Seattle Public Utilities

Protecting Seattle's Waterways

# Wastewater Collection System: 2017 Annual Report

March 30, 2018

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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 meet state and federal regulatory requirements and to share information with the public on activities Seattle Public Utilities (SPU) is undertaking to improve its wastewater collection system. The report provides 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 drainage continue to flow into the 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 85 CSO outfalls in SPU's wastewater collection system. As shown in Figure 1-2, they 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 to an average of no more than one per outfall per year based on a 20-year moving average.

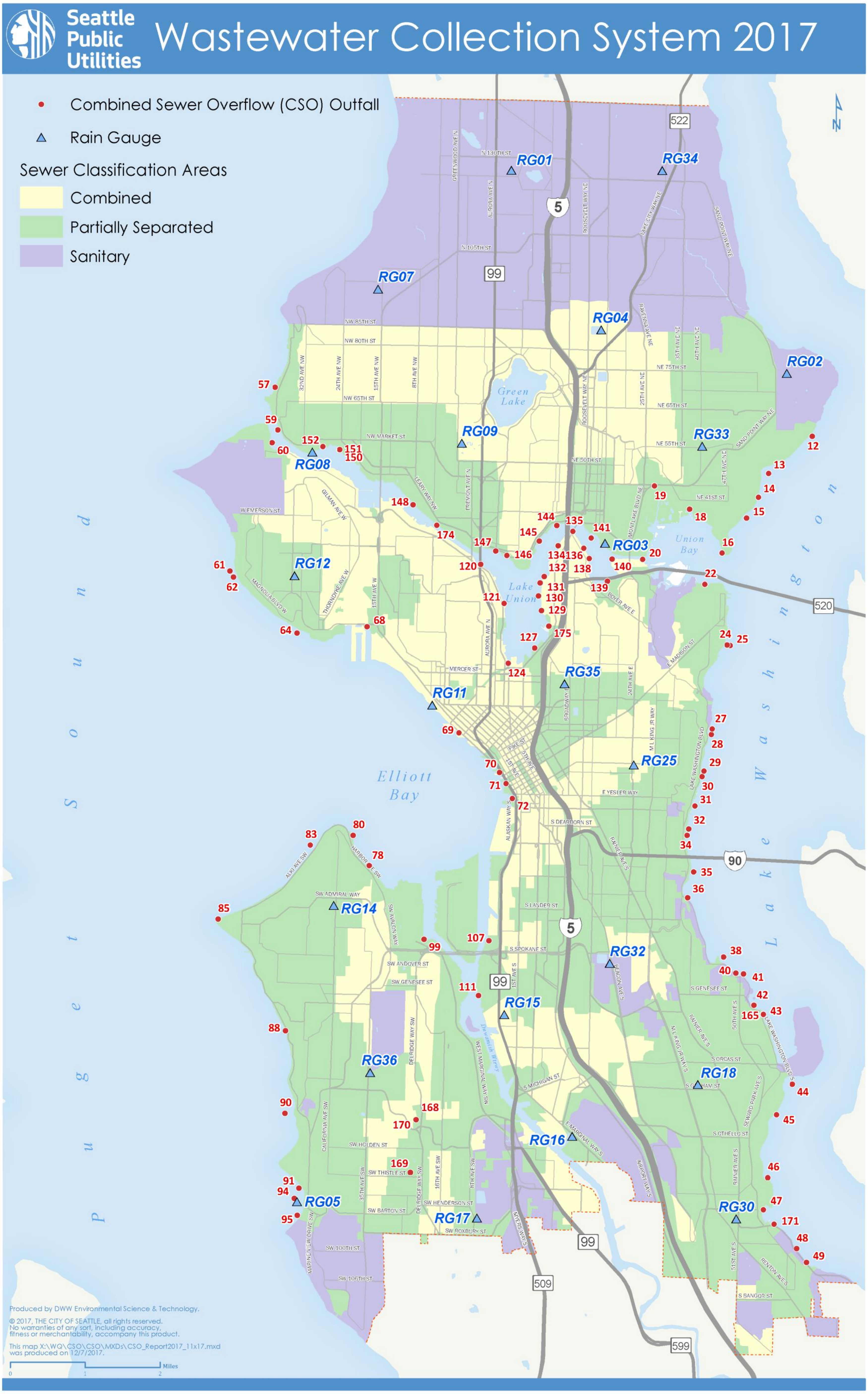


Figure 1-1. 2017 Combined Sewer Outfalls

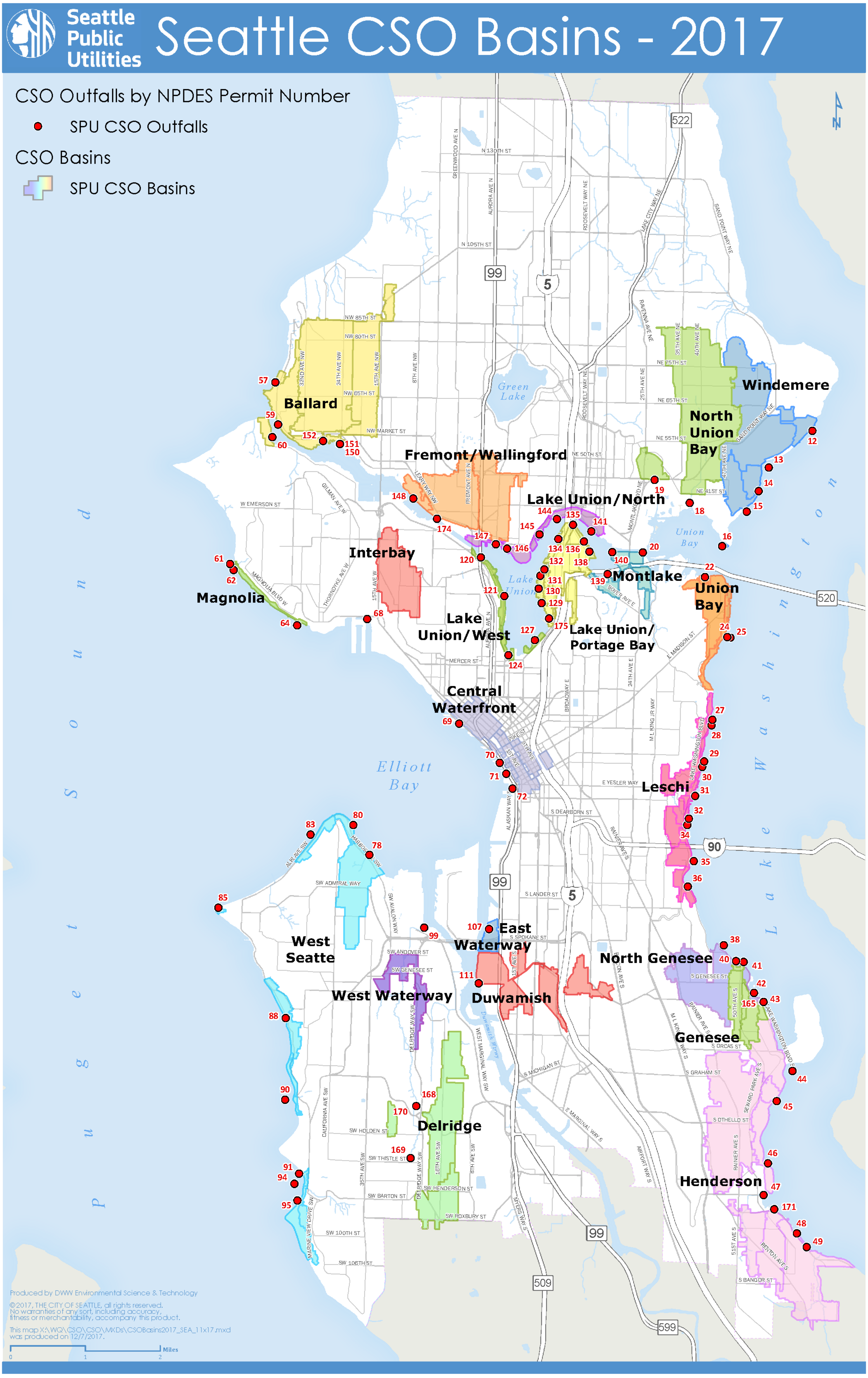


Figure 1-2. 2017 CSO Basins

## 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 current permit expires on April 30, 2021.

Ecology modified four Post Construction Monitoring Program due dates in Section S6.C of the permit on September 28, 2017. These modifications align the permit with Supplemental Compliance Plans submitted by SPU in accordance with the City's wastewater Consent Decree (see Sections 1.3, 4.5, and 5.4 of this report). The modifications were requested by SPU on May 25, 2017.

The NPDES Permit:

- Authorizes CSOs at the 85 outfalls shown in Figures 1-1 and 1-2. Outfall 33, which formerly served the Leschi area and is not shown in these figures, was removed from CSO service on July 22, 2016;
- 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 twenty-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 sewer overflows (SSOs) within specific timeframes; and
- Requires SPU to apply for permit renewal six months before the permit expires.

## 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:

- Resolves 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 report annually on Consent Decree required activities; and
- Establishes penalties for non-compliance.

## 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 reported quarterly in a summary spreadsheet.
- Engineering reports, plans, specifications, and construction quality assurance plans. These are required for specific CSO reduction projects. Due dates are specified in the permit.

Each of the 2017 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, and most were submitted in advance of deadlines. There were no DWOs. Most SSOs were reported by their respective deadlines, and most of the follow-up written 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. 2017 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,<br>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>SSO performance;<br>Number of miles of sewer that were cleaned, inspected, and repaired/replaced/rehabilitated;<br>Number of pump station inspections and the capacity of each pump station;<br>Number of maintenance holes and force mains inspected and repaired/replaced/rehabilitated;<br>Number and type of CSO regulators inspected;<br>Summaries of inspections and cleanings of each CSO control structure; and<br>Summaries of Fats Oil and Grease (FOG) inspections and enforcement actions taken the preceding year. | 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<br>g. Section 3.3 |

| Table 1-1. 2017 Annual Reporting Requirements | | |
|---|---|---|
| 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 |
| VII.43.a.iii | Describe the status of all Consent Decree compliance measures and specific reporting requirements for each program plan, including:<br>The CSO control measures for the Early Action CSO Control Program (Henderson Basins 44, 45, 46, and 47/171);<br>The Long-Term Control Plan;<br>The Post-Construction Monitoring Program Plan;<br>The CMOM Performance Program Plan;<br>The FOG Control Program Plan; and<br>The Joint Operations and System Optimization Plan between the City of Seattle and King County | a. Sections 4.2 and 4.7<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 4.4.1, 4.5, 4.6, 4.7, 5.3 and 5.4 |
| 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 4.5, 4.6, 4.7, 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 | Section 5.3 (and Section 4.1.10) |
| 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 2017, 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 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 single Joint Operations and System Optimization Plan (Joint Plan). Staff from King County's Department of Natural Resources and Parks (DNRP) and SPU 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 approved by the Director of SPU's Drainage and Wastewater Line of Business and the Director of DNRP's Wastewater Treatment Division and were included in the Joint Plan, submitted to EPA and Ecology on February 10, 2016. Comments were received from EPA and Ecology and a revised plan was submitted in March 2017. The following describes each commitment and the progress SPU and DNRP made in 2017:

- The Joint System Debrief Committee commitment is to evaluate performance of the SPU and DNRP systems, identify interconnections to improve operations, and share information after major storm events. SPU and DNRP conducted a post storm debrief meeting in March 2017 to review the operation of each agency's system during the February 9 storm event where flooding occurred at the West Point Treatment Plant and in the South Park Neighborhood. Subsequently, WTD provided regular updates to SPU on the progress of restoring West Point, and WTD and SPU coordinated a response to flooded customers in South Park. To coordinate for the 2017/2018 wet season, a meeting was held in September 2017 to discuss maintenance activities, system changes, meteorological information, and inter-agency communications. SPU also provided regular updates to DNRP on the Pump Station 43 bypass, installed after a leak in the force main was detected.
- The Data Sharing commitment is supported by four activities: the formation of the Joint Operations Information Sharing Team (JOIST), implementation of a pilot project for sharing real-time SCADA data, development of data sharing protocols, and the improvement of regional ability to forecast storms and rainfall intensities.
    - JOIST held four meetings during which SPU and DNRP staff conducted tours of both SPU and DNRP facilities and shared information on the operation of existing facilities, progress of capital projects, and coordination of Joint Plan commitments. Additionally, a meeting was arranged with the City of Portland operations staff to tour their CSO tunnel system and learn from their CSO program.

- The SPU and DNRP data sharing committee established standard operating procedures for sharing information and to facilitate data transfer as requested. An annual data review workshop was held in June to review flow monitoring data collected by each agency and provide recommendations for future monitoring.
- A Real-Time Data Sharing Pilot established a framework for real-time data sharing and resulted in development of a secure connection between DNRP's and SPU's Supervisory Control and Data Acquisition (SCADA) systems for the Windermere/ University basin where both DNRP and SPU have pump stations and CSO control facilities. SPU and DNRP signed an extension allowing the pilot project to continue for three more years and the agencies started working on an options analysis for a permanent solution. A joint project team held regular workshops throughout the year and a recommendation on a data-sharing platform will be made to both agencies in 2018. The recommended platform will replace the pilot project.
- Improved Rainfall Data for Forecasting with additional gauges. DNRP and SPU have started to share historical and real time rain gauge data and continued to exchange internal operational weather forecasts and impacts information for the past few years. Staff shared post-storm analyses, which are currently being incorporated into weather modeling and forecasting. Both agencies are working together to incorporate climate change model output to better understand future impacts of intense rainfall on the wastewater systems. Through a developing partnership with the Center for Western Water and Weather Extremes, SPU and DNRP are co-developing forecast alerts that will enable advance operational adjustments to mitigate CSO and flooding event.

- The Joint Modeling Coordination Committee commitment is to share tools and modeled information to improve operational strategies. Members of the Joint Modeling Coordination Committee held several meetings in 2017 to review modeling results and coordinate model developments between each agency. A major work activity was the completion of a MIKE URBAN model of the North Interceptor system that combined elements of SPU's system with DNRP's regional system. The committee also developed a model of the joint Ship Canal Water Quality Project facility to support design and operation.
- The Coordination during Startup and Commissioning of CSO Control Facilities commitment is to conduct document review, attend commissioning meetings, and implement data sharing for SPU and DNRP CSO control facilities. In 2017, DNRP reviewed the construction plans for the North Henderson CSO improvements. SPU also hosted facility tours during construction for DNRP staff.
- The Real Time CSO Notification commitment is to improve both onsite signs and website information to improve notification of CSO events and communication with customers. In 2017, SPU and DNRP worked on 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 will serve as a single point of contact for both SPU and DNRP CSO outfalls located in the City of Seattle. Sign fabrication and installation is expected to begin in 2018.

- The Reduce Saltwater Intrusion commitment is continuing to work together on studies, data and solutions for reducing intrusion. In 2017, DNRP conducted saltwater monitoring in their system during King Tide events and is planning to share that data with SPU. In November, saltwater intrusion was detected in the system. SPU and DNRP worked together to quickly identify the source originating from a failed flap gate that was repaired. DNRP will continue to monitor saltwater in the conveyance system during King Tides to monitor progress and identify any new issues.

In addition to the above commitments, SPU and DNRP created the Wastewater System Operations Oversight Committee in 2017 to meet regularly to resolve issues and make recommendations and/or decisions about operational coordination and system operations. The committee is authorized to make operational decisions and recommendations for capital or O&M projects that result in a change in operations of existing SPU and DNRP facilities or facilities under construction or upgrade.

In 2017, SPU and DNRP coordinated to initiate review of the Joint Plan. The Consent Decree requires that the Joint Plan is reviewed every three years and updated as necessary to ensure the optimal level of coordination and information sharing between SPU and DNRP. The review will continue in 2018.

**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 2017 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 85 CSO control structures 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 2017 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 2017 O&M accomplishments are summarized in Table 3-1.

### 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;
- 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 2017, 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 of this report. SPU is also working to optimize the operation of recently constructed storage facilities, as described in Sections 4.5 and 4.7.

| Table 3-1. 2017 O&M Accomplishments | |
|---|---|
| **Activity** | **Quantity** |
| Miles of mainline pipe cleaned | 473 |
| Miles of mainline pipe inspected via CCTV | 215 |
| Miles of mainline pipe repaired/replaced/rehabilitated | 3.5 |
| Number of pump station inspections [1] | 1,051 |
| Number of maintenance holes inspected | 614 |
| Number of force mains inspected | 60 |
| Number of force mains repaired/replaced/rehabilitated | 2 |
| Number of CSO structure inspections | 265 |
| Number of CSO structure cleanings | 97 |
| Number of CSO HydroBrake inspections | 363 |
| Number of CSO HydroBrake cleanings | 70 |
| Linear feet of pipe receiving chemical treatment to inhibit root growth | 91,844 |
| Number of catch basins inspected | 1,187 |
| Number of catch basins cleaned | 1.018 |
| Number of catch basins repaired | 10 |
| Number of catch basins replaced | 0 |
| Number of catch basin traps replaced | 82 |

*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 are implemented to help control nondomestic discharges into the Seattle sewer system: the FOG Control Program and the Industrial Pretreatment Program.

SPU administers the City's FOG Control Program, enforcing Seattle Municipal Code requirements to pretreat FOG-laden wastewater before it is discharged to the sewer system. FOG has a deleterious effect on the sewer system as it chemically reacts with calcium in the wastewater to form hardened deposits similar to soap. These deposits adhere to the inside of sewers and decrease capacity. Examples of FOG Program educational materials are shown in Figure 3-1. FOG Control inspection and enforcement activities conducted in 2017 are summarized in Section 3.3.

The Industrial Pretreatment Program is administered by King County DNRP. DNRP issues industrial waste pretreatment permits that include appropriate discharge limits and conducts regular site inspections and periodic permit reviews. SPU reviews CCTV tapes of lines to which these industries discharge to assess the impact to the local system. SPU and DNRP work together if permittees are found to have a negative impact on the sewer system.

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**Figure 3-1. FOG Control Program Educational Materials**

### 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.

In 2010, SPU integrated its former water and wastewater control centers into a single Control Center. The Control Center is staffed 24 hours a day and receives real-time Supervisory Control & Data Acquisition (SCADA) information. Initially, the Control Center received SCADA information only from SPU's 68 wastewater pump stations. 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 2011, monitoring and controls for SPU's first sewer system facility with active controls and SCADA connectivity also were brought into the Control Center. In 2012, a second control project (a motor-operated gate valve in the Windermere Area) was completed and brought into the Control Center for full operation.

In November 2014, SPU started the on-boarding process for several additional CSO control projects. On-boarding brings new facilities into the SPU SCADA system and into the Control Center for remote monitoring and operation. Temporary flow monitoring was installed to understand the new facility performance and to inform operational changes during facility start-up.

In 2015, SPU completed on-boarding storage projects located within the Windermere and Genesee areas, conveyance facilities and a pump station rehabilitation project in the South Henderson Area, and sewer system improvements in the Delridge area. SPU committed to optimizing the operation of the Windermere and South Henderson Areas to reduce or eliminate overflow frequency (see Sections 4.5 and 4.7). SPU is continuing to collect data in the Genesee and Delridge basins to complete the stabilization process (see Sections 4.1.2 and 4.6). The additional data will be used to determine compliance of these basins.

In 2016, several projects completed stabilization including an upgraded pump station in Fauntleroy (Pump Station 70 in Basin 94), a storage facility improvement in the North Union Bay area (Basin 18), and sewer system improvements in the Leschi area (Basins 26-36). The data collected during stabilization will be used to determine whether these areas are controlled.

Several CSO control facilities entered a stabilization period in 2017: an upgraded pump station in Madison Park (Pump Station 50 in Basin 22), a rehabilitation project in Madison Park (Pump Station 7 in Basins 24/25), and a combined sewage storage facility in Henderson North (Basin 44). Stabilization includes monitoring and analysis to help ensure a facility is functioning as intended. Stabilization of these facilities is expected to be complete in 2018. One additional CSO control facility will be completed in 2018: a retrofit in Montlake Basin 140.

### 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 were no DWOs in 2017.

SPU experienced eight exacerbated CSOs in 2017. Two of the exacerbated CSOs occurred on February 9 along the Central Waterfront (Outfalls 69 and 71). They were caused by prolonged rainfall and exacerbated by surcharging in the Elliot Bay Interceptor that occurred when DNRP shut down the Interbay Pump Station to direct flows to the Elliot West Wet Weather Facility, in response to flooding at the West Point Treatment Plant.

Six of the exacerbated CSOs occurred in October, November, and December at Shilshole Bay (Outfall 59). Flows from Wastewater Pump Station 43 normally are conveyed through a 12-inch diameter force main under Shilshole Bay. In September, SPU discovered that the force main had failed. SPU immediately installed an interim bypass system and on October 17 submitted a plan to Ecology for a more robust bypass system. The more robust bypass system was constructed using the City's emergency contracting procedures and will remain in place until the force main can be replaced. Because of unavoidable bypass system constraints, exacerbated CSOs will continue at Outfall 59 until the force main is replaced. SPU is replacing it as quickly as possible.

