedford Court | 10334 Bedford Ct NW | Air Lift | 1.6 | 4.8 | 12 | 2 at 150 gpm each | 30.3 | 0.62 | 0.26 |
| 57 | Sunnyside | 3600 Sunnyside Ave North | WW/DW | 16.3 | 12 | 17 | 2 at 300 gpm each | 31.5 | 14.3 | 10.0 |
| 58 | Woodlawn | 1350 North Northlake Way | WW/DW | 33.4 | 34 | 41 | 2 at 685 gpm each | 30 | 8.0 | 6.7 |
| 59 | Halliday | 2590 Westlake Ave North | WW/DW | 21.2 | 8.5 | 8.0 | 2 at 325 gpm each | 17.7 | 25.7 | 27.4 |
| 60 | Newton | 2010 Westlake Ave North | WW/DW | 57.6 | 65 | 94 | 2 at 250 gpm each | 67.4 | 4.4 | 3.1 |
| 61 | Aloha | 912 Westlake Ave North | WW/DW | 26.3 | 13 | 11 | 2 at 450 gpm each | 19.1 | 15.8 | 19.4 |
| 62 | Yale | 1103 Fairview Ave North | WW/DW | 12.2 | 27 | 27 | 2 at 300 gpm each | 18.4 | 6.0 | 6.0 |
| 63 | East Blaine | 140 East Blaine St | WW/DW | 33.1 | 103 | 136 | 2 at 600 gpm each | 31 | 2.4 | 1.8 |

| Number | Name | Address | Type [1] | Basin Area (acres) | Average Annual Inflow (gpm) | Average Wet Weather Inflow (gpm) | Number of Pumps and Rating | Static Head (feet) | Average Annual Storage Time (hours) | Average Wet Weather Storage Time (hours) |
|---|---|---|---|---|---|---|---|---|---|---|
| 64 | East Lynn Street No. 2 | 2390 Fairview Ave East | WW/DW | 9.4 | 63 | 103 | 2 at 300 gpm each | 16.2 | 2.4 | 1.4 |
| 65 | East Allison Street | 2955 Fairview Ave East | WW/DW | 19.2 | 23 | 31 | 2 at 200 gpm each | 47.2 | 10.4 | 7.8 |
| 66 | Portage Bay No. 1 | 3190 Portage Bay Pl East | WW/DW | 6.5 | 20 | 20 | 2 at 200 gpm each | 12.2 | 7.2 | 7.2 |
| 67 | Portage Bay No. 2 | 1209 East Shelby St | WW/DW | 14.7 | 30 | 30 | 2 at 250 gpm each | 17 | 5.0 | 5.0 |
| 69 | Sand Point | 6451 65th Ave NE | WW/DW | 15.5 | 44 | 58 | 2 at 300 gpm each | 79 | 2.0 | 1.5 |
| 70 | Barton No. 2 | 4890 SW Barton St | WW/DW | 73 | 37 | 76 | 2 at 290 gpm each | 29 | 12.5 | 6.1 |
| 71 | SW 98th Street | 5190 SW 98th St | WW/DW | 36.3 | 26 | 46 | 2 at 450 gpm each | 16 | 6.2 | 3.5 |
| 72 | SW Lander Street | 2600 13th Ave SW | WW/DW | 203.5 | 98 | 272 | 3 at 2100 gpm each | 22.8 | 12.2 | 4.4 |
| 73 | SW Spokane St | 1190 SW Spokane St | WW/DW | 336.5 | 96 | 258 | 3 at 2400 gpm each | 16.3 | 9.5 | 3.5 |
| 74 | 26th Avenue SW | 2799 26th Ave SW | Submersible | 144 | 26 | 38 | 2 at 300 gpm each | 30 | 12.3 | 8.4 |
| 75 | Point Place SW | 3200 Point Pl SW | Air Lift | 4.9 | n/a | n/a | 2 at 150 gpm each | 12.2 | n/a | n/a |
| 76 | Lowman Park | 7025 Beach Dr SW | WW/DW | 20.4 | 15 | 22 | 2 at 100 gpm each | 34 | 18.8 | 13.0 |
| 77 | 32nd Avenue West | 1499 32nd Ave West | WW/DW | 206.5 | 84 | 256 | 2 at 1400 gpm each | 48 | 21.0 | 6.9 |
| 78 | Airport Way South | 8415 Airport Way South | Air Lift | 18.4 | 11 | 12 | 2 at 150 gpm each | 14.5 | 4.5 | 4.1 |
| 80 | South Perry Street | 9724 Rainier Ave South | Air Lift | 4.6 | 4.8 | 5.2 | 2 at 150 gpm each | 22 | 14.1 | 13.1 |
| 81 | 72nd Avenue South | 10199 Rainier Avenue South | WW/DW | 11 | 10 | 13 | 2 at 200 gpm each | 53.3 | 19.0 | 14.7 |
| 82 | Arroyo Beach Place | 11013 Arroyo Beach Pl SW | Air Lift | 6 | 4.5 | 4.8 | 2 at 150 gpm each | 19.8 | 16.2 | 15.2 |
| 83 | West Ewing Street | 390 West Ewing St | Air Lift | 6.1 | 44 | 29 | 2 at 150 gpm each | 19 | 1.4 | 2.1 |
| 84 | 28th Avenue NW | 5390 28th Ave NW | WW/DW | 691.4 | 81 | 191 | 2 at 500 gpm each | 24.4 | 3.9 | 1.6 |
| 114 | 35th Avenue NE | 10701 36th Ave NE | Submersible | 3.2 | 11 | 24 | 2 at 150 gpm each | 5.6 | 19.4 | 9.1 |
| 118 | Midvale Avenue North | 1200 North 107th St | WW/DW | 22.4 | 7.6 | 13 | 2 at 300 gpm each | 11.5 | 48.4 | 28.1 |