A summary of the DWOs and exacerbated CSOs from 2007-2017 is included in Table 3-2.

**Table 3-2. Dry Weather Overflows (DWOs) and Combined Sewer Overflows (CSOs) Exacerbated by System Maintenance Issues 2007 – 2017**

| Year | DWOs | | CSOs Exacerbated by System Maintenance Issues[1] | |
|---|---|---|---|---|
| | No. of Overflows | Volume (gallons) | No. of Overflows | Volume (gallons) |
| 2007 | 7 | 499,264 | -- | -- |
| 2008 | 1 | 148,282 | 8 | 470,444 |
| 2009 | 1 | 3,509 | 3 | 156,153 |
| 2010 | 0 | 0 | 13 | 12,320,400 |
| 2011 | 0 | 0 | 10 | 2,317,068 |
| 2012 | 0 | 0 | 11 | 5,846,647 |
| 2013 | 3[2] | 123,670 | 5 | 12,894 |
| 2014 | 1 | 4,767 | 16 | 9,349,549 |
| 2015 | 3[3] | 77,598 | 3 | 10,825 |
| 2016 | 2 | 113,349 | 6 | 2,061,875 |
| 2017 | 0 | 0 | 8 | 465,938 |

[1] *CSOs exacerbated by system maintenance issues were not reported prior to 2008. The 'exacerbated CSOs' listed in this table are listed as CSO discharges in Table 5-4 and are included in the discharges summarized in Tables 5-5, 5-6, 5-7, and 5-8.*

[2] *None of these DWOs were caused by SPU or any other City entity.*

[3] *One of these DWOs was caused by a non-City entity.*

### 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:

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.

SPU continued its Make It a Straight Flush pilot outreach campaign to educate customers that only toilet paper and human waste should be flushed down the toilet. This campaign focuses on areas where SPU's crews perform extra maintenance because of flushed trash.

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.


**Figure 3-2. Make It a Straight Flush Campaign Poster**

### 3.1.7 Control 7: Prevent Pollution

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

***Description of the 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 system. SPU conducts these inspections in combined sewer basins as resources allow.

In addition, SPU conducts the following pollution prevention activities:

- Public Education Programs: SPU supports a variety of public education programs that help prevent pollution, including Spring Clean, Green Cleaning, Adopt-a-Street, Adopt-a-Drain, Storm Drain Stenciling, Surface Water Pollution Report Line, Pet Waste Disposal, Natural Yard Care, Car Tips (to decrease leaks from automobiles), event recycling, and Reduce, Reuse, and Recycle tips.
- Street Sweeping: The City of Seattle Department of Transportation (SDOT) performs street sweeping, including street sweeping downtown streets every night and cleaning alleys three nights per week. In 2017, SDOT street sweeping crews swept 5,797 miles in the SPU combined sewer system area.
- Illegal Dumping: The City of Seattle has made it easier for anyone to report illegal dumping among other issues via the Find It, Fix it app available for Android and Apple mobile phones. In 2017, SPU received 17,462 illegal dumping complaints from customers. More than 1,462,780 pounds of debris were removed from Seattle's public property. 100 percent of complaints were removed in 10 days or less. Thanks to new ways of using technology, customer engagement, and process improvements SPU reduced the average time for removing illegal dumping from 21 days in 2015 to under 10 days in 2017.

- Other Pollution Prevention Programs: SPU conducts multiple pollution prevention programs to keep contaminants from entering the sewer system. Pollution prevention programs performed by SPU in 2017 include: solid waste collection and recycling, product ban/substitution, control of product use such as cleaning and yard care recommendations, illegal dumping response, bulk refuse disposal, hazardous waste collection, and commercial/industrial pollution prevention.

***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 overflow 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.
- Legal authority enabling the City to address discharges to the combined sewer system owned and operated by Seattle Public Utilities is established by Seattle Municipal Code (SMC), Stormwater Code (for example, SMC 22.800.030. C) effective January 1, 2016, including revisions.

***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' Rule 21-2015, 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: Routine Maintenance - All properties are required to conduct annual inspections of all conveyance, catch basin, detention and treatment systems and maintain per thresholds described in Appendix G of the Directors' Rule. Solids and polluted water removed from these systems must be properly disposed.
- BMP 3: Proper Disposal of Fluids and Wastes - 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 - This provision requires businesses and real properties that load, unload, store, or manage liquids or erodible materials (e.g., stockpiles) to maintain spill plans, equipment and practices to prevent and clean spills, and includes 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***

- Revisions to the Stormwater Code: SPU has determined that the City's legal authority and administrative procedures are already sufficient to implement the pollution prevention program. As part of continuous improvement, 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.
- Coordination with DNRP: To meet its own NPDES Permit obligations, DNRP relies upon SPU to implement pollution prevention actions (e.g., spill response, water quality complaint response and street sweeping) in areas of the City served by DNRP CSO facilities. SPU currently provides these pollution prevention actions in areas served by DNRP CSO facilities but is not responsible for DNRP's NPDES Permit compliance. At DRNP's request, SPU plans to track and report to DNRP on the limited set of BMPs identified above. SPU will provide DNRP with information on these activities so that DNRP can report to EPA and Ecology in DRNP's annual report. SPU and DNRP will explore whether to continue this arrangement and, if so, how to document costs and responsibilities.

### 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 sewage overflows. The signs include the phone number for the CSO Hotline, staffed and managed by Public Health. Public Health also provides a website with detailed information about CSOs, potential public health hazards, and precautions the public may take to protect themselves. If sewage overflows occur due to sanitary sewer overflows, SPU posts additional warning signs at impacted waterways until the problem is resolved.

**Figure 3-3. Example of Outfall Signage**

In 2017 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 and DNRP intend to fabricate and install the new signs beginning in 2018.

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 3-4 show the simplified website language and the zoomable map the public sees when they access the website.

### 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.

Home » Services » Environment » Wastewater services » Combined sewer overflow status

# 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.

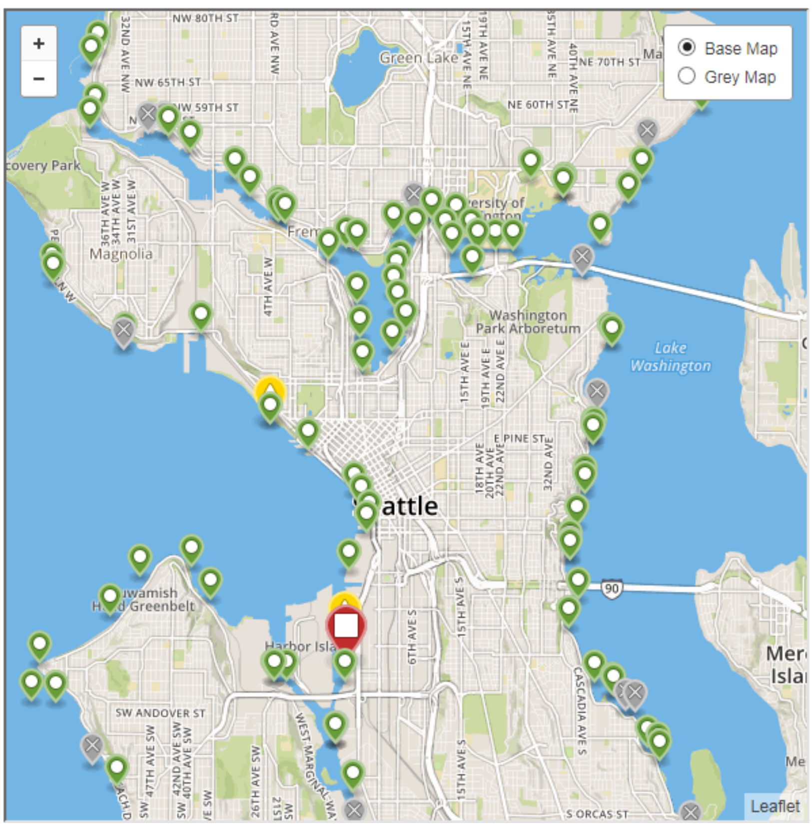
**Warning**

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


Example of a posted warning sign

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




## Legend

- Overflowing now
- Overflowed in the last 48 hrs
- No recent overflow
- Data not available

**Health Questions?**

Public Health Seattle & King County answers questions about CSOs

206-205-1151

Frequently asked questions about public health and CSOs

**Figure 3-4. DNRP/SPU Real-Time Overflow Website Screen Shots**

## 3.2 CMOM Performance Program Activities

The CMOM Performance Program Plan included a 2011-2016 CMOM Roadmap and a SSO Performance Threshold. The 2011-2016 CMOM Roadmap committed SPU to completing performance, productivity, and efficiency initiatives in each of the following program areas:

- Planning and scheduling;
- Sewer cleaning;
- FOG control;
- Repair, rehabilitation, and replacement;
- Condition assessment; and
- SSO response.

These initiatives were completed in 2016. Beginning in 2017, SPU began working on initiatives from the updated 2016-2020 CMOM Roadmap and will report here on progress made on those initiatives in the following program areas:

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

Sewer renewal encompasses repair, rehabilitation, and replacement activities.

### 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 2017 and planned for 2018 includes:

- Increased Sewer Cleaning – In 2017, SPU increased its annual sewer system cleaning production goal from 300 to 450 miles of pipe. SPU plans to continue the increased level of cleaning into 2018.
- Chemical Root Control – In 2017, SPU increased application of chemical root control agents in areas with known root intrusion issues. The same investment in chemical root control measures is planned for 2018 and SPU is evaluating other known “root hotspots” for inclusion in the program.
- Sewer Cleaning Preventive Maintenance – In 2017, SPU began reviewing current planning and scheduling processes and existing preventive maintenance schedules to help ensure maximum efficiency and effectiveness of our cleaning activities. This effort will continue throughout 2018.

### 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 more efficient and effective decisions about the maintenance and renewal of its components. Work completed in 2017 and planned for 2018 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 plans to continue at the increased level of condition assessment activities in 2018.
- Condition Assessment Strategy – In 2017, SPU completed a comprehensive wastewater collection system Condition Assessment Strategy that documents the goals, approach, processes, and measurements of success for SPU's condition assessment activities. Strategy implementation in began late 2017 and will continue throughout 2018.
- Management Areas – In 2017, an approach was developed to enable SPU to conduct inspections and condition assessment of its entire wastewater collection system in a systematic manner. The system was divided into 100 Management Areas according to the hydraulics of the wastewater collection system, 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. SPU will begin implementing the Management Areas approach in 2018 and plans to inspect its entire wastewater collection system in a priority-driven, proactive manner by 2023.

### 3.2.3 Sewer Renewal Initiatives

The purpose of the renewal initiatives is to prioritize and complete sewer renewal in a timely, efficient, and cost-effective manner. Work completed in 2017 and planned for 2018 includes:

- Increased Budget for Renewal Projects – Continuing into 2017, SPU increased spending on sewer renewal projects. Increased investment levels are planned to continue through 2018.
- Renewal Strategy – In 2017, SPU began developing a comprehensive wastewater collection system Renewal Strategy that documents SPU's priorities, our approach to making system renewal investments, and process improvements to improve efficiency. As a part of this effort, SPU is evaluating the need to improve or replace enterprise technology tools that support the Renewal Program. Strategy development is expected to be completed in late 2018.

### 3.2.4 SSO Performance

There were 42 sewer overflows in 2017, and they are summarized by cause in Table 3-3. The greatest number of sewer overflows were caused by roots in the sewer (6 overflows), City construction projects (6 overflows) and structural failures (12 overflows).

**Table 3-3. 2017 Sewer Overflows by Category**

| Category | Primary Cause of Sewer Overflows | Number of 2017 Sewer Overflows |
|---|---|---|
| 1 | Roots | 6 |
| 2 | FOG | 3 |
| 3 | Debris | 4 |
| 4 | Structural Failure – Gravity | 11 |
| 5 | Structural Failure – Force Main | 1 |
| 6 | Capacity – Gravity | 3 |
| 7 | Pump Station – Mechanical | 0 |
| 8 | Pump Station - Capacity | 2 |
| 9 | Power Outage | 0 |
| 10 | Operator Error | 1 |
| 11 | Maintenance Error | 0 |
| 12 | Pressure Release | 3 |
| 13 | City Construction | 6 |
| 14 | New Facility Startup | 0 |
| 15 | Private Side Sewer Issue | 1 |
| 16 | Capacity – King County | 1 |
| 17 | Private Construction | 0 |
| 18 | Other Agency Construction | 0 |
| 19 | Vandalism | 0 |
| 20 | Extreme Weather Event (≥25year) | 0 |
| | Total for Categories 1 – 20 | 42 |
| | Total for Categories 1 – 15 | 41 |

SSO performance for the years 2013 through 2017 is summarized in Table 3-4. SSO performance measures the effectiveness of SPU's CMOM Performance Program Plan and helps ensure SPU is focusing 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 (for example, 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, based on a two-year moving average.

**Table 3-4. 2013-2017 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 |

1. *Numbers in this column include only the sewer overflows included in the SSO performance calculation and exclude sewer overflows caused by extreme weather events, other agency construction, private construction, King County capacity constraints, and vandalism.*
2. *SPU has 1,422 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. One-third of the SSOs in 2017 were caused by the structural condition of the pipe, so in 2018 we are continuing to focus on understanding the condition of our wastewater system through increased CCTV inspection and increased investment and planning in our Renewal Program.

## 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 Sanitary Sewer Overflows (SSOs) by developing and implementing a FOG Control Plan. FOG Control Plan activities include standardizing procedures, training FOG inspectors, providing outreach and education to FOG-generating dischargers, and utilizing risk-based assessments to help prioritize inspections of food service establishments (FSE), FOG-related sewer cleaning, and FOG-related enforcement. Work completed in 2017 and planned for 2018 is described in the following sections.

### 3.3.1 FSE Risk Assessments and Regulatory Compliance Inspections

In 2017, FOG Control Program staff completed 1,226 FSE FOG discharge risk assessments and regulatory compliance inspections. These include FOG education, data collection, an evaluation of FOG discharge risk, and an assessment of compliance with Seattle Municipal Code. Completed risk assessments allow program staff to assign each FSE an overall priority, which is then used to designate an inspection frequency based on the amount of FOG production and the condition of the collection system.

The risk assessment and inspection frequency criteria are displayed in Table 3-5 below. As depicted in the table, inspections are scheduled based on the overall priority assigned to each individual FSE. SPU uses a matrix system which combines the “FOG Hotspot” mainline data based on our mainline CCTV, assessment and maintenance data and combines this with a grease production assessment from each FSE. This allows SPU to focus more energy and resources on the highest grease producers connected to the most highly impacted mainlines. For example, a heavy grease producing restaurant connected to a Category 1 hotspot mainline is considered a Priority 1 FSE and inspected two times per year while a minimally producing FSE on the same Category 1 line would be classified as a Priority 4 and receive only biannual inspections.

**Table 3-5. FOG Risk Assessment and Inspection Frequency Criteria**

| Hotspot/Discharge Risk Assessment Matrix | | | | |
|---|---|---|---|---|
| | FOG Discharge Risk | | | |
| Hotspot Risk | High | Medium | Low | Minimal |
| Category 1 | 1 | 2 | 3 | 4 |
| Category 2 | 2 | 3 | 4 | 5 |
| Category 3 | 3 | 4 | 5 | 6 |
| Category 4, 5, 6 | 4 | 5 | 6 | 7 |

| Inspection Frequencies | | |
|---|---|---|
| Map Category | Inspection Frequency Code | Years |
| Priority 1 | Semiannual | 2/year |
| Priority 2 | Annual | 1 year |
| Priority 3 | Annual | 1 year |
| Priority 4 | Biennial | 2 years |
| Priority 5 | Triennial | 3 years |
| Priority 6 | Quadrennial | 4 years |
| Priority 7 | Quinquennial | 5 years |

In accordance with the risk-based strategy in the approved FOG Control Program Plan, all 2017 regulatory compliance inspections were conducted at facilities assigned a Priority 1, Priority 2, or Priority 3 designation.

2018 efforts will include the following activities:

- Regulatory compliance inspections of all Priority 1, 2, and 3 facilities as described in Table 3-5 above.
- Continued initial risk assessments for facilities connected to Category 3, 4, 5 and 6 mainlines.
- Continued focused enforcement at facilities that discharge to high priority sewer mainlines and that have a high risk for discharging high levels of FOG.

### 3.3.2 FOG Outreach

Inspectors also conducted door to door residential outreach in residential areas with Priority 1 and Priority 2 hotspots. In 2017, the team conducted outreach to 1,974 single family dwellings and multi-family properties. Additionally, 6,722 residential FOG fliers were distributed in response to customer service inquiries primarily initiated by multi-family housing property owners and managers.

Specific 2017 commercial and residential outreach activities included the following:

***Commercial***

- Conducted 1,226 FSE site visits with an outreach component;
- Delivered FOG messaging to 90 FSEs and delivered free spill kits to 101 FSEs, as part of a Seattle Green Business Program multi-faceted conservation, pollution prevention, and recycling campaign;
- Maintained and updated a commercial FOG messaging website: http://www.seattle.gov/util/ForBusinesses/DrainageSewerBusinesses/FatsOilsGreaseDisposal/index.htm.

***Residential***

- Distributed education and outreach materials to 187 residential units on 93 parcels that discharge to FOG hotspot associated sewer mainlines;
- Attended and distributed FOG control materials at multiple community events including: Trends – Rental Property Management conference and Tradeshow, which was attended by over 1,300 rental property owners and managers;
- Through our customer service web portal and individual inquires, distributed 6,722 FOG educational brochures;
- As a member of the Seattle Multi-Family Conservation Initiative team, distributed conservation and environmental messaging associated with several SPU programs;
- Initiated a project to improve residential awareness and update outreach materials. Key activities associated with this are:
    - Contracted with a consultant team to aid in the research and development of multi-cultural outreach and education materials and messaging.
    - Distributed customer awareness surveys.
    - Conducted focus group with area plumbers and service providers.
- Maintained and updated residential FOG messaging website: http://www.seattle.gov/util/MyServices/DrainageSewer/FatsOilsGrease/index.htm.

All outreach materials are under review for update in 2018 as part of the project described above.

2018 outreach efforts will include the completion of the assessment project and implementation of the updated outreach program.

### 3.3.3 FOG Planning and Program Management

SPU staff review the FOG Control Program Plan each year and update it as appropriate to continue focusing efforts on areas most heavily impacted by FOG discharges. The 2017 annual review did not result in any plan revisions.

The FSE Inventory Management Plan describes SPU's approach for collecting, using, and managing FSE data. In 2017, SPU updated the FSE database periodically by uploading an updated listing of FSEs permitted through the King County Public Health Department. 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 2018, SPU plans to continue to initiate modification of existing City side sewer regulation through the development of a Director's Rule and maintenance reporting program.

SPU reviewed all FOG Standard Operating Procedures (SOPs) in 2017. As a result of this review, the Regulatory Inspection and Linko Database SOPs were updated to reflect minor 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;
- Empowers and expand the capabilities, ownership and buy-in of field inspectors by providing them with a voice in the program process development.

FOG Inspector training in 2017 included the following:

- In-house FOG inspector training included informal discussions concerning procedural changes brought about by technology improvement projects and program improvements. These sessions occur weekly during FOG Team meetings;
- Monthly online training webinar training sessions were offered by the FOG program software provider, Linko Technologies, and attended by FOG inspectors as appropriate;
- In April, FOG Team members attended and presented at the Western States Alliance FOG Forum Workshop in Suquamish Washington; and
- FOG Team members actively participated in quarterly meetings of the APWA PREFOG Sub-Committee in February, May, August and November.

### 3.3.4 Inter-Agency/Stakeholder Coordination

SPU Staff coordinated with external agencies and groups who impact FOG Pretreatment installations, conduct plumbing plan review, and enforce public health regulations relating to restaurant kitchens. The partners involved include UA Local 32 Plumbers and Pipefitters Union, King County Plumbing Department, and Seattle-King County Public Health (Public Health). These collaborations have proved to be highly beneficial and have led to the following improvements in FOG Pretreatment Installations in SPU's service area.

- Discussions with UA Local 32 Plumbers and Pipefitters Union representatives led to the installation of a FOG Pretreatment training mock-up at their training facility. In addition, SPU has been asked to develop courseware in 2018 to provide training to apprentice plumbers during their initial training phase and journeymen plumbers for continuing education credits. This training will help plumbers understand the necessity and requirements for properly installing FOG Pretreatment.
- Discussions with Public Health Plumbing Inspectors have increased their awareness of the issues related to and sources of FOG laden discharges from FSEs. This increased awareness has led to an expansion of their plan review process to include all FSE kitchen plan submissions whereas in the past only new facilities were reviewed. This added effort will help ensure proper installations for restaurants going into existing spaces and confirm facilities undergoing renovation are also brought up to King County Plumbing Code standards. This will greatly reduce the need to enforce retrofits to existing restaurants.
- Coordination with Public Health has led to improved communication between our two entities and alleviated potential conflicts in implementing the King County Public Health, Seattle Side Sewer, and King County Plumbing Codes. An example of this conflict is the requirement and SPU’s assertion that a food preparation sink is a source of FOG and therefore required to be served by a properly sized and installed pretreatment device. For a time, Public Health did not allow connection of this sink due to the potential for contamination in the event of a back-up from the pretreatment unit. Through our communications it was agreed that the sink should be connected to pretreatment with the addition of an air gap in the drain line between the sink and the pretreatment unit. These communications have led to more consistent messaging from inspectors from both agencies and less confusion by the FSEs we regulate.

These efforts will continue in 2018 by implementing the training at the UA Local 32 Training Facility and through periodic coordination meetings scheduled between King County Plumbing Department, Public Health and SPU.

## 3.4 Annual Review of Operations and Maintenance Manuals

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 will submit an O&M Manual for the Henderson North CSO storage facility.

**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 2017 and work that SPU plans to complete in 2018. During 2017, 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. 2017 project spending is summarized in Table 4-1.

**Table 4-1. 2017 Plan Implementation Spending**

| Project Name | Amount Spent |
|---|---|
| Ship Canal Water Quality Project | $14,145,804 |
| North Henderson CSO Reduction Project | $3,129,321 |
| Central Waterfront CSO Reduction Projects | $778,756 |
| South Henderson 49 CSO Reduction Project | $17,311 |
| Delridge 168/169 CSO Reduction Project | $24,415 |
| Sewer System Improvement Projects (Retrofits) | $2,181,608 |
| Outfall Rehabilitation | $187,764 |
| Windermere Supplemental Compliance | $115,516 |
| Genesee Supplemental Compliance | $173,600 |
| South Henderson 47/171 Supplemental Compliance | $52,449 |
| Magnolia 62 Supplemental Compliance | $68,500 |
| Ballard Roadside Raingardens | $280,027 |
| Delridge Roadside Raingardens | $210,047 |
| RainWise | $1,026,468 |
| NDS Partnering | $1,566,012 |
| South Park Water Quality Facility | $999,037 |
| Expanded Street Arterial Sweeping | $2,350,979 |
| Total | $27,307,613 |

## 4.1 Sewer System Improvement Projects

SPU made significant progress on a variety of combined sewer system improvement projects in 2017, as summarized in the following paragraphs.

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

In 2017, SPU completed an options analysis of the Delridge Basin 99 area to identify an appropriate sewer system retrofit. The analysis showed that removing the existing HydroBrake and replacing it with an automated sluice gate will allow for more optimal use of the existing offline storage pipe (CSO Storage Facility 34) as well as allow SPU to discharge a consistent flowrate to the DNRP system. The sluice gate retrofit is currently being designed and is anticipated to be constructed and operational in 2019.

### 4.1.2 Delridge (Basins 168, 169) HydroBrake Retrofit Project

SPU replaced the existing HydroBrakes at CSO Facilities 2 and 3 (NPDES 168 and 169, respectively) with actively controlled valves and added upstream flow diversion structures to more optimally use the existing storage facilities in these two CSO basins in 2015. These improvements reduce the frequency of surcharging in the downstream sewer system, reduce CSOs at Outfalls 168 and 169, and have nearly eliminated unscheduled maintenance due to debris issues at the facilities.

Since construction, SPU has fine-tuned the operation of the valves to meet design intent and mitigate the effects of hydraulic jumps near operational monitoring points. SPU has continued to collect monitoring data throughout this time. Now that the facilities are operating as designed, the monitoring data collected is being used to update the area hydraulic model.

### 4.1.3 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. The improvements were divided into 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.

Post-project performance monitoring began in 2016 and continued in 2017. The flow data will be used in 2018 to determine if any operational adjustments are needed at the pump station, orifices, or automated gates in order to balance flows throughout this interconnected area.

### 4.1.4 Duwamish (Basin 111) Weir Raising Project

The Duwamish Basin (111) is located in industrial south Seattle in the Duwamish River valley. The sewer system improvement project for this basin consisted of raising the overflow weirs at Overflow Structures

111B and 111C. Post-project performance monitoring indicates that the improvements are performing as expected. Post-project performance monitoring will continue in 2018.

### 4.1.5 Madison Park (Basin 22) Pump Station 50 Rehabilitation Project

Basin 22 is located in the Madison Park area. Combined sewage from the basin flows by gravity to Pump Station 50, located at the north end of 39th Avenue East. Pump Station 50 was an airlift-type pump station that in recent years underperformed and had recurring reliability and maintenance issues resulting in SSOs and CSOs. In 2016, the air lift pump station was upgraded to include larger capacity submersible pumps, new piping, valves, and new electrical and SCADA equipment. The project also included upgrades to the overflow structure and new valve vaults. Construction was completed in December 2016. Monitoring conducted in 2017 showed that the pump station is meeting design intent and that the facility is working according to design. There were no CSOs from Basin 22 in 2017. Long term simulations are planned for 2018 to confirm that this basin meets the CSO standard.

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

In late 2016, SPU kicked off the design phase of the Magnolia (Basin 60) sewer system improvement. The project consists of upsizing Pump Station 22 and replacing the associated force main with a larger force main. This will enable SPU to send more flows to DNRP's Fort Lawton Tunnel, which delivers flows to the West Point Wastewater Treatment Plant. Design of this project is planned for completion in the first quarter of 2018 with construction estimated to be completed by the end of 2019.

### 4.1.7 Montlake (Basin 20) Pump Station 13 Rehabilitation Project

In 2016, SPU conducted a detailed options analysis for Basin 20, which recommended rehabilitating and upsizing Pump Station 13 and replacing the force main from the pump station to DNRP's trunk sewer in order to pump more flow out of the basin. This project is currently in design and is anticipated to be constructed and operational by 2020. Following construction, SPU will monitor the pump station's operations and make any necessary adjustments to achieve design intent.

### 4.1.8 East Waterway (Basin 107) Flap Gate Rehabilitation

Overflows in Basin 107 are caused by two principal sources of flow: runoff from the basin surface and backwater from DNRP's Elliot Bay Interceptor (EBI). The outfall elevation is below the maximum hydraulic grade line of the EBI which requires the use of a flap gate at the connection of SPU's system to the EBI to prevent backflow. The existing flap valve had rusted and become inoperable, allowing backflow from the EBI and exacerbation of CSO volumes through SPU's outfall. In August of 2017, SPU removed the old flap gate and installed a backwater valve to prevent the EBI from backwatering into SPU's system (see figures below). Following construction, SPU deployed additional monitoring in the basin to evaluate the effectiveness of the valve in reducing CSO volumes. Monitoring will continue into 2018.

**Figure 4-1. Removed Flap Gate (left) and New Backwater Valve (right) in Basin 107**

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

In 2016, SPU conducted an analysis of Basin 138 in 2016 to identify an appropriate sewer system retrofit. The recommended option involves removing the HydroBrake at the existing offline storage tank and replacing it with an automated sluice gate. This retrofit will optimize the existing offline storage allowing the storage tanks to discharge at a rate that matches the firm pumping capacity of Pump Station 20. The HydroBrake peak flow is below the pump station's firm capacity which allows the pump station to cycle during tank draining cycles when it could run continuously and drain the storage tank quicker between back to back storms and peak rainfall intensities. The project is currently in design and is anticipated to be constructed and operational by 2020.

### 4.1.10 Future Sewer System Improvement Projects

**Montlake Basin 140**: In the 2015 Annual Report, SPU indicated that the preferred sewer system improvement for Basin 140 was a complete overhaul of Pump Station 15 and construction of a new force main from the pump station to DNRP's trunk line. Further analysis of the Montlake Area in 2016 concluded that a weir height adjustment in Basin 140 will better utilize existing offline storage, particularly during high intensity rainfall events. SPU will raise the weir in 2018 and monitor basin performance.

**Magnolia 61, 62, and 64**: As reported in the 2016 Annual Report, the average number of CSOs at Outfall 62 has increased in recent years. In 2017, SPU conducted an analysis of Basin 62 and the hydraulically connected Basins 61 and 64 to understand the cause of the increased CSOs and to begin to identify possible solutions. The analysis identified two system performance data gaps. The first data gap is a better understanding of the condition of the sewer mainline that connects Basins 61 and 62 to Basin 64, which is buried in the beach. There is evidence that sedimentation of the Beach Line may cause or exacerbate CSOs, and thus SPU intends to CCTV and clean (if necessary) the Beach Line in 2018. Additionally, the modeling portion of the analysis indicated that raising the CSO weir at Outfall 62 may reduce the frequency of overflows by preventing supercritical flow that appear to be causing flow to jump over the weir and result in low volume CSOs. This weir raising will be further investigated in 2018 and implemented if SPU determines it is feasible. Monitoring will be deployed after any system change to measure effectiveness and provide data for any subsequent planning work.

## 4.2 North Henderson Storage Project (Basins 44, 45)

The North Henderson CSO Reduction Project will reduce the number and volume of combined sewage overflows from Outfalls 44 and 45. The project includes a new 2.65 MG storage facility in Seward Park and more modest improvements adjacent to Martha Washington Park. The storage facility includes diversion structures with motor-operated gates to control flow into the storage tank, a mechanical and electrical facility vault, and a pump and force main system to return stored flow back into the sewer system.


**Figure 4-2. Completed North Henderson CSO Storage Facility**

The new facilities were placed in operation in May 2017 and are in SPU's "stabilization" phase. Stabilization consists of monitoring and adjusting operations to optimize performance of the newly constructed facilities. SPU plans to submit a notification that construction is complete and the facilities are in regular operation by the end of 2018. Hydraulic modeling will be performed in 2019 to determine if Outfalls 44 and 45 are controlled.

## 4.3 Ship Canal Water Quality Project

The Ship Canal Water Quality Project (Ship Canal Project) is a joint SPU-DNRP project that will control CSOs from SPU's Wallingford, Fremont and Ballard areas (Outfalls 147, 150, 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 Joint Oversight and Project Review and Change Management Committees to provide policy guidance and senior level management oversight, support and direction to the project.

A Draft Facility Plan was prepared for the Ship Canal Project and was submitted to EPA and Ecology for review in January 2016. As the lead agency, SPU issued a draft Ship Canal Project Supplemental EIS for public comment on September 22, 2016 and held a public hearing on October 18, 2016. Comments were received through October 24. The Final Supplemental EIS was issued on January 26, 2017 and included responses to all comments received on the Draft Supplemental EIS. The appeal period ended on February 9, 2017, and there were no appeals. This completed the SEPA process for the Ship Canal Project.

The Final Facility Plan for the Ship Canal Project was submitted in March 2017 and was approved by EPA and Ecology in June 2017. The approval letter noted that SPU and DNRP are continuing to update the hydrologic and hydraulic model used to size the project. Accordingly, EPA and Ecology required that SPU and DNRP submit a Facility Plan Addendum once the modeling is complete, to document the model and any resulting design changes.

SPU and DNRP completed an integrated hydraulic model in 2017. The integrated model provides a common platform for both agencies to evaluate design and operation of CSO control facilities in the north end of Seattle. SPU and DNRP worked together to develop and calibrate common standardized "MIKE URBAN" models for both agencies' CSO Basins and facilities tributary to the Ship Canal Water Quality Project and the West Point Treatment Plant. The component models were integrated into a single model used to simulate the North Interceptor, define operational strategies, and evaluate the predicted performance of the Ship Canal Project.

The Facility Plan Addendum was drafted in 2017. The storage tunnel diameter was increased from 14 feet to 18 feet 10 inches to provide the storage volume identified in the integrated hydraulic model, address upstream and downstream operational variabilities, address the uncertainties of climate change, and help ensure long-term compliance with the CSO standard. The Addendum was submitted to Ecology and EPA in February 2018.

In 2017 the project team made significant progress in the design of the major project construction packages:

- The storage tunnel and the conveyance packages (3rd Ave and 11th Ave NW and Fremont) completed 60 percent design in 2017 and are on schedule to complete 90 percent design in early 2018.
- The Ballard Early Work Package completed 100 percent design This construction package includes site remediation near the western tunnel portal, replacement of the pedestrian pier and CSO Outfall 151 at the 24th Ave NW street end, and temporary power and utility relocations at the Ballard site. Reconstruction of the 24th Ave NW pier will enable barging of tunneling spoils. Construction is planned for 2018 and 2019, in advance of storage tunnel construction.
- SPU began developing a site plan for the property SPU owns in Ballard where the SCWQP Tunnel Effluent Pump Station (TEPS) will be located. The site plan will inform the design of the pump station, which is currently expected to complete 60 percent design in 2018.
- The Shilshole Pipe project completed 90 percent design in 2017. This package includes the construction of two conveyance pipelines to convey TEPS flows to the King County Ballard Siphon. These conveyance pipelines were originally planned to be designed and constructed with the TEPS package; however, in early 2017 SPU learned that SDOT was planning to construct the Burke-Gilman Trail Missing Link (BGTML) Project in 2018. The trail would be located directly over the planned conveyance pipelines. SPU and SDOT decided that it would be cost efficient and minimize community impacts to expedite design of the Shilshole Pipe package and construct it with the BGTML Project. The Shilshole Pipe/BGTML project is currently scheduled to be constructed in 2018.

In 2017 SPU completed an MOA with the City's Department of Finance and Administrative Services (FAS). The MOA allows SPU to lease FAS property in Wallingford that is needed for the east tunnel portal and take permanent possession of a portion of the site after construction.

SPU is also working to obtain necessary property easements along the tunnel alignment. Properties have been appraised and two of the four private property underground tunnel easements have been acquired. SPU expects to acquire the remaining underground easements in early 2018. The pier adjacent to the 24th Ave NW pier has also been leased to facilitate reconstruction of the 24th Ave NW pier.

SPU continued with community outreach for the Ship Canal WQ Project during 2017, as summarized below:

- Staffed information booths at the Fremont Fair, Ballard Seafood Fest, Fremont Market, Burke Gilman workshops, and Seattle City Light Open House in June, July, September, October and November, resulting in approximately 762 contacts and 33 listserv signups.
- Delivered project briefings at advisory boards (Freight Advisory Board, Bicycle Advisory Board), a community council (Wallingford), and organizations (Friends of Street Ends, Cascade Bicycle Club).
- Delivered presentations to Seattle City Council and the King County Regional Water Quality Committee.
- Held public drop-ins (3) and working sessions (3) for stakeholders in Ballard, Fremont and Wallingford.
- Conducted numerous stakeholder briefings with property owners and businesses along the proposed project sites and tunnel alignment.
- Contacted businesses and residents (approximately 125 flyers) along the tunnel alignment to coordinate geotechnical investigations, site fence construction, drop-in sessions, potholing, and soil and groundwater investigations.

SPU's planned 2018 outreach activities include:

- Staff information booths at the Fremont Fair and Ballard Seafood Fest.
- Deliver project briefings at organizations and boards focused on trees, bicycles, pedestrians, and industry.
- Deliver notices and mailers along the tunnel alignment, as necessary.
- Continue stakeholder briefings and attending community meetings.
- Provide project information via fact sheets, website, listserv and other materials.
- Conduct construction outreach with neighbors adjacent to the Ballard project site.
- Conduct site design outreach with parties interested in the Ballard project site.
- Begin pre-construction and construction outreach for Ballard Early Work construction and pre-construction outreach for the storage tunnel, 3rd Avenue conveyance, and advanced utility relocation construction.
- Hold public drop-in session(s) and/or site tour at the Ballard Early Work site.

## 4.4 Central Waterfront CSO Reduction Projects

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

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

SPU and the Seattle Department of Transportation (SDOT) are coordinating the design and construction of the Central Waterfront sewer system modifications and the Waterfront Seattle Alaskan Way to Elliott Way - S King St to Battery St Project, because critical portions of both City projects are located under the existing Alaskan Way Viaduct and neither of these City projects can be completed until the Alaskan Way Viaduct is demolished. Attempting to complete the CSO control project prior to demolition of the Viaduct would result in significant additional cost, additional disruption to businesses and motorists, additional risk of failure of the currently compromised viaduct structure itself, and risk that the completed improvements would be damaged during subsequent demolition work. In addition, the Viaduct cannot be demolished until the new SR-99 tunnel is complete, or there would be major additional disruption to businesses and motorists. WSDOT is solely responsible for completing the new SR-99 tunnel and funding the Viaduct demolition; the City is not able to direct the activities of WSDOT or its tunneling contractor, Seattle Tunnel Partners (STP), and therefore is 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 Basin 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 pushed the SR-99 completion and Viaduct demolition schedules beyond the point where the City can assure that the CSO control project will be completed by 2020. Consequently, SPU submitted notification of this force majeure event the same day. Unfortunately, the City cannot determine the full extent of the delay until WSDOT and its construction contractor have a firm completion schedule. In the meantime, SPU is continuing to complete the design of the Basin 70, 71, 72 CSO control project so that it is ready to construct after the SR-99 tunnel is complete and the Viaduct is demolished.

The WSDOT-caused delay is not expected to cause or contribute to endangerment of public health, welfare, or the environment. Outfalls 70 and 72 already discharge less than once per year on average, and the discharge from Outfall 71 is a relatively small portion of the City's CSO volume.

In 2017, SPU completed the 90 percent design, completed the assessment of impacts on customers, and began implementing the necessary measures to mitigate customer impacts. In 2018, SPU plans to complete design for inclusion in the bid package for the Waterfront Seattle Alaskan Way to Elliott Way - S King St to Battery St Project, and complete implementing the necessary measures to mitigate customer impacts.

### 4.4.2 North Central Waterfront (Basin 69)

In 2017 SPU initiated work on the most northern CSO basin along the Central Waterfront (Basin 69). The goal of the project is to bring Outfall 69 in control with the Consent Decree standard of no more than one CSO per year over a twenty-year moving average. Basin 69 is approximately 150 acres in size and the wastewater collection system is fully combined. All combined sewage flows north into DNRP's EBI. Currently, the control volume for this basin is estimated at approximately 130,000 gallons. In 2017, SPU installed flow meters in the basin to collect data to inform the calibration of the hydraulic model. In mid-2018, SPU will initiate options analysis to evaluate control solutions for the basin. SPU is on schedule to deliver the draft engineering report for the preferred alternative by mid-2019.

There are numerous other transportation projects planned to be constructed in Basin 69 as well as interests from community groups to create more open space and green corridors. SPU coordinated with these stakeholders in 2017 and this coordination will continue through 2019.

## 4.5 Windermere Supplemental Compliance Plan

In 2015 SPU completed the 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 the performance of the facility was completed in Summer 2016. The modeling showed that, although the project has significantly reduced the occurrence of overflows from Basin 13, the modelled 20-year average number of overflows was 1.6, which exceeds the State CSO performance standard. Therefore, on October 4th, 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 in the Windermere Area. SPU submitted a Technical Memorandum summarizing the findings of the evaluation on December 28, 2017. SPU found that the two main control gates in the Windermere area need to be reprogrammed and recalibrated to better respond to changes in flow. The evaluation also found that more flow monitors need to be deployed in the area to get a better understanding of additional flow inputs to the Lake Line. In 2018, per the approved Plan, SPU will implement the gate changes and will continue to work with DNRP to identify other short-term system operational improvements.

**Figure 4-3. Completed Windermere CSO Storage Facility**

## 4.6 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 had two detrimental effects on the operation of the Genesee CSO facilities:

- It caused the tanks to fill up prematurely during storms, and
- It caused the tanks to 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 2018, SPU will use the flow information and the updated hydraulic model to determine by June 29, 2018 whether outfalls 40/41 and 32 are controlled to the Consent Decree performance standard.

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

Figure 4-5. Completed Genesee CSO Storage Facility 11A

## 4.7 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 4-6. Completed 52nd Ave S Combined Sewage Conveyance Project**

Hydraulic modeling of these projects was completed in late 2016 and used to assess the performance of these improvements. The modeling showed that Basin 46 is meeting the Consent Decree 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 are not yet meeting the CSO performance standard, SPU submitted a Supplemental Compliance Plan to Ecology and EPA on March 22, 2017 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. Per the approved Plan, this adjustment was implemented by December 29, 2017. In 2018, SPU will monitor flows and conduct hydraulic modeling.

## 4.8 Outfall Rehabilitation Projects

In 2016, SPU completed the design for the replacement of Outfall 151 as part of the work on the Ship Canal Water Quality Project (see Section 4.3). Construction of Outfall 151 is anticipated to begin in 2018 and end first quarter of 2019. Per the 2015 Outfall Rehabilitation plan, two other projects are in the design phase: a replacement trash rack at Outfall 99, which is anticipated to be installed in 2018, and rehabilitation of the bulkhead at Outfall 171, which is scheduled for 2019.

## 4.9 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 7$^{th}$ Avenue South drainage basin, a highly industrial basin in the City's South Park neighborhood, and discharge treated water to the Lower Duwamish Waterway.

In 2017, SPU completed the pilot study field testing and submitted the Pilot Study Test Report to Ecology. In addition, SPU began options analysis, including: evaluation of the existing basin hydraulics, evaluation of performance and footprints for different treatment technologies, and preliminary evaluation of facility siting. Work planned for 2018 includes: finalizing the siting strategy, beginning the property acquisition process, and completing options analysis.

**Figure 4-7. Pilot Test – Chemically Enhanced Sand Filtration Technology**

Figure 4-8. Pilot Test - Ballasted Flocculation Technology

## 4.10 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 2017 included:

- Improving user access to RainWise materials on the joint www.700milliongallons.org website.
- Incorporating lessons learned into draft updates of Volume III (Design Phase) and Volume V (Operations & Maintenance) of the joint SPU/DNRP Green Stormwater Infrastructure (GSI) Manual and including procedures and templates for designing curbless roadway typologies, which are the primary focus for SPU's NDS Partnering Program (see Section 4.10.2).