*1. WW/DW = Wet Well/Dry Well*

| Table A-3. 2020 Pump Station Work Order Summary | | | |
|---|---|---|---|
| **WWPS Number** | **Inspection** | **Maintenance** | **Total Work Orders** |
| WWPS001 | 14 | 21 | 35 |
| WWPS002 | 23 | 29 | 52 |
| WWPS004 | 5 | 16 | 21 |
| WWPS005 | 11 | 29 | 40 |
| WWPS006 | 11 | 25 | 36 |
| WWPS007 | 19 | 40 | 59 |
| WWPS009 | 11 | 28 | 39 |
| WWPS010 | 15 | 29 | 44 |
| WWPS011 | 14 | 14 | 28 |
| WWPS013 | 18 | 30 | 48 |
| WWPS017 | 41 | 24 | 65 |
| WWPS018 | 12 | 10 | 22 |
| WWPS019 | 64 | 16 | 80 |
| WWPS020 | 14 | 4 | 18 |
| WWPS021 | 28 | 21 | 49 |
| WWPS022 | 16 | 12 | 28 |
| WWPS025 | 18 | 42 | 60 |
| WWPS028 | 19 | 25 | 44 |
| WWPS030 | 18 | 22 | 40 |
| WWPS031 | 17 | 29 | 46 |
| WWPS035 | 17 | 44 | 61 |
| WWPS036 | 4 | 19 | 23 |
| WWPS037 | 26 | 18 | 44 |
| WWPS038 | 7 | 68 | 75 |
| WWPS039 | 21 | 18 | 39 |
| WWPS042 | 7 | 37 | 44 |
| WWPS043 | 31 | 28 | 59 |
| WWPS044 | 16 | 46 | 62 |
| WWPS045 | 22 | 36 | 58 |
| WWPS046 | 5 | 19 | 24 |
| WWPS047 | 6 | 19 | 25 |
| WWPS048 | 18 | 22 | 40 |
| WWPS049 | 51 | 25 | 76 |
| WWPS050 | 6 | 22 | 28 |
| WWPS051 | 41 | 38 | 79 |
| WWPS053 | 8 | 11 | 19 |
| WWPS054 | 25 | 55 | 80 |
| WWPS055 | 5 | 24 | 29 |
| WWPS056 | 6 | 58 | 64 |

| WWPS Number | Inspection | Maintenance | Total Work Orders |
|---|---|---|---|
| WWPS057 | 28 | 15 | 43 |
| WWPS058 | 12 | 18 | 30 |
| WWPS059 | 13 | 20 | 33 |
| WWPS060 | 5 | 19 | 24 |
| WWPS061 | 5 | 19 | 24 |
| WWPS062 | 63 | 29 | 92 |
| WWPS063 | 6 | 23 | 29 |
| WWPS064 | 5 | 18 | 23 |
| WWPS065 | 5 | 17 | 22 |
| WWPS066 | 4 | 15 | 19 |
| WWPS067 | 4 | 4 | 8 |
| WWPS069 | 11 | 27 | 38 |
| WWPS070 | 12 | 36 | 48 |
| WWPS071 | 4 | 27 | 31 |
| WWPS072 | 21 | 12 | 33 |
| WWPS073 | 13 | 16 | 29 |
| WWPS074 | 25 | 20 | 45 |
| WWPS075 | 4 | 15 | 19 |
| WWPS076 | 34 | 14 | 48 |
| WWPS077 | 10 | 22 | 32 |
| WWPS078 | 5 | 20 | 25 |
| WWPS080 | 15 | 18 | 33 |
| WWPS081 | 4 | 20 | 24 |
| WWPS082 | 4 | 17 | 21 |
| WWPS083 | 5 | 26 | 31 |
| WWPS084 | 10 | 16 | 26 |
| WWPS114 | 27 | 24 | 51 |
| WWPS118 | 6 | 30 | 36 |
| **Grand Total** | **1,070** | **1,630** | **2,700** |