In 2018, the collaborative work will include:

- Updating Volume II (Options Analysis) of the joint GSI Manual to include lessons learned from past projects, and
- Developing a new volume of the GSI Manual (Construction and Commissioning) to document the procedures and practices in construction and commissioning to help ensure the quality of projects, building on lessons learned from recent projects.

### 4.10.1 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 670 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 to enter the program. There are currently 70 active contractors listed on the RainWise website that are available to bid and install systems for RainWise customers. In addition, there are at least five contractors that have RainWise training but choose not to be on the RainWise list because they consider RainWise to be a part of much larger installations.

In 2018, 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.

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. The average 2017 installation now controls the runoff from nearly 1,600 square feet of roof area. Typical RainWise installations are shown in Figure 4-9.


**Figure 4-9. Raingarden (left) and Cistern (right)**

In 2017, the RainWise Program completed 130 projects in the Ballard, North Union Bay, Delridge, Fremont, Genesee, Henderson, Leschi, Montlake, and Windermere basins. Since program inception, 766 installations have been completed. These installations control approximately 22 acres of impervious roof area and an estimated 11.8 million gallons (MG) per year of stormwater, and they provide an estimated 168,000 gallons of CSO control volume.

In an effort to reach historically underserved communities, SPU continues to undertake equity inclusion initiatives in the Delridge, Genesee, and Henderson basins to explore and implement best practices for involving these communities in RainWise. In 2017, the initiative provided outreach to Somali, Vietnamese, Filipino and Chinese homeowners. Additionally, three Vietnamese and three 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, Highland Park, Barton, and South Park. DNRP completed 102 installations in 2017, bringing their total installations since joining the program in 2013 to 677. DNRP's installations control approximate 18.5 acres of impervious roof area and 8.9 MG per year of stormwater.

SPU will continue to offer its RainWise Program in 2018.

### 4.10.2 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 2017, the Program finalized design of the 30th Ave NE Sidewalk and NDS Project, the first partnership project with SDOT.

Work in 2017 also included options analysis for the Longfellow and Thornton Creek NDS Projects. This work included identifying potential project blocks, specifically where there was a potential partnership opportunity (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.

In 2018, the NDS Partnering Program plans to construct the 30th Ave NE Sidewalk and NDS Project with SDOT in the Spring and begin design of the Longfellow and Thornton Creek NDS Projects. SPU is on schedule to meet its regulatory milestones and does not anticipate any significant problems for implementation.

**Figure 4-10. Rendering of 30th Ave NE Sidewalk and NDS Project**

## 4.11 Expanded Arterial Street Sweeping Program

This program expands the City's arterial street sweeping program, per commitments in the Plan to Protect Seattle's Waterways.

During 2017, the team continued implementing the expanded program. Key tasks completed included:

- Swept 16,320 broom-miles draining to waterways to capture 175 dry tons of total suspended solids (TSS) equivalent (over 140 percent of the 122 tons/year target).
- Utilized overtime to address difficulties maintaining a full crew due to a tight labor market and high turnover;
- Received a new, 75% grant-funded sweeper;
- Submitted a Post Construction Monitoring Quality Assurance Project Plan (QAPP) for review, and;
- Collected 48 post-construction monitoring plan samples.

During 2018, 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 new routes.
- Place the new sweeper into service.
- Submit year one of two post-construction monitoring reports.
- Complete year two of two post-construction monitoring.

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

**SECTION 5**

# Monitoring Programs and Results

This section provides a brief overview of SPU's precipitation and flow monitoring programs and presents 2017 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. In 2015, Rain Gauge (RG) 30 was temporarily removed due to roof repairs at Rainier Beach Library, where it is housed. These repairs were completed in January 2017 and the rain gauge was re-installed. No additional changes to the network of permanent rain gauges were made in 2017.

SPU anticipates one additional rain gauge located in Ballard will be added to the network in 2018. Its status will be included in next year's annual report.

Two tables summarizing 2017 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.

For the fourth year in a row, Seattle experienced wetter than normal conditions. Annual rainfall across the city ranged from a maximum of 48.09 inches (RG01, North Seattle) to a minimum of 39.46 inches (RG17, Delridge). Normal annual rainfall, averaged citywide, is 34.94 inches.

Despite the overall wet conditions, Seattle avoided extreme rainfall intensities for the second straight year. Rain gauges recorded eight events with recurrence values exceeding two-years, but none exceeding 25-years. Of the significant events, three were due to long-duration (6-hours and longer) "atmospheric rivers," while the remainder were due to various types of localized convective activity.

## 5.2 Flow Monitoring Program

During 2017, SPU's flow monitoring consultant operated and maintained 72 monitoring points. An additional 24 monitoring points were operated and maintained by SPU staff, for a total of 96 continuous monitoring sites.

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 2017 Monitoring Results

Several tables summarizing 2017 flow monitoring and flow monitor performance are included in the following pages of this report:

- Table 5-3 show the 2017 flow monitor performance by outfall and month;
- Table 5-4 provides the details of all 2017 CSOs by outfall and date;
- Table 5-5 includes the most recent 5-year overflow frequency for each outfall and compares 2017 and baseline CSO conditions;
- Table 5-6 compares 2013-2017 CSOs by outfall;
- Table 5-7 compares 2013-2017 CSOs by receiving water body;
- Table 5-8 shows which outfalls met the performance standard for controlled outfalls in 2017.

Observations and conclusions from these tables include:

- All of the flow monitoring stations were in service, detecting and quantifying any CSOs, over 99% of the time.
- Total 2017 precipitation (44.82 inches) was comparable to the previous year (45.43 inches). More precipitation occurred in February than in any other month, and the amount (8.61 inches) was 73 percent higher than the most recent five-year average (4.98 inches).
- There were 275 CSOs in 2017, totaling 147.5 million gallons (MG). Over 22 percent of these CSOs occurred in February, and 50 percent of the annual CSO volume was discharged in February.
- Over 38 percent of the 2017 CSO volume was from Outfall 152 (Ballard), which serves the largest combined sewer area of any of the outfalls. Not surprisingly, the water body receiving the greatest CSO volume in 2017 was Salmon Bay (Ballard).
- The five outfalls that will be controlled by the Ship Canal WQ Project (Outfalls 147, 150, 151, 152, and 174) contributed almost half of the 2017 CSOs (128 of the 275 CSOs) and 61 percent of the 2017 CSO volume (90.0 of the 147.5 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 shows that one outfall identified as controlled in SPU's NPDES Permit did not meet the State CSO performance standard in 2017 (Outfall 62). SPU hereby notifies Ecology and EPA of this noncompliance. A description of the issues and steps taken to date to address the noncompliance is provided in Section 4.1.10. For example, in 2017, SPU conducted an analysis of Basin 62 and the hydraulically connected Basins 61 and 64 to understand the cause of the increased CSOs and to begin to identify possible solutions. Per Paragraph 18 of the City's Consent Decree, SPU will submit a plan for performing supplemental remedial measures to achieve compliance.

Table 5-8 also shows that two basins in the Windermere Area (Basins 13 and 15) did not meet the State CSO performance standard in 2017. SPU previously submitted, and Ecology and EPA previously approved, a Supplemental Compliance Plan describing planned remedial measures to achieve compliance in Basin 13. Per Paragraph 18 of the City's Consent Decree, SPU will submit documentation identifying supplemental remedial measures to achieve compliance in Basin 15. SPU expects to coordinate completion of these remedial measures with DNRP and to complete them in conjunction with the remedial measures for Basin 13.

## 5.4 CSO Control Post-Construction Monitoring

In 2016, Quality Assurance Project Plans (QAPPs) and Sediment Sampling and Analysis Plans (SAPs) were prepared for Outfalls 95 and 68. These were submitted to Ecology for review in March and June 2016, respectively. In July 2017, SPU received comments on the sediment monitoring portion of the Outfall 95 QAPP from Ecology's Toxics Cleanup Program, Aquatic Lands Cleanup Unit.

In 2017, SPU submitted Supplemental Compliance Plans addressing post-construction monitoring at three outfalls: Outfalls 13, 68, and 18. The approved Supplemental Compliance Plan for the Windermere Area (see Section 4.5) deferred post-construction monitoring at Outfall 13 until it is controlled. The Supplemental Compliance Plan for Outfall 18, submitted on May 12, 2017, deferred post-construction monitoring of Outfall 18 until DNRP's immediately adjacent Belvoir Pump Station Emergency Overflow (Outfall 012) is controlled. The Supplemental Compliance Plan for Outfall 68, submitted on May 22, 2017, adjusted the post-construction monitoring schedule for Outfall 68 to coincide with the availability of results from sampling the Port of Seattle is conducting under the terms of a cleanup order with Ecology. On September 28, 2017, Ecology modified four due dates in SPU's NPDES Permit to align the permit with these three Supplemental Compliance Plans (see Section 1.2).

No sediment sampling or analysis was required or performed during 2017.

SPU planned to perform visual water quality monitoring at Outfalls 68 and 95 in the Fall/Winter of 2017-2018 following a CSO event. No CSO events occurred at either outfall in Fall 2017, so visual monitoring is now planned for 2018.

In 2018, SPU plans to collect sediment samples at Outfall 95 during the late Summer or Fall.

## 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.

| Table 5-1. 2017 Precipitation by Gauge and by Month (inches) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rain Gauge | January | February | March | April | May | June | July | August | September | October | November | December |
| RG01 | 4.07 | 8.36 | 7.19 | 4.84 | 3.10 | 1.06 | 0.03 | 0.17 | 0.81 | 4.31 | 9.24 | 4.91 |
| RG02 | 3.88 | 8.52 | 6.77 | 4.07 | 3.15 | 1.07 | 0.04 | 0.23 | 1.07 | 3.76 | 8.89 | 4.87 |
| RG03 | 3.87 | 8.18 | 6.59 | 3.99 | 2.57 | 1.06 | 0.03 | 0.15 | 1.17 | 3.28 | 8.36 | 4.47 |
| RG04 | 3.79 | 8.11 | 6.71 | 4.33 | 2.90 | 1.08 | 0.04 | 0.22 | 0.77 | 3.58 | 10.32 | 5.70 |
| RG05 | 4.03 | 8.49 | 6.31 | 3.03 | 2.26 | 1.21 | 0.00 | 0.02 | 0.92 | 3.06 | 7.34 | 4.40 |
| RG07 | 4.36 | 8.08 | 7.00 | 4.66 | 2.77 | 0.96 | 0.02 | 0.11 | 0.93 | 3.66 | 8.32 | 4.46 |
| RG08 | 3.88 | 7.90 | 6.54 | 3.75 | 2.55 | 0.84 | 0.00 | 0.05 | 0.70 | 3.35 | 7.46 | 4.19 |
| RG09 | 4.02 | 8.45 | 7.20 | 4.60 | 2.71 | 1.03 | 0.02 | 0.15 | 1.00 | 3.45 | 8.39 | 4.62 |
| RG11 | 3.90 | 8.91 | 6.53 | 4.45 | 2.11 | 1.04 | 0.01 | 0.04 | 0.91 | 3.15 | 8.09 | 4.28 |
| RG12 | 4.08 | 8.64 | 7.15 | 4.34 | 2.73 | 1.05 | 0.01 | 0.05 | 0.77 | 3.29 | 8.13 | 4.75 |
| RG14 | 4.25 | 9.10 | 7.02 | 3.94 | 2.25 | 1.17 | 0.00 | 0.03 | 1.03 | 3.60 | 8.33 | 4.91 |
| RG15 | 4.05 | 8.71 | 6.64 | 3.55 | 2.46 | 1.15 | 0.00 | 0.03 | 0.84 | 3.18 | 7.91 | 5.10 |
| RG16 | 3.94 | 8.84 | 6.92 | 3.96 | 2.33 | 1.31 | 0.00 | 0.03 | 0.92 | 3.02 | 8.22 | 4.99 |
| RG17 | 3.96 | 8.20 | 5.70 | 3.23 | 1.97 | 1.16 | 0.01 | 0.04 | 0.95 | 3.02 | 6.94 | 4.28 |
| RG18 | 4.01 | 8.76 | 7.38 | 4.37 | 2.53 | 1.60 | 0.00 | 0.04 | 1.01 | 3.46 | 9.03 | 5.39 |
| RG25 | 4.01 | 9.43 | 6.68 | 4.23 | 2.39 | 1.36 | 0.02 | 0.07 | 1.02 | 3.01 | 8.25 | 4.86 |
| RG30 | 3.94 | 9.63 | 7.33 | 4.24 | 2.54 | 1.49 | 0.00 | 0.12 | 0.92 | 3.46 | 9.42 | 5.42 |
| Monthly Average | 4.00 | 8.61 | 6.80 | 4.09 | 2.55 | 1.16 | 0.01 | 0.09 | 0.93 | 3.39 | 8.39 | 4.80 |

| Table 5-2. 2013-2017 Average Precipitation by Month (inches) | | | | | |
|---|---|---|---|---|---|
| **Month/Year** | **2013** | **2014** | **2015** | **2016** | **2017** |
| **January** | 3.95 | 4.05 | 2.63 | 7.53 | 4.00 |
| **February** | 1.67 | 5.67 | 4.51 | 4.42 | 8.61 |
| **March** | 2.67 | 8.62 | 4.61 | 5.57 | 6.80 |
| **April** | 4.58 | 3.12 | 1.60 | 1.46 | 4.09 |
| **May** | 1.63 | 2.57 | 0.58 | 1.18 | 2.55 |
| **June** | 1.64 | 0.88 | 0.17 | 1.50 | 1.16 |
| **July** | 0.04 | 0.93 | 0.25 | 0.59 | 0.01 |
| **August** | 1.06 | 1.35 | 2.88 | 0.09 | 0.09 |
| **September** | 5.30 | 2.73 | 1.46 | 1.17 | 0.93 |
| **October** | 1.25 | 6.73 | 3.67 | 10.57 | 3.39 |
| **November** | 2.92 | 4.61 | 6.83 | 7.44 | 8.39 |
| **December** | 1.22 | 5.50 | 10.41 | 3.91 | 4.80 |
| **Annual Total** | **27.93** | **46.76** | **39.59** | **45.43** | **44.82** |

| Table 5-3. 2017 Flow Monitor Performance by Outfall and Month | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | | Feb | | Mar | | Apr | | May | | Jun | | Jul | | Aug | | Sept | | Oct | | Nov | | Dec | | 2017 Cumulative | |
| Outfall Number | 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 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 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 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 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 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| 22 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| 24 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| 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 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| 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 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 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 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 48.7 | 93.2 | 0.0 | 100.0 | 48.7 | 99.4 |
| 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 | 30.0 | 96.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 30.0 | 99.7 |
| 33 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 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 | | 2017 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 | 67.3 | 91.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 34.5 | 95.2 | 25.4 | 96.6 | 0.0 | 100.0 | 0.0 | 100.0 | 127.2 | 98.6 |
| 47 | 0.0 | 100.0 | 0.0 | 100.0 | 10.1 | 98.6 | 0.0 | 100.0 | 0.0 | 100.0 | 67.9 | 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 | 78.0 | 99.1 |
| 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 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| 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 | 43.5 | 94.0 | 0.0 | 100.0 | 43.5 | 99.5 |
| 68 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 5.9 | 99.2 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 5.9 | 99.9 |
| 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 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 46.6 | 93.5 | 12.0 | 98.4 | 58.6 | 99.3 |
| 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 | 0.9 | 99.9 | 0.0 | 100.0 | 0.0 | 100.0 | 15.3 | 97.9 | 0.0 | 100.0 | 16.2 | 99.8 |
| 72 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 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 | | 2017 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 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| 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 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| 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 | 2.4 | 99.7 | 2.4 | 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 | 2.9 | 99.6 | 0.0 | 100.0 | 0.0 | 100.0 | 2.9 | 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 | 79.2 | 89.4 | 79.2 | 99.1 |
| 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 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 |
| 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 | | 2017 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 | 2.8 | 99.6 | 0.0 | 100.0 | 0.0 | 100.0 | 2.8 | 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 | 11.0 | 98.5 | 7.7 | 98.9 | 58.1 | 92.2 | 76.8 | 99.1 |
| **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 | 1.6 | 99.8 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 1.6 | 100.0 |
| **148** | 3.9 | 99.5 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 3.9 | 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 | 3.8 | 99.5 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 3.8 | 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 | 0.0 | 100.0 | 0.0 | 100.0 |
| **168** | 0.6 | 99.9 | 6.5 | 99.1 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 13.7 | 98.1 | 0.0 | 100.0 | 20.7 | 99.8 |
| **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 | 2.0 | 99.7 | 0.0 | 100.0 | 2.0 | 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 | 69.8 | 90.6 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 69.8 | 99.2 |
| **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:** | 34.5 | 99.9 | 6.5 | 100.0 | 77.4 | 99.9 | 0.0 | 100.0 | 5.9 | 100.0 | 71.7 | 99.9 | 69.8 | 99.9 | 0.9 | 100.0 | 36.1 | 99.9 | 42.1 | 99.9 | 177.4 | 99.7 | 151.7 | 99.8 | 674.0 | 99.9 |

| Table 5-4. 2017 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 overflow during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **13** | City of Seattle | Lake Washington | 01/18/2017 | 799,065 | 15.80 | 44.78 | 2.84 |
| | | | | 02/09/2017 | 2,589,378 | 11.65 | 34.78 | 2.30 |
| | | | | 02/16/2017 | 667,185 | 6.12 | 30.52 | 2.40 |
| | | | | 11/21/2017 | 50,499 | 2.33 | 58.20 | 2.40 |
| | | | | Total | 4,106,127 | 35.90 | 168.28 | 9.94 |
| | | | | Average | 1,026,532 | 8.98 | 42.07 | 2.49 |
| | | | | | | | | |
| WA0031682 | **14** | City of Seattle | Lake Washington | 02/16/2017 | 1 | 0.08 | 30.25 | 2.17 |
| | | | | Total | 1 | 0.08 | 30.25 | 2.17 |
| | | | | Average | 1 | 0.08 | 30.25 | 2.17 |
| | | | | | | | | |
| WA0031682 | **15** | City of Seattle | Lake Washington | 01/18/2017 | 39,113 | 1.53 | 29.47 | 2.29 |
| | | | | 02/09/2017 | 87,901 | 2.70 | 25.17 | 2.03 |
| | | | | 02/16/2017 | 7,898 | 0.43 | 30.47 | 2.20 |
| | | | | 11/21/2017 | 376 | 0.33 | 7.02 | 2.10 |
| | | | | Total | 135,288 | 5.00 | 92.12 | 8.62 |
| | | | | Average | 33,822 | 1.25 | 23.03 | 2.16 |
| | | | | | | | | |
| WA0031682 | **16** | City of Seattle | Union Bay | *No combined sewer overflows during 2017* | | | | |

| 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 | 02/09/2017 | 44,582 | 1.47 | 24.23 | 2.00 |
| | | | | Total | 44,582 | 1.47 | 24.23 | 2.00 |
| | | | | Average | 44,582 | 1.47 | 24.23 | 2.00 |
| | | | | | | | | |
| WA0031682 | **19** | City of Seattle | Union Bay | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **20** | City of Seattle | Union Bay | 01/17/2017 | 431,091 | 15.93 | 32.33 | 2.36 |
| | | | | 02/09/2017 | 633,225 | 14.43 | 31.07 | 2.25 |
| | | | | 02/15/2017 | 329,393 | 25.80 | 30.47 | 2.20 |
| | | | | 11/21/2017 | 106,008 | 4.40 | 59.77 | 2.38 |
| | | | | 12/19/2017 | 124,497 | 4.93 | 31.08 | 1.79 |
| | | | | 12/29/2017 | 69,257 | 2.97 | 19.35 | 1.17 |
| | | | | Total | 1,693,470 | 68.47 | 204.07 | 12.15 |
| | | | | Average | 282,245 | 11.41 | 34.01 | 2.03 |
| | | | | | | | | |
| WA0031682 | **22** | City of Seattle | Union Bay | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **24** | City of Seattle | Lake Washington | 02/09/2017 | 877,185 | 6.50 | 156.87 | 5.21 |
| | | | | Total | 877,185 | 6.50 | 156.87 | 5.21 |
| | | | | Average | 877,185 | 6.50 | 156.87 | 5.21 |
| | | | | | | | | |
| WA0031682 | **25** | City of Seattle | Lake Washington | 02/09/2017 | 459,487 | 5.67 | 156.03 | 5.21 |
| | | | | Total | 459,487 | 5.67 | 156.03 | 5.21 |
| | | | | Average | 459,487 | 5.67 | 156.03 | 5.21 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| | | | | | | | | |
| WA0031682 | **27** | City of Seattle | Lake Washington | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **28** | City of Seattle | Lake Washington | 02/09/2017 | 20,961 | 4.93 | 154.83 | 5.19 |
| | | | | 02/16/2017 | 2,445 | 0.25 | 31.25 | 2.38 |
| | | | | 04/26/2017 | 568 | 0.15 | 19.20 | 0.35 |
| | | | | 12/19/2017 | 70 | 0.03 | 28.43 | 1.90 |
| | | | | Total | 24,045 | 5.37 | 233.71 | 9.82 |
| | | | | Average | 6,011 | 1.34 | 58.43 | 2.46 |
| | | | | | | | | |
| WA0031682 | **29** | City of Seattle | Lake Washington | 01/17/2017 | 190,389 | 17.30 | 31.98 | 2.37 |
| | | | | 02/09/2017 | 30,970 | 17.63 | 160.33 | 5.36 |
| | | | | 02/15/2017 | 8,417 | 25.07 | 31.25 | 2.38 |
| | | | | 03/15/2017 | 8,823 | 1.63 | 200.40 | 2.97 |
| | | | | 03/17/2017 | 58,832 | 13.97 | 22.68 | 1.21 |
| | | | | Total | 297,430 | 75.60 | 446.65 | 14.29 |
| | | | | Average | 59,486 | 15.12 | 89.33 | 2.86 |
| | | | | | | | | |
| WA0031682 | **30** | City of Seattle | Lake Washington | 01/18/2017 | 286 | 0.43 | 28.45 | 2.25 |
| | | | | 02/09/2017 | 17,926 | 10.90 | 160.07 | 5.35 |
| | | | | 02/16/2017 | 6,150 | 3.05 | 31.25 | 2.38 |
| | | | | Total | 24,363 | 14.38 | 219.77 | 9.98 |
| | | | | Average | 8,121 | 4.79 | 73.26 | 3.33 |
| | | | | | | | | |
| | | | | | | | | |

| 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 | 01/17/2017 | 280,737 | 17.63 | 32.42 | 2.37 |
| | | | | 02/09/2017 | 482,910 | 21.70 | 164.23 | 5.36 |
| | | | | 02/15/2017 | 455,618 | 30.87 | 31.25 | 2.38 |
| | | | | 03/15/2017 | 3,401 | 1.17 | 200.30 | 2.96 |
| | | | | 03/17/2017 | 41,695 | 13.73 | 22.68 | 1.21 |
| | | | | 11/21/2017 | 6,173 | 0.40 | 55.62 | 2.26 |
| | | | | 12/29/2017 | 1,138 | 0.60 | 17.88 | 1.37 |
| | | | | Total | 1,271,673 | 86.10 | 524.38 | 17.91 |
| | | | | Average | 181,668 | 12.30 | 74.91 | 2.56 |
| | | | | | | | | |
| WA0031682 | **32** | City of Seattle | Lake Washington | 01/17/2017 | 74,679 | 14.50 | 30.92 | 2.37 |
| | | | | 02/09/2017 | 86,340 | 9.13 | 152.40 | 5.04 |
| | | | | 02/15/2017 | 90,014 | 26.47 | 31.25 | 2.38 |
| | | | | Total | 251,033 | 50.10 | 214.57 | 9.79 |
| | | | | Average | 83,678 | 16.70 | 71.52 | 3.26 |
| | | | | | | | | |
| WA0031682 | **33** | City of Seattle | Lake Washington | *Sealed and removed on July 22, 2016* | | | | |
| | | | | | | | | |
| WA0031682 | **34** | City of Seattle | Lake Washington | 02/09/2017 | 98,569 | 4.23 | 155.00 | 5.19 |
| | | | | Total | 98,569 | 4.23 | 155.00 | 5.19 |
| | | | | Average | 98,569 | 4.23 | 155.00 | 5.19 |
| | | | | | | | | |
| WA0031682 | **35** | City of Seattle | Lake Washington | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **36** | City of Seattle | Lake Washington | *No combined sewer overflows during 2017* | | | | |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| WA0031682 | **38** | City of Seattle | Lake Washington | 01/18/2017 | 103,182 | 1.90 | 29.63 | 2.34 |
| | | | | 02/09/2017 | 397,367 | 7.37 | 30.48 | 2.26 |
| | | | | 02/16/2017 | 86,530 | 3.27 | 30.60 | 2.26 |
| | | | | Total | 587,079 | 12.53 | 90.71 | 6.86 |
| | | | | Average | 195,693 | 4.18 | 30.24 | 2.29 |
| | | | | | | | | |
| WA0031682 | **40** | City of Seattle | Lake Washington | 01/18/2017 | 592,927 | 27.42 | 52.47 | 2.77 |
| | | | | 02/09/2017 | 949,798 | 26.42 | 48.85 | 2.46 |
| | | | | 02/16/2017 | 509,432 | 20.08 | 30.60 | 2.26 |
| | | | | Total | 2,052,156 | 73.92 | 131.92 | 7.49 |
| | | | | Average | 684,052 | 24.64 | 43.97 | 2.50 |
| | | | | | | | | |
| WA0031682 | **41** | City of Seattle | Lake Washington | 01/18/2017 | 592,927 | 27.42 | 52.47 | 2.77 |
| | | | | 02/09/2017 | 949,798 | 26.42 | 48.85 | 2.46 |
| | | | | 02/16/2017 | 509,432 | 20.08 | 30.60 | 2.26 |
| | | | | Total | 2,052,156 | 73.92 | 131.92 | 7.49 |
| | | | | Average | 684,052 | 24.64 | 43.97 | 2.50 |
| | | | | | | | | |
| WA0031682 | **42** | City of Seattle | Lake Washington | 02/09/2017 | 142,428 | 6.17 | 30.42 | 2.26 |
| | | | | 02/16/2017 | 108,518 | 6.03 | 30.60 | 2.26 |
| | | | | Total | 250,946 | 12.20 | 61.02 | 4.52 |
| | | | | Average | 125,473 | 6.10 | 30.51 | 2.26 |
| | | | | | | | | |
| WA0031682 | **43** | City of Seattle | Lake Washington | 01/17/2017 | 772,066 | 16.00 | 33.55 | 2.41 |
| | | | | 02/09/2017 | 1,317,868 | 18.75 | 36.68 | 2.40 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| | | | | 02/15/2017 | 657,059 | 15.75 | 30.60 | 2.26 |
| | | | | 12/19/2017 | 35,062 | 8.08 | 34.82 | 2.08 |
| | | | | 12/29/2017 | 55,146 | 12.42 | 40.80 | 1.65 |
| | | | | Total | 2,837,201 | 71.00 | 176.45 | 10.80 |
| | | | | Average | 567,440 | 14.20 | 35.29 | 2.16 |
| | | | | | | | | |
| WA0031682 | **44** | City of Seattle | Lake Washington | 01/08/2017 | 188 | 0.03 | 3.43 | 0.34 |
| | | | | 01/17/2017 | 4,197,599 | 48.63 | 59.55 | 2.89 |
| | | | | 02/03/2017 | 475,140 | 75.70 | 85.50 | 2.73 |
| | | | | 02/08/2017 | 4,997,441 | 40.03 | 47.08 | 2.46 |
| | | | | 02/15/2017 | 4,587,083 | 42.87 | 30.60 | 2.26 |
| | | | | 02/21/2017 | 35,745 | 1.37 | 87.28 | 0.61 |
| | | | | 03/03/2017 | 23,244 | 2.33 | 24.57 | 0.60 |
| | | | | 03/09/2017 | 43,143 | 5.83 | 68.10 | 1.22 |
| | | | | 03/11/2017 | 380 | 0.53 | 3.47 | 0.28 |
| | | | | 03/13/2017 | 810,666 | 57.40 | 101.57 | 2.04 |
| | | | | 03/17/2017 | 896,711 | 27.50 | 22.47 | 1.35 |
| | | | | Total | 16,067,339 | 302.23 | 533.61 | 16.78 |
| | | | | Average | 1,460,667 | 27.48 | 48.51 | 1.53 |
| | | | | | | | | |
| WA0031682 | **45** | City of Seattle | Lake Washington | 01/17/2017 | 181,988 | 16.90 | 31.63 | 2.37 |
| | | | | 02/08/2017 | 633,333 | 21.87 | 35.32 | 2.40 |
| | | | | 02/15/2017 | 279,577 | 29.23 | 30.60 | 2.26 |
| | | | | 03/15/2017 | 15,912 | 3.90 | 98.80 | 2.02 |
| | | | | 03/17/2017 | 20,772 | 13.37 | 22.47 | 1.35 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| | | | | Total | 1,131,582 | 85.27 | 218.82 | 10.40 |
| | | | | Average | 226,316 | 17.05 | 43.76 | 2.08 |
| | | | | | | | | |
| WA0031682 | **46** | City of Seattle | Lake Washington | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **47** | City of Seattle | Lake Washington | 01/18/2017 | 71,991 | 1.67 | 29.77 | 2.32 |
| | | | | 02/09/2017 | 1,840,780 | 12.17 | 157.40 | 5.34 |
| | | | | 02/16/2017 | 181,774 | 4.25 | 32.98 | 2.51 |
| | | | | Total | 2,094,545 | 18.08 | 220.15 | 10.17 |
| | | | | Average | 698,182 | 6.03 | 73.38 | 3.39 |
| | | | | | | | | |
| WA0031682 | **48** | City of Seattle | Lake Washington | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **49** | City of Seattle | Lake Washington | 01/17/2017 | 1,049,510 | 16.33 | 32.93 | 2.37 |
| | | | | 02/09/2017 | 3,657,458 | 21.90 | 165.18 | 5.45 |
| | | | | 02/15/2017 | 1,341,267 | 19.97 | 32.98 | 2.51 |
| | | | | 12/19/2017 | 259,134 | 5.27 | 64.55 | 1.65 |
| | | | | 12/29/2017 | 419,505 | 7.43 | 34.62 | 1.59 |
| | | | | Total | 6,726,873 | 70.90 | 330.26 | 13.57 |
| | | | | Average | 1,345,375 | 14.18 | 66.05 | 2.71 |
| | | | | | | | | |
| WA0031682 | **57** | City of Seattle | Puget Sound - Central | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| WA0031682 | **59** | City of Seattle | Salmon Bay | 01/18/2017 | 3,075 | 1.17 | 29.55 | 2.24 |
| | | | | 02/09/2017 | 11,807 | 0.58 | 24.90 | 1.77 |
| | | | | 10/18/2017 | 133,803 | 7.42 | 44.17 | 1.44 |
| | | | | 10/21/2017 | 13,187 | 0.58 | 111.83 | 2.82 |
| | | | | 11/15/2017 | 6,033 | 0.33 | 11.80 | 0.78 |
| | | | | 11/21/2017 | 20,401 | 12.33 | 56.93 | 2.15 |
| | | | | 12/19/2017 | 41,080 | 3.33 | 29.18 | 1.57 |
| | | | | 12/29/2017 | 7,045 | 0.33 | 17.38 | 0.91 |
| | | | | Total | 236,431 | 26.07 | 325.74 | 13.68 |
| | | | | Average | 29,554 | 3.26 | 40.72 | 1.71 |
| | | | | | | | | |
| WA0031682 | **60** | City of Seattle | Salmon Bay | 01/18/2017 | 22,423 | 0.90 | 29.02 | 2.22 |
| | | | | 02/09/2017 | 16,646 | 6.60 | 25.20 | 1.81 |
| | | | | 02/16/2017 | 18 | 0.10 | 28.15 | 2.12 |
| | | | | Total | 39,088 | 7.60 | 82.37 | 6.15 |
| | | | | Average | 13,029 | 2.53 | 27.46 | 2.05 |
| | | | | | | | | |
| WA0031682 | **61** | City of Seattle | Elliott Bay | 01/18/2017 | 14,501 | 0.20 | 28.65 | 2.38 |
| | | | | 02/09/2017 | 353 | 0.20 | 24.62 | 1.99 |
| | | | | Total | 14,854 | 0.40 | 53.27 | 4.37 |
| | | | | Average | 7,427 | 0.20 | 26.63 | 2.19 |
| | | | | | | | | |
| WA0031682 | **62** | City of Seattle | Elliott Bay | 01/18/2017 | 1,979 | 0.33 | 28.62 | 2.38 |
| | | | | 02/09/2017 | 1,399 | 0.42 | 24.70 | 2.00 |
| | | | | 02/16/2017 | 45 | 0.08 | 28.08 | 2.44 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| | | | | 05/04/2017 | 10 | 0.08 | 1.90 | 0.31 |
| | | | | Total | 3,434 | 0.92 | 83.30 | 7.13 |
| | | | | Average | 859 | 0.23 | 20.82 | 1.78 |
| | | | | | | | | |
| WA0031682 | **64** | City of Seattle | Elliott Bay | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **68** | City of Seattle | Elliott Bay | 02/09/2017 | 13,982 | 0.50 | 25.78 | 2.16 |
| | | | | 05/04/2017 | 638 | 0.13 | 1.93 | 0.31 |
| | | | | Total | 14,620 | 0.63 | 27.71 | 2.47 |
| | | | | Average | 7,310 | 0.32 | 13.86 | 1.24 |
| | | | | | | | | |
| WA0031682 | **69** | City of Seattle | Elliott Bay | 02/09/2017 | 135,902 | 1.00 | 24.95 | 2.05 |
| | | | | 05/04/2017 | 10,459 | 0.18 | 2.13 | 0.30 |
| | | | | Total | 146,360 | 1.18 | 27.08 | 2.35 |
| | | | | Average | 73,180 | 0.59 | 13.54 | 1.18 |
| | | | | | | | | |
| WA0031682 | **70** | City of Seattle | Elliott Bay | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **71** | City of Seattle | Elliott Bay | 02/09/2017 | 108,487 | 1.80 | 25.95 | 2.15 |
| | | | | 10/21/2017 | 119,630 | 2.37 | 108.57 | 2.44 |
| | | | | 11/03/2017 | 36,530 | 0.93 | 27.07 | 0.58 |
| | | | | 11/05/2017 | 130,546 | 2.20 | 16.35 | 0.87 |
| | | | | 11/21/2017 | 5,728 | 0.53 | 53.68 | 2.07 |
| | | | | Total | 400,921 | 7.83 | 231.62 | 8.11 |
| | | | | Average | 80,184 | 1.57 | 46.32 | 1.62 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| WA0031682 | **72** | City of Seattle | Elliott Bay | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **78** | City of Seattle | Elliott Bay | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **80** | City of Seattle | Puget Sound | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **83** | City of Seattle | Puget Sound | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **85** | City of Seattle | Puget Sound | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **88** | City of Seattle | Puget Sound | 02/09/2017 | 51,735 | 1.43 | 26.17 | 2.25 |
| | | | | Total | 51,735 | 1.43 | 26.17 | 2.25 |
| | | | | Average | 51,735 | 1.43 | 26.17 | 2.25 |
| | | | | | | | | |
| WA0031682 | **90** | City of Seattle | Puget Sound | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **91** | City of Seattle | Puget Sound | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **94** | City of Seattle | Puget Sound | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **95** | City of Seattle | Puget Sound | 02/09/2017 | 13,868 | 0.97 | 26.00 | 2.10 |
| | | | | 05/04/2017 | 1,090 | 0.17 | 2.97 | 0.36 |
| | | | | Total | 14,958 | 1.14 | 28.97 | 2.46 |
| | | | | Average | 7,479 | 0.57 | 14.49 | 1.23 |
| | | | | | | | | |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| WA0031682 | **99** | City of Seattle | West Waterway - Duwamish River | 01/17/2017 | 1,161,300 | 18.90 | 34.58 | 2.61 |
| | | | | 02/09/2017 | 1,990,866 | 20.53 | 37.17 | 2.48 |
| | | | | 02/15/2017 | 1,035,337 | 27.23 | 34.97 | 2.34 |
| | | | | 12/19/2017 | 224,350 | 4.50 | 29.97 | 2.02 |
| | | | | 12/29/2017 | 136,926 | 3.07 | 22.25 | 1.47 |
| | | | | Total | 4,548,780 | 66.67 | 106.72 | 7.43 |
| | | | | Average | 909,756 | 22.22 | 35.57 | 2.48 |
| | | | | | | | | |
| WA0031682 | **107** | City of Seattle | East Waterway - Duwamish River | 01/17/2017 | 426,311 | 20.12 | 31.60 | 2.50 |
| | | | | 02/08/2017 | 419,086 | 18.13 | 32.82 | 2.31 |
| | | | | 02/15/2017 | 94,157 | 23.67 | 28.87 | 2.11 |
| | | | | 04/12/2017 | 5,696 | 0.50 | 4.77 | 0.48 |
| | | | | 11/21/2017 | 1,656 | 0.67 | 57.23 | 2.26 |
| | | | | 12/29/2017 | 122 | 0.07 | 19.62 | 1.38 |
| | | | | Total | 947,028 | 63.15 | 174.90 | 11.04 |
| | | | | Average | 157,838 | 10.53 | 29.15 | 1.84 |
| | | | | | | | | |
| WA0031682 | **111** | City of Seattle | Duwamish River | 01/18/2017 | 379 | 0.20 | 28.63 | 2.40 |
| | | | | 02/09/2017 | 549,168 | 5.73 | 29.08 | 2.24 |
| | | | | Total | 549,547 | 5.93 | 57.71 | 4.64 |
| | | | | Average | 274,773 | 2.97 | 28.86 | 2.32 |
| | | | | | | | | |
| WA0031682 | **120** | City of Seattle | Lake Union | *No combined sewer overflows during 2017* | | | | |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| WA0031682 | **121** | City of Seattle | Lake Union | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **124** | City of Seattle | Lake Union | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **127** | City of Seattle | Lake Union | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **129** | City of Seattle | Lake Union | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **130** | City of Seattle | Lake Union | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **131** | City of Seattle | Lake Union | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **132** | City of Seattle | Lake Union | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **134** | City of Seattle | Lake Union | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **135** | City of Seattle | Lake Union | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **136** | City of Seattle | Lake Union | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **138** | City of Seattle | Portage Bay | 01/17/2017 | 107,722 | 12.53 | 29.50 | 2.30 |
| | | | | 02/09/2017 | 239,331 | 8.03 | 25.23 | 2.03 |
| | | | | 02/15/2017 | 45,473 | 1.43 | 19.60 | 1.66 |
| | | | | Total | 392,526 | 22.00 | 74.33 | 5.99 |
| | | | | Average | 130,842 | 7.33 | 24.78 | 2.00 |

| 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 | 02/09/2017 | 139,866 | 1.80 | 24.73 | 2.03 |
| | | | | 11/21/2017 | 48,991 | 2.13 | 57.00 | 2.26 |
| | | | | 12/19/2017 | 200,426 | 6.57 | 30.22 | 1.79 |
| | | | | Total | 389,283 | 10.50 | 111.95 | 6.08 |
| | | | | Average | 129,761 | 3.50 | 37.32 | 2.03 |
| | | | | | | | | |
| WA0031682 | **140** | City of Seattle | Portage Bay | 01/18/2017 | 21,573 | 2.07 | 29.97 | 2.31 |
| | | | | 02/09/2017 | 244,575 | 6.70 | 28.70 | 2.20 |
| | | | | 02/15/2017 | 78,167 | 24.10 | 30.47 | 2.20 |
| | | | | 04/26/2017 | 3,935 | 0.15 | 18.85 | 0.19 |
| | | | | 05/05/2017 | 142 | 0.07 | 11.83 | 0.54 |
| | | | | 11/21/2017 | 29,574 | 1.58 | 57.45 | 2.28 |
| | | | | 12/19/2017 | 37,425 | 2.23 | 30.35 | 1.79 |
| | | | | Total | 415,391 | 36.90 | 207.62 | 11.51 |
| | | | | Average | 59,342 | 5.27 | 29.66 | 1.64 |
| | | | | | | | | |
| WA0031682 | **141** | City of Seattle | Portage Bay | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **144** | City of Seattle | Lake Union | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **145** | City of Seattle | Lake Union | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **146** | City of Seattle | Lake Union | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| WA0031682 | **147** | City of Seattle | Lake Union | 01/08/2017 | 194,250 | 3.50 | 6.47 | 0.53 |
| | | | | 01/17/2017 | 4,187,517 | 32.58 | 43.02 | 2.67 |
| | | | | 01/22/2017 | 545 | 0.08 | 15.32 | 0.16 |
| | | | | 02/03/2017 | 163,104 | 34.17 | 45.82 | 1.35 |
| | | | | 02/08/2017 | 2,754,924 | 25.17 | 30.90 | 2.25 |
| | | | | 02/14/2017 | 2,364,590 | 30.50 | 30.47 | 2.20 |
| | | | | 03/03/2017 | 213,844 | 1.83 | 30.02 | 0.47 |
| | | | | 03/09/2017 | 240,351 | 7.50 | 28.70 | 0.74 |
| | | | | 03/11/2017 | 20,622 | 2.83 | 3.40 | 0.26 |
| | | | | 03/13/2017 | 974,181 | 45.17 | 96.98 | 2.08 |
| | | | | 03/17/2017 | 1,359,365 | 18.83 | 23.07 | 1.31 |
| | | | | 03/24/2017 | 28,493 | 4.25 | 22.15 | 0.65 |
| | | | | 03/29/2017 | 70,958 | 24.00 | 151.67 | 1.69 |
| | | | | 04/02/2017 | 48,486 | 0.25 | 7.18 | 0.07 |
| | | | | 04/07/2017 | 258,576 | 17.67 | 72.05 | 1.28 |
| | | | | 04/10/2017 | 155,559 | 12.25 | 13.65 | 0.49 |
| | | | | 04/12/2017 | 418,083 | 8.50 | 10.43 | 0.81 |
| | | | | 04/18/2017 | 9,372 | 0.25 | 26.42 | 0.26 |
| | | | | 04/19/2017 | 211,260 | 1.83 | 54.42 | 0.69 |
| | | | | 04/23/2017 | 23,156 | 0.25 | 28.18 | 0.32 |
| | | | | 04/26/2017 | 76,729 | 0.33 | 19.05 | 0.10 |
| | | | | 05/03/2017 | 91,417 | 1.25 | 9.55 | 0.44 |
| | | | | 05/04/2017 | 266,844 | 33.75 | 33.90 | 0.53 |
| | | | | 05/12/2017 | 28,708 | 0.83 | 33.38 | 0.27 |
| | | | | 05/16/2017 | 225,441 | 5.33 | 127.38 | 1.54 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| | | | | 06/15/2017 | 64,951 | 2.33 | 14.77 | 0.61 |
| | | | | 09/19/2017 | 138,667 | 5.08 | 52.47 | 0.78 |
| | | | | 10/12/2017 | 5,115 | 1.08 | 14.65 | 0.49 |
| | | | | 10/18/2017 | 1,653,389 | 39.92 | 74.07 | 1.83 |
| | | | | 10/21/2017 | 122,868 | 6.08 | 110.90 | 2.57 |
| | | | | 11/03/2017 | 211,844 | 2.50 | 17.45 | 0.56 |
| | | | | 11/04/2017 | 100,177 | 9.42 | 68.62 | 1.53 |
| | | | | 11/09/2017 | 10,944 | 0.25 | 26.37 | 0.35 |
| | | | | 11/12/2017 | 290,368 | 34.67 | 57.55 | 1.09 |
| | | | | 11/15/2017 | 416,049 | 2.42 | 9.80 | 0.55 |
| | | | | 11/20/2017 | 1,872,854 | 64.83 | 80.37 | 2.80 |
| | | | | 11/25/2017 | 127,924 | 17.42 | 44.80 | 0.72 |
| | | | | 11/28/2017 | 107,934 | 3.08 | 8.37 | 0.40 |
| | | | | 11/30/2017 | 37,174 | 1.75 | 3.55 | 0.30 |
| | | | | 12/02/2017 | 61,073 | 11.92 | 33.22 | 0.83 |
| | | | | 12/18/2017 | 3,089,587 | 13.33 | 31.27 | 1.81 |
| | | | | 12/29/2017 | 2,344,726 | 8.67 | 20.22 | 1.13 |
| | | | | Total | 25,042,017 | 537.67 | 1631.98 | 41.51 |
| | | | | Average | 596,239 | 12.80 | 38.86 | 0.99 |
| | | | | | | | | |
| WA0031682 | **148** | City of Seattle | Lake Washington - Ship Canal | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **150/151** | City of Seattle | Salmon Bay | 01/17/2017 | 389,022 | 18.27 | 29.42 | 2.24 |
| | | | | 02/09/2017 | 709,000 | 9.67 | 26.00 | 1.86 |
| | | | | 02/14/2017 | 332,132 | 29.37 | 31.08 | 2.26 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| | | | | 03/03/2017 | 11,761 | 0.37 | 22.65 | 0.39 |
| | | | | 03/09/2017 | 1,186 | 0.10 | 62.00 | 0.91 |
| | | | | 03/14/2017 | 89 | 0.13 | 73.83 | 1.22 |
| | | | | 03/17/2017 | 4,211 | 0.87 | 9.45 | 0.74 |
| | | | | 03/24/2017 | 49 | 0.07 | 21.53 | 0.60 |
| | | | | 04/10/2017 | 53 | 0.13 | 15.87 | 0.39 |
| | | | | 04/12/2017 | 2,079 | 0.57 | 4.07 | 0.42 |
| | | | | 04/23/2017 | 249 | 0.17 | 28.92 | 0.27 |
| | | | | 04/26/2017 | 82,467 | 0.37 | 18.37 | 0.10 |
| | | | | 05/04/2017 | 219,128 | 0.43 | 2.20 | 0.73 |
| | | | | 05/16/2017 | 119,306 | 5.57 | 127.18 | 2.44 |
| | | | | 09/19/2017 | 10,918 | 0.17 | 51.42 | 0.46 |
| | | | | 10/12/2017 | 313,847 | 0.70 | 13.38 | 0.32 |
| | | | | 10/18/2017 | 426,438 | 22.50 | 56.60 | 1.61 |
| | | | | 10/21/2017 | 114 | 1.40 | 106.60 | 2.45 |
| | | | | 11/03/2017 | 9,326 | 2.63 | 18.00 | 0.42 |
| | | | | 11/04/2017 | 40,331 | 8.70 | 15.00 | 0.63 |
| | | | | 11/12/2017 | 158,393 | 10.90 | 106.72 | 1.17 |
| | | | | 11/15/2017 | 127,551 | 5.57 | 12.00 | 0.78 |
| | | | | 11/20/2017 | 365,358 | 1.60 | 17.92 | 0.68 |
| | | | | 11/21/2017 | 787,711 | 25.93 | 80.45 | 2.63 |
| | | | | 11/26/2017 | 446,557 | 0.87 | 21.43 | 0.53 |
| | | | | 11/28/2017 | 9,287 | 0.23 | 7.50 | 0.34 |
| | | | | 12/02/2017 | 45,669 | 1.87 | 28.08 | 0.72 |
| | | | | 12/19/2017 | 42,936 | 5.87 | 29.17 | 1.57 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| | | | | 12/29/2017 | 40,217 | 4.87 | 17.40 | 0.91 |
| | | | | Total | 4,695,385 | 159.87 | 1054.23 | 29.79 |
| | | | | Average | 161,910 | 5.51 | 36.35 | 1.03 |
| | | | | | | | | |
| WA0031682 | **152** | City of Seattle | Salmon Bay | 01/08/2017 | 207,495 | 6.00 | 8.67 | 0.58 |
| | | | | 01/17/2017 | 6,872,550 | 50.22 | 60.48 | 2.72 |
| | | | | 01/22/2017 | 148,319 | 3.22 | 26.08 | 0.31 |
| | | | | 02/03/2017 | 4,362,000 | 74.83 | 85.90 | 2.13 |
| | | | | 02/08/2017 | 8,673,347 | 41.02 | 47.67 | 1.98 |
| | | | | 02/14/2017 | 11,061,000 | 39.80 | 31.08 | 2.26 |
| | | | | 02/19/2017 | 220,965 | 30.48 | 54.97 | 0.39 |
| | | | | 02/21/2017 | 572,528 | 2.30 | 86.70 | 0.72 |
| | | | | 02/27/2017 | 147,750 | 0.63 | 38.80 | 0.59 |
| | | | | 03/03/2017 | 316,128 | 2.70 | 23.58 | 0.44 |
| | | | | 03/05/2017 | 9,933 | 0.52 | 4.95 | 0.14 |
| | | | | 03/07/2017 | 56,559 | 7.48 | 13.43 | 0.43 |
| | | | | 03/09/2017 | 416,044 | 5.82 | 65.10 | 1.11 |
| | | | | 03/11/2017 | 201,700 | 3.52 | 4.03 | 0.26 |
| | | | | 03/13/2017 | 1,328,883 | 55.55 | 100.40 | 1.82 |
| | | | | 03/17/2017 | 1,522,385 | 23.77 | 22.67 | 1.18 |
| | | | | 03/21/2017 | 1,469 | 0.35 | 15.75 | 0.18 |
| | | | | 03/23/2017 | 188,763 | 19.38 | 22.50 | 0.63 |
| | | | | 03/26/2017 | 533 | 0.35 | 2.20 | 0.08 |
| | | | | 03/29/2017 | 162,585 | 24.33 | 91.93 | 0.84 |
| | | | | 04/02/2017 | 58,002 | 0.42 | 0.57 | 0.14 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| | | | | 04/05/2017 | 124,225 | 64.42 | 73.50 | 1.15 |
| | | | | 04/10/2017 | 189,873 | 15.78 | 16.27 | 0.39 |
| | | | | 04/12/2017 | 629,481 | 21.72 | 22.97 | 0.86 |
| | | | | 04/18/2017 | 109,797 | 28.73 | 54.85 | 0.60 |
| | | | | 04/23/2017 | 43,483 | 0.70 | 29.22 | 0.27 |
| | | | | 04/26/2017 | 202,144 | 0.77 | 18.60 | 0.10 |
| | | | | 05/03/2017 | 99,372 | 3.37 | 9.87 | 0.44 |
| | | | | 05/04/2017 | 713,754 | 4.60 | 6.17 | 0.86 |
| | | | | 05/11/2017 | 893 | 0.83 | 8.53 | 1.10 |
| | | | | 05/13/2017 | 117,392 | 21.12 | 67.48 | 1.65 |
| | | | | 05/15/2017 | 579,513 | 16.48 | 127.52 | 2.44 |
| | | | | 06/15/2017 | 54,624 | 6.05 | 13.02 | 0.44 |
| | | | | 09/19/2017 | 19,219 | 0.83 | 51.85 | 0.48 |
| | | | | 10/10/2017 | 46,295 | 0.38 | 1.82 | 0.04 |
| | | | | 10/12/2017 | 750,667 | 1.47 | 13.68 | 0.36 |
| | | | | 10/18/2017 | 1,807,509 | 26.55 | 60.30 | 1.80 |
| | | | | 10/21/2017 | 289,324 | 16.83 | 111.33 | 2.79 |
| | | | | 11/03/2017 | 122,468 | 3.30 | 18.17 | 0.43 |
| | | | | 11/04/2017 | 139,749 | 10.20 | 15.57 | 0.65 |
| | | | | 11/09/2017 | 16,644 | 0.43 | 26.38 | 0.33 |
| | | | | 11/11/2017 | 806,563 | 53.67 | 120.92 | 1.37 |
| | | | | 11/15/2017 | 1,503,336 | 6.93 | 12.77 | 0.78 |
| | | | | 11/19/2017 | 4,863,577 | 90.57 | 93.88 | 2.84 |
| | | | | 11/25/2017 | 932,465 | 19.50 | 22.78 | 0.55 |
| | | | | 11/28/2017 | 246,612 | 4.75 | 9.53 | 0.34 |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| | | | | 11/30/2017 | 213,723 | 2.98 | 52.27 | 0.58 |
| | | | | 12/02/2017 | 861,453 | 13.83 | 34.12 | 0.88 |
| | | | | 12/18/2017 | 2,560,703 | 35.50 | 43.93 | 1.65 |
| | | | | 12/29/2017 | 1,488,935 | 14.17 | 24.07 | 1.03 |
| | | | | Total | 56,062,735 | 879.15 | 1968.82 | 46.13 |
| | | | | Average | 1,121,255 | 17.58 | 39.38 | 0.92 |
| | | | | | | | | |
| WA0031682 | **161** | City of Seattle | Lake Washington | *No combined sewer overflows during 2017* | | | | |
| | | | | | | | | |
| WA0031682 | **165** | City of Seattle | Lake Washington | 02/09/2017 | 31,204 | 4.50 | 28.65 | 2.24 |
| | | | | 02/16/2017 | 770 | 0.10 | 30.60 | 2.26 |
| | | | | Total | 31,973 | 4.60 | 59.25 | 4.50 |
| | | | | Average | 15,987 | 2.30 | 29.63 | 2.25 |
| | | | | | | | | |
| WA0031682 | **168** | City of Seattle | Lake Washington | 01/18/2017 | 721,135 | 14.27 | 42.25 | 2.69 |
| | | | | 02/09/2017 | 3,211,114 | 16.07 | 32.22 | 1.90 |
| | | | | Total | 3,932,249 | 30.34 | 74.47 | 4.59 |
| | | | | Average | 1,966,125 | 15.17 | 37.24 | 2.30 |
| | | | | | | | | |
| WA0031682 | **169** | City of Seattle | Lake Washington | 01/18/2017 | 321,531 | 6.82 | 30.50 | 2.35 |
| | | | | 02/09/2017 | 1,190,179 | 11.68 | 27.88 | 1.90 |
| | | | | 02/16/2017 | 271,445 | 3.60 | 30.17 | 2.13 |
| | | | | Total | 1,783,155 | 22.10 | 88.55 | 6.38 |
| | | | | Average | 594,385 | 7.37 | 29.52 | 2.13 |
| | | | | | | | | |

| Permit No | Outfall No | Facility Name | Receiving Water | CSO Events | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Starting Date | Volume (gallons) | Duration (hours) | Storm Duration (hours) | Precipitation (inches) |
| WA0031682 | **170** | City of Seattle | Lake Washington | 02/09/2017 | 15,194 | 3.53 | 22.25 | 1.83 |
| | | | | Total | 15,194 | 3.53 | 22.25 | 1.83 |
| | | | | Average | 15,194 | 3.53 | 22.25 | 1.83 |
| | | | | | | | | |
| WA0031682 | **171** | City of Seattle | Lake Washington | 01/18/2017 | 22,735 | 0.83 | 29.07 | 2.31 |
| | | | | 02/09/2017 | 458,403 | 8.93 | 156.78 | 5.32 |
| | | | | 02/16/2017 | 612 | 0.13 | 32.30 | 2.48 |
| | | | | Total | 481,749 | 9.90 | 218.15 | 10.11 |
| | | | | Average | 160,583 | 3.30 | 72.72 | 3.37 |
| | | | | | | | | |
| WA0031682 | **174** | City of Seattle | Lake Washington Canal | 01/17/2017 | 1,053,485 | 19.00 | 31.18 | 2.46 |
| | | | | 02/08/2017 | 1,529,914 | 10.33 | 26.25 | 2.02 |
| | | | | 05/04/2017 | 30,731 | 0.25 | 2.07 | 0.35 |
| | | | | 10/18/2017 | 35,566 | 0.92 | 37.98 | 0.94 |
| | | | | 11/21/2017 | 487,865 | 11.33 | 56.53 | 2.25 |
| | | | | 12/19/2017 | 593,619 | 5.58 | 30.35 | 1.81 |
| | | | | 12/29/2017 | 444,968 | 3.25 | 19.05 | 1.11 |
| | | | | Total | 4,176,148 | 50.67 | 203.42 | 10.94 |
| | | | | Average | 596,593 | 7.24 | 29.06 | 1.56 |
| | | | | | | | | |
| WA0031682 | **175** | City of Seattle | Lake Union | *No combined sewer overflows during 2017* | | | | |

| Table 5-5. Comparison of 2017 and Baseline CSOs by Outfall | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Outfall Number | 2013 - 2017 Average CSO Frequency (No./year) | 2017 CSO Discharge Events | | | Receiving Water | 2010 Baseline CSO | | 2017 CSOs Compared to 2010 Baseline CSOs |
| | | Frequency (No./year) | Duration (hours) | Volume (gallons) | | Frequency (No./year) | Volume (MG/year) | |
| **12** | 0.6 | 0 | 0.00 | 0 | Lake Washington | 0 | 0 | Equals |
| **13** | 6 | 4 | 35.90 | 4,106,126 | Lake Washington | 12 | 6.7 | Below |
| **14** | 0.6 | 1 | 0.08 | 1 | Lake Washington | 0 | 0 | Below |
| **15** | 3.6 | 4 | 5.00 | 135,288 | Lake Washington | 1.2 | 0.3 | Frequency Above, Volume Below |
| **16** | 0 | 0 | 0.00 | 0 | Lake Washington | 0 | 0 | Equals |
| **18** | 2.6 | 1 | 1.47 | 44,582 | Union Bay | 6.6 | 0.5 | Frequency Below, Volume Below |
| **19** | 0.2 | 0 | 0.00 | 0 | Union Bay | 0.2 | 0 | Frequency Below, Volume Equals |
| **20** | 5 | 6 | 68.47 | 1,693,470 | Union Bay | 2.6 | 0.1 | Above |
| **22** | 2 | 0 | 0.00 | 0 | Union Bay | 0.7 | 0.1 | Below |
| **24** | 0.6 | 1 | 6.50 | 877,185 | Lake Washington | 0.2 | 0 | Above |
| **25** | 0.6 | 1 | 5.67 | 459,487 | Lake Washington | 2.8 | 1.6 | Below |
| **27** | 0 | 0 | 0.00 | 0 | Lake Washington | 0 | 0 | Equals |
| **28** | 4.6 | 4 | 5.37 | 24,045 | Lake Washington | 15 | 0.4 | Below |
| **29** | 7.6 | 5 | 75.60 | 297,430 | Lake Washington | 4.7 | 0.3 | Frequency Above, Volume Below |
| **30** | 3.2 | 3 | 14.38 | 24,363 | Lake Washington | 5.4 | 0.7 | Below |
| **31** | 5.4 | 7 | 86.10 | 1,271,673 | Lake Washington | 9.3 | 0.5 | Frequency Below, Volume Above |
| **32** | 2.2 | 3 | 50.10 | 251,033 | Lake Washington | 8.4 | 0.3 | Below |
| **33** | 0 | NA | NA | NA | Lake Washington | 0.2 | 0 | NA (Removed from service) |
| **34** | 0.8 | 1 | 4.23 | 98,569 | Lake Washington | 1.4 | 0.5 | Below |
| **35** | 1.6 | 0 | 0.00 | 0 | Lake Washington | 2 | 0.3 | Below |
| **36** | 2.2 | 0 | 0.00 | 0 | Lake Washington | 2.7 | 0.1 | Below |
| **38** | 1.4 | 3 | 12.53 | 587,079 | Lake Washington | 0.7 | 0.4 | Above |
| **40** | 4.4 | 3 | 73.92 | 2,052,156 | Lake Washington | 6 | 0.8 | Frequency Below, Volume Above |
| **41** | 9 | 3 | 73.92 | 2,052,156 | Lake Washington | 7.5 | 0.9 | Frequency Below, Volume Above |
| **42** | 2.4 | 2 | 12.20 | 250,946 | Lake Washington | 0.6 | 0.02 | Above |
| **43** | 7.4 | 5 | 71.00 | 2,837,201 | Lake Washington | 7 | 0.7 | Frequency Below, Volume Above |
| **44** | 19.8 | 11 | 302.23 | 16,067,339 | Lake Washington | 13 | 9.3 | Frequency Below, Volume Above |
| **45** | 11 | 5 | 85.27 | 1,131,582 | Lake Washington | 5.9 | 1.1 | Frequency Below, Volume Equal |
| **46** | 1.2 | 0 | 0.00 | 0 | Lake Washington | 6.5 | 0.9 | Below |

| Outfall Number | 2013 - 2017 Average CSO Frequency (No./year) | 2017 CSO Discharge Events | | | Receiving Water | 2010 Baseline CSO | | 2017 CSOs Compared to 2010 Baseline CSOs |
|---|---|---|---|---|---|---|---|---|
| | | Frequency (No./year) | Duration (hours) | Volume (gallons) | | Frequency (No./year) | Volume (MG/year) | |
| **47** | 6.6 | 3 | 18.08 | 2,094,545 | Lake Washington | 5.6 | 1.8 | Frequency Below, Volume Above |
| **48** | 0 | 0 | 0.00 | 0 | Lake Washington | 0 | 0 | Equals |
| **49** | 4.4 | 5 | 70.90 | 6,726,873 | Lake Washington | 1.6 | 0.8 | Above |
| **57** | 0 | 0 | 0.00 | 0 | Puget Sound | 0 | 0 | Equals |
| **59** | 2 | 8 | 26.07 | 236,432 | Salmon Bay | 0.2 | 0.4 | Frequency Above, Volume Below |
| **60** | 2.4 | 3 | 7.60 | 39,088 | Salmon Bay | 1.7 | 0.8 | Frequency Above, Volume Below |
| **61** | 0.4 | 2 | 0.40 | 14,854 | Elliott Bay | 0 | 0 | Above |
| **62** | 2.6 | 4 | 0.92 | 3,434 | Elliott Bay | 0.7 | 0 | Above |
| **64** | 0 | 0 | 0.00 | 0 | Elliott Bay | 0.1 | 0 | Frequency Below, Volume Equals |
| **68** | 2.2 | 2 | 0.63 | 14,620 | Elliott Bay | 1.4 | 1.3 | Frequency Above, Volume Below |
| **69** | 3.2 | 2 | 1.18 | 146,360 | Elliott Bay | 4.4 | 1.4 | Below |
| **70** | 0.4 | 0 | 0.00 | 0 | Elliott Bay | 0.9 | 0.2 | Below |
| **71** | 3.8 | 5 | 7.83 | 400,921 | Elliott Bay | 4.3 | 1.3 | Frequency Above, Volume Below |
| **72** | 0.2 | 0 | 0.00 | 0 | Elliott Bay | 1.2 | 0.3 | Below |
| **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** | 0.2 | 1 | 1.43 | 51,735 | Puget Sound | 0.3 | 0.2 | Frequency Above, Volume Below |
| **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** | 0.6 | 2 | 1.14 | 14,958 | Puget Sound | 3 | 0.4 | Below |
| **99** | 4.2 | 5 | 74.23 | 4,548,780 | W Waterway - Duwamish River | 0.5 | 2.8 | Above |
| **107** | 5.8 | 6 | 63.15 | 947,028 | E Waterway - Duwamish River | 3.8 | 1.9 | Frequency Above, Volume Below |
| **111** | 2.2 | 2 | 5.93 | 549,547 | 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 | 2013 - 2017 Average CSO Frequency (No./year) | 2017 CSO Discharge Events | | | Receiving Water | 2010 Baseline CSO | | 2017 CSOs Compared to 2010 Baseline CSOs |
|---|---|---|---|---|---|---|---|---|
| | | Frequency (No./year) | Duration (hours) | Volume (gallons) | | Frequency (No./year) | Volume (MG/year) | |
| **127** | 0.2 | 0 | 0.00 | 0 | Lake Union | 0.7 | 0.1 | Below |
| **129** | 0.4 | 0 | 0.00 | 0 | Lake Union | 0.1 | 0 | Frequency Below, Volume Equals |
| **130** | 0.6 | 0 | 0.00 | 0 | Lake Union | 0 | 0 | Equals |
| **131** | 0 | 0 | 0.00 | 0 | Lake Union | 0.1 | 0 | Frequency Below, Volume Equals |
| **132** | 1 | 0 | 0.00 | 0 | Lake Union | 0.7 | 0 | Frequency Below, Volume Equals |
| **134** | 0 | 0 | 0.00 | 0 | Lake Union | 0 | 0 | Equals |
| **135** | 0.4 | 0 | 0.00 | 0 | Lake Union | 0.3 | 0 | Frequency Below, Volume Equals |
| **136** | 0 | 0 | 0.00 | 0 | Lake Union | 0 | 0 | Equals |
| **138** | 3.6 | 3 | 22.00 | 392,526 | Portage Bay | 2.3 | 2 | Frequency Above, Volume Below |
| **139** | 2.4 | 3 | 10.50 | 389,283 | Portage Bay | 0.7 | 1.4 | Frequency Above, Volume Below |
| **140** | 9 | 7 | 36.90 | 415,391 | Portage Bay | 4.1 | 0.3 | Above |
| **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** | 41.6 | 42 | 537.67 | 25,042,017 | Lake Union | 33 | 19 | Above |
| **148** | 0.2 | 0 | 0.00 | 0 | Lake Washington Ship Canal | 0 | 0 | Equals |
| **150/151** | 27.2 | 29 | 159.87 | 4,695,385 | Salmon Bay | 15 | 2 | Above |
| **152** | 48.8 | 50 | 879.15 | 56,062,735 | Salmon Bay | 15 | 9.7 | Above |
| **161** | 0 | 0 | 0.00 | 0 | Lake Washington | 0 | 0 | Equals |
| **165** | 1.2 | 2 | 4.60 | 31,973 | Lake Washington | 1.1 | 0.02 | Above |
| **168** | 1 | 2 | 30.33 | 3,932,249 | Longfellow Creek | 3.9 | 1.6 | Frequency Below, Volume Above |
| **169** | 1.4 | 3 | 22.10 | 1,783,155 | Longfellow Creek | 2.2 | 49 | Frequency Above, Volume Below |
| **170** | 0.2 | 1 | 3.53 | 15,194 | Longfellow Creek | 0.4 | 0.1 | Frequency Above, Volume Below |
| **171** | 6.6 | 3 | 9.90 | 481,749 | Lake Washington | 4.1 | 0.75 | Below |
| **174** | 12.2 | 7 | 50.67 | 4,176,148 | Lake Washington Ship Canal | 11 | 5.9 | Below |
| **175** | 1.2 | 0 | 0.00 | 0 | Lake Union | 0.7 | 0 | Frequency Below, Volume Equals |
| **Total** | **306** | **275** | **3,037** | **147,468,689** | | **252** | **140** | |

| Table 5-6. 2013-2017 Summary Comparison of CSOs by Outfall | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Outfall No. | Frequency (Number per Year) | | | | | Duration (Hours per Year) | | | | | Volume (Gallons per Year) | | | | | Receiving Water |
| | 2013 | 2014 | 2015 | 2016 | 2017 | 2013 | 2013 | 2015 | 2016 | 2017 | 2013 | 2014 | 2015 | 2016 | 2017 | |
| 12 | 1 | 1 | 2 | 0 | 0 | 10.87 | 0.30 | 0.87 | 0.00 | 0.00 | 58,966 | 590 | 2,612 | 0 | 0 | Lake Washington |
| 13 | 2 | 15 | 7 | 2 | 4 | 8.42 | 139.42 | 80.15 | 22.93 | 35.90 | 889,232 | 12,376,374 | 10,406,831 | 389,145 | 4,106,126 | Lake Washington |
| 14 | 0 | 0 | 1 | 1 | 1 | 0.00 | 0.00 | 0.03 | 0.42 | 0.08 | 0 | 0 | 136 | 14 | 1 | Lake Washington |
| 15 | 2 | 2 | 7 | 3 | 4 | 2.53 | 6.41 | 5.69 | 5.30 | 5.00 | 28,466 | 66,045 | 130,433 | 43,665 | 135,288 | Lake Washington |
| 16 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | Lake Washington |
| 18 | 2 | 5 | 2 | 3 | 1 | 6.43 | 38.75 | 12.53 | 79.17 | 1.47 | 1,635,247 | 3,350,103 | 2,821,975 | 1,703,725 | 44,582 | Union Bay |
| 19 | 1 | 0 | 0 | 0 | 0 | 1.03 | 0.00 | 0.00 | 0.00 | 0.00 | 902 | 0 | 0 | 0 | 0 | Union Bay |
| 20 | 2 | 5 | 8 | 4 | 6 | 6.13 | 18.60 | 28.73 | 18.50 | 68.47 | 209,475 | 562,408 | 939,125 | 277,377 | 1,693,470 | Union Bay |
| 22 | 3 | 3 | 3 | 1 | 0 | 8.42 | 4.02 | 6.75 | 0.73 | 0.00 | 11,402 | 16,765 | 10,825 | 1,002 | 0 | Union Bay |
| 24 | 1 | 0 | 0 | 1 | 1 | 1.73 | 0.00 | 0.00 | 0.67 | 6.50 | 184,519 | 0 | 0 | 39,762 | 877,185 | Lake Washington |
| 25 | 1 | 0 | 0 | 1 | 1 | 1.53 | 0.00 | 0.00 | 0.60 | 5.67 | 97,238 | 0 | 0 | 48,394 | 459,487 | 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 | 3 | 7 | 5 | 4 | 4 | 6.33 | 0.77 | 10.68 | 0.53 | 5.37 | 4,761 | 3,781 | 15,141 | 4,174 | 24,045 | Lake Washington |
| 29 | 7 | 7 | 9 | 10 | 5 | 21.73 | 23.68 | 79.00 | 13.43 | 75.60 | 107,553 | 134,427 | 163,604 | 23,379 | 297,430 | Lake Washington |
| 30 | 2 | 2 | 4 | 5 | 3 | 10.60 | 8.53 | 47.70 | 3.85 | 14.38 | 103,602 | 149,342 | 68,875 | 2,380 | 24,363 | Lake Washington |
| 31 | 0 | 5 | 5 | 10 | 7 | 0.00 | 28.69 | 108.95 | 63.26 | 86.10 | 0 | 152,897 | 1,292,158 | 689,411 | 1,271,673 | Lake Washington |
| 32 | 1 | 2 | 1 | 4 | 3 | 6.42 | 10.08 | 1.40 | 3.07 | 50.10 | 88,300 | 111,411 | 21,463 | 20,455 | 251,033 | Lake Washington |
| 33 | 0 | 0 | 0 | 0 | NA | 0.00 | 0.00 | 0.00 | 0.00 | NA | 0 | 0 | 0 | 0 | NA | Lake Washington |
| 34 | 0 | 2 | 1 | 0 | 1 | 0.00 | 4.97 | 1.70 | 0.00 | 4.23 | 0 | 79,864 | 36,871 | 0 | 98,569 | Lake Washington |
| 35 | 1 | 2 | 5 | 0 | 0 | 0.08 | 0.16 | 2.82 | 0.00 | 0.00 | 802 | 851 | 26,232 | 0 | 0 | Lake Washington |
| 36 | 3 | 2 | 4 | 2 | 0 | 4.72 | 8.40 | 92.02 | 2.70 | 0.00 | 8,389 | 26,931 | 129,992 | 8,215 | 0 | Lake Washington |
| 38 | 0 | 2 | 2 | 0 | 3 | 0.00 | 2.53 | 8.08 | 0.00 | 12.53 | 0 | 55,731 | 424,286 | 0 | 587,079 | Lake Washington |
| 40 | 2 | 11 | 5 | 1 | 3 | 14.70 | 97.27 | 133.60 | 67.22 | 73.92 | 728,493 | 2,502,735 | 2,079,022 | 455,337 | 2,052,156 | Lake Washington |
| 41 | 8 | 22 | 9 | 3 | 3 | 54.07 | 269.17 | 233.73 | 67.22 | 73.92 | 400,178 | 2,745,644 | 6,552,815 | 455,337 | 2,052,156 | Lake Washington |
| 42 | 1 | 6 | 3 | 0 | 2 | 7.13 | 46.80 | 10.67 | 0.00 | 12.20 | 125,525 | 489,133 | 161,845 | 0 | 250,946 | Lake Washington |

| Outfall No. | Frequency (Number per Year) | | | | | Duration (Hours per Year) | | | | | Volume (Gallons per Year) | | | | | Receiving Water |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2013 | 2014 | 2015 | 2016 | 2017 | 2013 | 2013 | 2015 | 2016 | 2017 | 2013 | 2014 | 2015 | 2016 | 2017 | |
| **43** | 6 | 14 | 7 | 5 | 5 | 17.02 | 117.08 | 113.98 | 57.17 | 71.00 | 517,740 | 1,541,559 | 3,237,045 | 1,687,465 | 2,837,201 | Lake Washington |
| **44** | 11 | 25 | 18 | 34 | 11 | 91.27 | 319.81 | 419.69 | 452.47 | 302.23 | 2,873,135 | 11,257,313 | 17,584,437 | 9,129,326 | 16,067,339 | Lake Washington |
| **45** | 7 | 21 | 10 | 12 | 5 | 53.33 | 95.72 | 188.83 | 68.85 | 85.27 | 243,619 | 520,482 | 1,047,926 | 322,189 | 1,131,582 | Lake Washington |
| **46** | 1 | 4 | 1 | 0 | 0 | 0.33 | 27.88 | 1.33 | 0.00 | 0.00 | 281 | 51,982 | 16,053 | 0 | 0 | Lake Washington |
| **47** | 10 | 15 | 3 | 2 | 3 | 70.75 | 55.72 | 57.00 | 1.92 | 18.08 | 2,377,107 | 2,475,920 | 1,859,583 | 109,548 | 2,094,545 | 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** | 2 | 6 | 5 | 4 | 5 | 9.27 | 44.28 | 86.64 | 15.19 | 70.90 | 1,056,726 | 2,452,672 | 5,220,691 | 819,793 | 6,726,873 | 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 | 0 | 0 | 1 | 8 | 0.44 | 0.00 | 0.00 | 0.42 | 26.07 | 11,666 | 0 | 0 | 76,208 | 236,432 | Salmon Bay |
| **60** | 1 | 2 | 4 | 2 | 3 | 1.17 | 4.30 | 8.08 | 4.70 | 7.60 | 47,234 | 86,372 | 200,834 | 20,813 | 39,088 | Salmon Bay |
| **61** | 0 | 0 | 0 | 0 | 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.40 | 0 | 0 | 0 | 0 | 14,854 | Elliott Bay |
| **62** | 2 | 2 | 4 | 1 | 4 | 0.41 | 0.64 | 3.70 | 4.42 | 0.92 | 7,285 | 1,584 | 75,305 | 1,868 | 3,434 | 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 | 4 | 2 | 2 | 2.10 | 3.84 | 5.48 | 17.30 | 0.63 | 331,236 | 188,263 | 559,251 | 247,681 | 14,620 | Elliott Bay |
| **69** | 3 | 3 | 4 | 4 | 2 | 2.18 | 1.09 | 2.52 | 0.90 | 1.18 | 439,013 | 206,238 | 435,845 | 65,281 | 146,360 | Elliott Bay |
| **70** | 1 | 0 | 1 | 0 | 0 | 0.60 | 0.00 | 0.13 | 0.00 | 0.00 | 65,550 | 0 | 22,849 | 0 | 0 | Elliott Bay |
| **71** | 4 | 2 | 6 | 2 | 5 | 11.08 | 1.01 | 3.20 | 1.77 | 7.83 | 369,332 | 81,675 | 225,540 | 140,046 | 400,921 | Elliott Bay |
| **72** | 1 | 0 | 0 | 0 | 0 | 0.47 | 0.00 | 0.00 | 0.00 | 0.00 | 14,783 | 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 | 0 | 0 | 0 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 1.43 | 0 | 0 | 0 | 0 | 51,735 | 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** | 1 | 0 | 0 | 0 | 2 | 1.58 | 0.00 | 0.00 | 0.00 | 1.14 | 803 | 0 | 0 | 0 | 14,958 | Puget Sound |
| **99** | 1 | 6 | 4 | 5 | 5 | 5.07 | 72.67 | 74.23 | 23.00 | 74.23 | 405,700 | 3,827,730 | 4,855,651 | 1,053,542 | 4,548,780 | W Waterway - Duwamish River |

| Outfall No. | Frequency (Number per Year) | | | | | Duration (Hours per Year) | | | | | Volume (Gallons per Year) | | | | | Receiving Water |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2013 | 2014 | 2015 | 2016 | 2017 | 2013 | 2013 | 2015 | 2016 | 2017 | 2013 | 2014 | 2015 | 2016 | 2017 | |
| 107 | 3 | 6 | 9 | 5 | 6 | 9.33 | 30.10 | 82.20 | 42.58 | 63.15 | 232,587 | 288,804 | 673,362 | 427,231 | 947,028 | E Waterway - Duwamish River |
| 111 | 3 | 3 | 3 | 0 | 2 | 6.37 | 16.59 | 6.57 | 0.00 | 5.93 | 11,507 | 146,654 | 1,056,402 | 0 | 549,547 | 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 | 0.00 | 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 | 1 | 0 | 0 | 0.00 | 0.00 | 70.60 | 0.00 | 0.00 | 0 | 0 | 64,878 | 0 | 0 | Lake Union |
| 129 | 2 | 0 | 0 | 0 | 0 | 49.97 | 0.00 | 0.00 | 0.00 | 0.00 | 64,910 | 0 | 0 | 0 | 0 | Lake Union |
| 130 | 0 | 0 | 3 | 0 | 0 | 0.00 | 0.00 | 0.82 | 0.00 | 0.00 | 0 | 0 | 268,332 | 0 | 0 | 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 | 2 | 0 | 3 | 0 | 0 | 0.23 | 0.00 | 1.58 | 0.00 | 0.00 | 3,986 | 0 | 1,014,884 | 0 | 0 | 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 | 2 | 0 | 0 | 0.00 | 0.00 | 0.90 | 0.00 | 0.00 | 0 | 0 | 9,889 | 0 | 0 | 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 | 2 | 3 | 7 | 3 | 3 | 3.50 | 8.00 | 17.48 | 3.23 | 22.00 | 119,989 | 264,644 | 721,977 | 85,056 | 392,526 | Portage Bay |
| 139 | 1 | 2 | 6 | 0 | 3 | 1.43 | 3.33 | 16.38 | 0.00 | 10.50 | 47,561 | 47,515 | 1,171,445 | 0 | 389,283 | Portage Bay |
| 140 | 5 | 13 | 10 | 10 | 7 | 8.05 | 9.72 | 28.25 | 3.29 | 36.90 | 147,407 | 341,627 | 695,688 | 48,134 | 415,391 | 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 | 27 | 49 | 32 | 58 | 42 | 238.15 | 589.00 | 495.17 | 531.66 | 537.67 | 4,800,690 | 12,316,618 | 16,682,352 | 13,068,417 | 25,042,017 | Lake Union |
| 148 | 0 | 0 | 1 | 0 | 0 | 0.00 | 0.00 | 1.30 | 0.00 | 0.00 | 0 | 0 | 1,400 | 0 | 0 | Lake Washington Ship Canal |
| 150/151 | 14 | 34 | 28 | 31 | 29 | 114.80 | 268.14 | 387.00 | 249.07 | 159.87 | 1,737,206 | 3,543,723 | 2,539,871 | 2,226,176 | 4,695,385 | Salmon Bay |
| 152 | 44 | 53 | 34 | 63 | 50 | 440.30 | 900.65 | 713.68 | 1052.89 | 879.15 | 13,192,217 | 41,104,401 | 36,195,281 | 42,062,058 | 56,062,735 | 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 | 1 | 2 | 1 | 0 | 2 | 0.25 | 1.34 | 1.48 | 0.00 | 4.60 | 4,387 | 8,970 | 16,634 | 0 | 31,973 | Lake Washington |
| 168 | 0 | 1 | 2 | 0 | 2 | 0.00 | 13.73 | 84.33 | 0.00 | 30.33 | 0 | 1,092,208 | 7,718,986 | 0 | 3,932,249 | Longfellow Creek |
| 169 | 0 | 1 | 2 | 1 | 3 | 0.00 | 23.15 | 105.93 | 6.27 | 22.10 | 0 | 604,990 | 6,162,245 | 664,680 | 1,783,155 | Longfellow Creek |

| Outfall No. | Frequency (Number per Year) | | | | | Duration (Hours per Year) | | | | | Volume (Gallons per Year) | | | | | Receiving Water |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2013 | 2014 | 2015 | 2016 | 2017 | 2013 | 2013 | 2015 | 2016 | 2017 | 2013 | 2014 | 2015 | 2016 | 2017 | |
| **170** | 0 | 0 | 0 | 0 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 3.53 | 0 | 0 | 0 | 0 | 15,194 | Longfellow Creek |
| **171** | 10 | 15 | 3 | 2 | 3 | 79.75 | 57.62 | 24.05 | 1.53 | 9.90 | 970,469 | 1,544,026 | 287,884 | 90,094 | 481,749 | Lake Washington |
| **174** | 7 | 20 | 15 | 12 | 7 | 24.95 | 89.35 | 113.37 | 83.34 | 50.67 | 2,775,594 | 8,763,659 | 13,555,680 | 9,106,686 | 4,176,148 | Lake Washington Ship Canal |
| **175** | 2 | 0 | 4 | 0 | 0 | 1.40 | 0.00 | 1.43 | 0.00 | 0.00 | 3,062 | 0 | 243,126 | 0 | 0 | Lake Union |
| **Total** | **219** | **406** | **318** | **314** | **275** | **1407.85** | **3463.88** | **3981.56** | **2971.55** | **3036.64** | **37,497,456** | **115,586,683** | **149,702,955** | **85,614,065** | **147,468,689** | |

| Table 5-7. 2013-2017 Summary Comparison of CSOs by Receiving Water | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Receiving Water | Frequency (Number per Year) | | | | | Duration (Hours per Year) | | | | | Volume (Gallons per Year) | | | | |
| | 2013 | 2014 | 2015 | 2016 | 2017 | 2013 | 2014 | 2015 | 2016 | 2017 | 2013 | 2014 | 2015 | 2016 | 2017 |
| Duwamish River | 3 | 3 | 3 | 0 | 2 | 11 | 17 | 7 | 0 | 6 | 11,507 | 146,654 | 1,056,402 | 0 | 549,547 |
| East Waterway | 3 | 6 | 9 | 5 | 6 | 9 | 30 | 82 | 43 | 63 | 232,587 | 288,804 | 673,362 | 427,231 | 947,028 |
| Elliott Bay | 12 | 4 | 19 | 9 | 15 | 12 | 5 | 15 | 24 | 11 | 1,227,201 | 269,938 | 1,318,790 | 454,875 | 580,189 |
| Lake Union | 33 | 49 | 45 | 58 | 42 | 290 | 589 | 571 | 532 | 538 | 4,872,642 | 12,316,618 | 18,283,461 | 13,068,417 | 25,042,017 |
| Lake Washington | 84 | 191 | 116 | 106 | 79 | 462 | 1,367 | 1,709 | 848 | 1,023 | 11,216,814 | 38,750,702 | 50,779,955 | 14,338,085 | 41,858,799 |
| Lake Washington - Ship Canal | 7 | 20 | 16 | 12 | 7 | 25 | 89 | 115 | 83 | 51 | 2,775,594 | 8,763,659 | 13,557,080 | 9,106,686 | 4,176,148 |
| Longfellow Creek | 0 | 2 | 4 | 1 | 6 | 0 | 37 | 190 | 6 | 56 | 0 | 1,697,198 | 13,881,231 | 664,680 | 5,730,598 |
| Portage Bay | 8 | 18 | 23 | 13 | 13 | 13 | 21 | 62 | 7 | 69 | 314,957 | 653,786 | 2,589,110 | 133,190 | 1,197,199 |
| Puget Sound | 1 | 0 | 0 | 0 | 3 | 2 | 0 | 0 | 0 | 3 | 803 | 0 | 0 | 0 | 66,693 |
| Salmon Bay | 60 | 94 | 66 | 97 | 90 | 561 | 1,175 | 1,108 | 1,307 | 1,073 | 14,988,321 | 44,942,318 | 38,935,987 | 44,385,255 | 61,033,640 |
| Union Bay | 8 | 13 | 13 | 8 | 7 | 22 | 61 | 48 | 98 | 70 | 1,857,024 | 3,929,276 | 3,771,925 | 1,982,104 | 1,738,052 |
| West Waterway | 0 | 6 | 4 | 5 | 5 | 0 | 73 | 74 | 23 | 74 | 0 | 3,827,730 | 4,855,651 | 1,053,542 | 4,548,780 |
| TOTAL: | 219 | 406 | 318 | 314 | 275 | 1,407 | 3,464 | 3,981 | 2,972 | 3,037 | 37,497,450 | 115,586,683 | 149,702,956 | 85,614,065 | 147,468,689 |

**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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | | | | |
| **12** | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 0.3 | Yes | N/A | 3 |
| **13** | 2 | 1 | 0 | 1 | 0 | 2 | 0 | 3 | 3 | 1 | 0 | 1 | 1 | 1 | 2 | 1 | 5 | 5 | 2 | 4 | 1.8 | No | InfoWorks results, July 2016 | 7 |
| **14** | | | | | | | | | | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.5 | Yes | N/A | 4 |
| **15** | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 5 | 3 | 4 | 1.2 | No | InfoWorks results, July 2016 | 7 |
| **16** | | | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | Yes | N/A | 3 |
| **18** | 5 | 2 | 0 | 3 | 2 | 3 | 4 | 4 | 11 | 2 | 3 | 8 | 5 | 4 | 8 | 2 | 5 | 2 | 3 | 1 | 3.9 | No | LTCP Long Term Simulation Results, February 2013 | 5, 8 |
| **19** | | | | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.2 | Yes | N/A | 3 |
| **20** | 1 | 1 | 0 | 0 | 0 | 2 | 1 | 0 | 3 | 1 | 0 | 3 | 3 | 3 | 2 | 2 | 5 | 8 | 4 | 6 | 2.3 | No | LTCP Long Term Simulation Results, February 2013 | 5 |
| **22** | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 4 | 3 | 3 | 3 | 1 | 0 | 1.2 | No | LTCP Long Term Simulation Results, February 2013 | 5, 9 |
| **24** | 1 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 4 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0.8 | Yes | LTCP Long Term Simulation Results, February 2013 | 5 |
| **25** | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 3 | 1 | 1 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0.8 | Yes | LTCP Long Term Simulation Results, February 2013 | 5, 10 |
| **27** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | LTCP Long Term Simulation Results, February 2014 | 5 |
| **28** | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 2 | 1 | 26 | 8 | 2 | 2 | 2 | 3 | 7 | 5 | 4 | 4 | 3.5 | No | LTCP Long Term Simulation Results, February 2013 | 5 |
| **29** | 1 | 1 | 0 | 3 | 1 | 2 | 2 | 0 | 5 | 1 | 5 | 4 | 2 | 3 | 11 | 7 | 7 | 9 | 9 | 5 | 3.9 | No | LTCP Long Term Simulation Results, February 2013 | 5 |
| **30** | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 2 | 1 | 0 | 1 | 3 | 2 | 2 | 4 | 5 | 3 | 1.5 | No | LTCP Long Term Simulation Results, February 2013 | 6 |
| **31** | 21 | 14 | 2 | 17 | 13 | 18 | 13 | 19 | 32 | 10 | 4 | 12 | 11 | 11 | 2 | 0 | 5 | 5 | 10 | 7 | 11.3 | No | LTCP Long Term Simulation Results, February 2013 | 5 |
| **32** | 7 | 4 | 1 | 13 | 4 | 4 | 4 | 4 | 15 | 5 | 1 | 7 | 3 | 4 | 3 | 1 | 2 | 1 | 4 | 3 | 4.5 | No | LTCP Long Term Simulation Results, February 2013 | 5 |
| **33** | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.2 | Yes | LTCP Long Term Simulation Results, February 2013 | 5 |
| **34** | 1 | 1 | 0 | 1 | 1 | 2 | 1 | 0 | 3 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 2 | 1 | 0 | 1 | 0.9 | Yes | LTCP Long Term Simulation Results, February 2013 | 5, 11 |
| **35** | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 0 | 1 | 1 | 0 | 3 | 0 | 1 | 1 | 1 | 2 | 5 | 0 | 0 | 1.1 | No | LTCP Long Term Simulation Results, February 2013 | 5, 12 |
| **36** | 3 | 2 | 0 | 3 | 1 | 2 | 2 | 1 | 6 | 1 | 0 | 5 | 2 | 1 | 2 | 3 | 2 | 4 | 2 | 0 | 2.1 | No | LTCP Long Term Simulation Results, February 2013 | 5 |

| Outfall Number | Number of Combined Sewer Overflows Per Year [1] | | | | | | | | | | | | | | | | | | | | Average Annual Overflow Frequency | Meets Performance Standard? [2] | Long-Term Simulation Source | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | | | | |
| **38** | 1 | 0 | 0 | 1 | 0 | 2 | 1 | 0 | 2 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 2 | 2 | 0 | 3 | 0.9 | Yes | InfoWorks V9.5 H&H Model - Extracted Data Set from Long Term Simulation Run | 5 |
| **40** | 5 | 2 | 3 | 9 | 4 | 6 | 4 | 4 | 12 | 7 | 1 | 6 | 5 | 4 | 10 | 2 | 11 | 5 | 1 | 3 | 5.2 | No | InfoWorks V9.5 H&H Model - Extracted Data Set from Long Term Simulation Run | 5 |
| **41** | 9 | 3 | 3 | 11 | 5 | 7 | 5 | 9 | 15 | 7 | 9 | 14 | 5 | 5 | 13 | 8 | 22 | 9 | 3 | 3 | 8.3 | No | InfoWorks V9.5 H&H Model - Extracted Data Set from Long Term Simulation Run | 5 |
| **42** | 1 | 0 | 0 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 1 | 6 | 3 | 0 | 2 | 1.3 | No | InfoWorks V9.5 H&H Model - Extracted Data Set from Long Term Simulation Run | 5, 13 |
| **43** | 8 | 3 | 3 | 11 | 5 | 7 | 4 | 5 | 13 | 7 | 3 | 11 | 9 | 7 | 14 | 6 | 14 | 6 | 5 | 5 | 7.3 | No | InfoWorks V9.5 H&H Model - Extracted Data Set from Long Term Simulation Run | 5 |
| **44** | 20 | 12 | 8 | 14 | 10 | 18 | 16 | 13 | 29 | 9 | 12 | 16 | 16 | 17 | 22 | 11 | 25 | 18 | 34 | 11 | 16.6 | No | InfoWorks V9.5 H&H Model - Extracted Data Set from Long Term Simulation Run | 5 |
| **45** | 20 | 10 | 6 | 16 | 11 | 18 | 22 | 17 | 21 | 19 | 5 | 11 | 10 | 11 | 14 | 7 | 20 | 10 | 12 | 5 | 13.3 | No | InfoWorks V9.5 H&H Model - Extracted Data Set from Long Term Simulation Run | 5 |
| **46** | 0 | 0 | 0 | 2 | 0 | 3 | 1 | 0 | 1 | 1 | 0 | 3 | 1 | 1 | 2 | 0 | 1 | 2 | 0 | 0 | 0.9 | Yes | InfoWorks results, December 2016 | 14 |
| **47** | 4 | 1 | 0 | 5 | 3 | 7 | 3 | 4 | 6 | 4 | 2 | 9 | 5 | 2 | 6 | 4 | 7 | 3 | 2 | 3 | 4.0 | No | InfoWorks results, December 2016 | 15 |
| **48** | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | N/A | 5 |
| **49** | 1 | 0 | 0 | 1 | 1 | 2 | 0 | 4 | 11 | 2 | 1 | 6 | 4 | 2 | 5 | 2 | 6 | 5 | 4 | 5 | 3.1 | No | InfoWorks V9.5 H&H Model - Extracted Data Set from Long Term Simulation Run | 5 |
| **57** | | | | 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 | 0.9 | Yes | N/A | 3, 16 |
| **60** | 1 | 4 | 1 | 2 | 0 | 2 | 1 | 4 | 4 | 3 | 0 | 3 | 4 | 2 | 6 | 1 | 2 | 4 | 2 | 3 | 2.5 | No | LTCP Long Term Simulation Results, February 2013 | 5 |
| **61** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.2 | Yes | N/A | 5 |
| **62** | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 3 | 1 | 2 | 2 | 4 | 1 | 4 | 1.1 | No | N/A | 5 |
| **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 | 5 |
| **68** | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 2 | 4 | 1 | 2 | 1.0 | Yes | LTCP Long Term Simulation Results, February 2013 | 5, 17 |
| **69** | 3 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 3 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 2 | 1.9 | No | LTCP Long Term Simulation Results, February 2013 | 5 |

| Outfall Number | Number of Combined Sewer Overflows Per Year [1] | | | | | | | | | | | | | | | | | | | | Average Annual Overflow Frequency | Meets Performance Standard? [2] | Long-Term Simulation Source | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | | | | |
| **70** | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0.4 | Yes | AWVSRP Modeling Support Alternative Modeling Report, May 2012, Appendix D | 5 |
| **71** | 1 | 0 | 0 | 1 | 0 | 3 | 1 | 1 | 2 | 1 | 2 | 9 | 7 | 3 | 5 | 3 | 2 | 5 | 2 | 5 | 2.7 | No | AWVSRP Modeling Support Alternative Modeling Report, May 2012, Appendix D | 5 |
| **72** | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.3 | Yes | AWVSRP Modeling Support Alternative Modeling Report, May 2012, Appendix D | 5 |
| **78** | | | | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 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 | Yes | N/A | 3 |
| **83** | | | | 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 | Yes | N/A | 3 |
| **88** | | | | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 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 | 0.1 | Yes | N/A | 3 |
| **91** | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | N/A | 3 |
| **94** | | | | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | Yes | N/A | 3 |
| **95** | | | | 3 | 1 | 2 | 0 | 4 | 6 | 1 | 3 | 7 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 2 | 2.1 | No | N/A | 3, 18 |
| **99** | 2 | 2 | 0 | 3 | 0 | 1 | 1 | 2 | 1 | 1 | 0 | 1 | 2 | 3 | 5 | 1 | 6 | 4 | 5 | 5 | 2.3 | No | LTCP Long Term Simulation Results, February 2013 | 5 |
| **107** | 5 | 6 | 1 | 6 | 5 | 3 | 7 | 5 | 7 | 1 | 2 | 11 | 12 | 5 | 4 | 3 | 6 | 9 | 5 | 6 | 5.5 | No | LTCP Long Term Simulation Results, January 2014 | 5 |
| **111** | 2 | 0 | 0 | 2 | 1 | 3 | 1 | 3 | 2 | 1 | 0 | 6 | 3 | 2 | 1 | 3 | 3 | 3 | 0 | 2 | 1.9 | No | LTCP Long Term Simulation Results, February 2013 | 5 |
| **120** | | | | 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 | 0.1 | Yes | N/A | 3 |
| **124** | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | N/A | 3 |
| **127** | | | | 0 | 0 | 0 | 1 | 0 | 3 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 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 | Yes | N/A | 3 |
| **130** | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0.3 | Yes | N/A | 5 |
| **131** | | | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | Yes | N/A | 3 |
| **132** | | | | | | | | | | | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 3 | 0 | 0 | 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 | Yes | N/A | 3 |
| **135** | | | | | | | | | | | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0.3 | Yes | N/A | 5 |
| **136** | | | | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | | | | |
| **138** | 1 | 0 | 0 | 1 | 0 | 2 | 3 | 0 | 3 | 1 | 1 | 2 | 1 | 3 | 2 | 2 | 3 | 7 | 3 | 3 | 1.9 | No | LTCP Long Term Simulation Results, February 2013 | 5 |
| **139** | 2 | 0 | 0 | 1 | 0 | 1 | 3 | 1 | 2 | 1 | 0 | 1 | 2 | 1 | 2 | 1 | 2 | 6 | 0 | 3 | 1.5 | No | LTCP Long Term Simulation Results, February 2013 | 5 |
| **140** | 3 | 0 | 2 | 2 | 3 | 6 | 5 | 6 | 5 | 1 | 1 | 7 | 8 | 2 | 4 | 5 | 13 | 10 | 10 | 7 | 5.0 | No | LTCP Long Term Simulation Results, February 2013 | 5 |
| **141** | | | | 0 | 0 | 0 | 0 | 0 | 1 | 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 | 0.1 | Yes | N/A | 3 |
| **145** | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | N/A | 3 |
| **146** | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | N/A | 3 |
| **147** | 32 | 32 | 27 | 26 | 29 | 31 | 29 | 37 | 45 | 35 | 50 | 45 | 63 | 40 | 47 | 27 | 49 | 32 | 58 | 42 | 38.8 | No | LTCP Long Term Simulation Results, February 2013 | 5 |
| **148** | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0.2 | Yes | N/A | 3 |
| **150/151** | 15 | 19 | 11 | 16 | 10 | 14 | 6 | 15 | 23 | 11 | 2 | 22 | 29 | 25 | 31 | 14 | 34 | 28 | 31 | 29 | 19.3 | No | LTCP Long Term Simulation Results, February 2013 | 5 |
| **152** | 49 | 49 | 57 | 47 | 39 | 53 | 44 | 46 | 42 | 43 | 11 | 29 | 63 | 48 | 57 | 44 | 53 | 34 | 63 | 50 | 46.1 | No | LTCP Long Term Simulation Results, February 2013 | 5 |
| **161** | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | Yes | N/A | 3 |
| **165** | | | | | | | | | | | 1 | 1 | 1 | 0 | 2 | 1 | 2 | 1 | 0 | 2 | 1.1 | No | N/A | 5, 19 |
| **168** | 2 | 6 | 0 | 5 | 1 | 2 | 1 | 2 | 8 | 3 | 0 | 6 | 2 | 0 | 2 | 0 | 1 | 2 | 0 | 2 | 2.3 | No | LTCP Long Term Simulation Results, February 2013 | 5 |
| **169** | 2 | 6 | 0 | 5 | 1 | 2 | 1 | 2 | 8 | 3 | 1 | 1 | 2 | 2 | 1 | 0 | 1 | 2 | 1 | 3 | 2.2 | No | LTCP Long Term Simulation Results, February 2013 | 5 |
| **170** | | | | | | | | | | | 0 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0.5 | Yes | N/A | 5 |
| **171** | 4 | 1 | 0 | 1 | 2 | 5 | 0 | 4 | 6 | 3 | 2 | 7 | 5 | 2 | 6 | 3 | 7 | 4 | 2 | 3 | 3.4 | No | InfoWorks results, December 2016 | 15 |
| **174** | 9 | 6 | 1 | 8 | 3 | 5 | 6 | 10 | 21 | 6 | 6 | 14 | 13 | 10 | 17 | 7 | 20 | 15 | 12 | 7 | 9.8 | No | LTCP Long Term Simulation Results, February 2013 | 5 |
| **175** | | | | | | | | | | | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 4 | 0 | 0 | 0.7 | Yes | N/A | 5 |

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 >1 per year. Some outfalls have higher than expected calculated Average Annual Overflow Frequencies because of impacts from uncontrolled adjacent basins, exacerbated CSOs, or recently completed system retrofits. Examples of these situations are explained in Notes 7 through 13. SPU will continue to monitor these outfalls to confirm that they are controlled and, if not, to plan additional control actions.
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 2016.

4. 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 2016.
5. 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 2016.
6. The flow monitoring configuration prior to 2009 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 2009 and 2016.
7. SPU completed the Windermere CSO Reduction Project in 2015 and subsequently updated the hydraulic model for Basins 13 and 15 to reflect the constructed facilities.
8. SPU completed two separate retrofit projects in Basin 18 in 2012 and 2016, reducing the frequency of CSOs in subsequent years.
9. Several exacerbated CSOs occurred at Outfall 22 in recent years because of the deteriorating performance of WWPS50. The pump station was rehabilitated and existing air-lift style pumps replaced with submersible pumps in 2016.
10. 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.
11. As part of the Leschi Phase I retrofit project, the weir height at Outfall 34 was raised a foot in August 2014, reducing the frequency of CSOs in subsequent years.
12. Basin 35 CSOs in 2009 were likely exacerbated by a clogged HydroBrake; the inspection frequency has since been increased.
13. Several exacerbated CSOs occurred from Outfall 42 in 2014 due to the historic wet weather (March 2014) and construction of the Genesee CSO reduction project (Basins 40/41 and 43). SPU will monitor the performance of Basin 42 to help ensure it is controlled.
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. SPU completed the South Henderson CSO Reduction Projects (weir retrofits and 52nd Ave Conveyance Project) in 2015 and subsequently updated the hydraulic model for Basins 47 and 171 to reflect the constructed facilities.
16. During repair of the WWPS 43 force main, flows are being temporarily bypassed around WWPS 43. Because of unavoidable bypass system constraints, there were six exacerbated CSOs at Outfall 59 in 2017.
17. Basin 68 CSOs in 2015 and 2016 were likely exacerbated by a partially clogged HydroBrake. Subsequent attention to inspection and maintenance seems to have reduced the frequency of CSOs.
18. The Basin 95 retrofit project was completed in 2013, reducing the frequency of CSOs in subsequent years.
19. Basin 165 is in the Genesee area and is pumped into the Lake Line upstream of the other Genesee basins. Based on modeling, control of the other Genesee basins (Basins 40/41, 42, and 43) should bring Basin 165 in control.

| Table 5-9. Integrated Plan Performance Targets and 2017 Results | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Status** | **Project Name** | **Average volume treated or removed (MG/year)** | **Fecal coliform (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** | NDS Partnering[3] | NA | NA | NA | NA | NA | NA | NA |
| | South Park Water Quality Facility[3] | NA | NA | NA | NA | NA | NA | NA |
| | Expanded Arterial Street Sweeping[4] | 1,900 | 141,300 | 1.3 | 53 | 9.3 | 64,300 | 23 |

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. Monitoring for project has not begun.
4. 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. 2017 Sewer Overflow (SSO) Details | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2017 SSO Number | ERTS Number | Date | Address | SSO Volume (gallons) | Volume to Surface Water (gallons) | Surface Water | Primary Cause | Secondary Cause, if Any |
| 1 | 670063 | 1/10/17 | 11219 Cornell Ave S | 2 | | | City Construction | |
| 2 | 670123 | 1/18/17 | 2653 SW Yancy St (revised from ERTS report) | 50,000 | 50,000 | Longfellow Creek | City Construction | |
| 3 | 670148 | 1/18/17 | 1201 NW Carkeek Park Dr | 5 | | | Capacity-gravity | |
| 4 | 670149 | 1/18/17 | 4115 Beach Dr SW | 5 | | | Debris | |
| 5 | 670264 | 1/18/17 | 714 Harvard Ave E | Unknown | | | Roots | FOG |
| 6 | 670713 | 2/9/17 | 4884 Beacon Ave S | 300 | | | FOG | Roots |
| 7 | 670710 | 2/9/17 | 4115 Beach Dr SW | 10 | | | Debris | |
| 8 | 670715 | 2/9/17 | 5817 18th Ave S (revised from ERTS report) | Unknown | | | Capacity-gravity | |
| 9 | 670852 | 2/9/17 | 700 S Kenyon St (revised from ERTS report) | Unknown | | | Capacity-King County | |
| 10 | 670646 | 2/9/17 | 5047 Delridge Way S | 5 | | | Roots | |
| 11 | 670657 | 2/9/17 | 2653 SW Yancy St (revised from ERTS report) | 6,000 | 6,000 | Longfellow Creek | City Construction | |
| 12 | 670663 | 2/9/17 | 9892 40th Ave S (revised from ERTS report) | 47,075 | 47,075 | Duwamish River | Pump Station-capacity | |
| 13 | 670768 | 2/9/17 | 8811 E Marginal Way S (revised from ERTS report) | 100 | 100 | Duwamish River | Pump Station-capacity | |
| 14 | 670696 | 2/13/17 | 11027 Arroyo Beach Pl SW | 10,000 | 5,000 | Puget Sound | Structural Failure-gravity | |
| 15 | 670851 | 2/16/17 | 1201 NW Carkeek Park Dr | 500 | | | Capacity-gravity | |
| 16 | 671064 | 2/23/17 | 3402 Claremont Ave S | 50 | | | Structural Failure-gravity | |
| 17 | 671228 | 1/17/17 | 2214 37th Ave SW | Unknown | | | City Construction | |
| 18 | 671230 | 3/1/17 | 4109 SW Barton St (revised from ERTS report) | 25 | | | City Construction | |
| 19 | 671855<br>671856 | 3/29/17 | 5467 16th Ave SW | 1 | | | Pressure Release | |

| 2017 SSO Number | ERTS Number | Date | Address | SSO Volume (gallons) | Volume to Surface Water (gallons) | Surface Water | Primary Cause | Secondary Cause, if Any |
|---|---|---|---|---|---|---|---|---|
| 20 | 671867 | 3/3/17 | 10333 Interlaken Ave N | Unknown | | | Pressure Release | |
| 21 | 672894 | 5/6/17 | 5753 28th Ave NE | 50 | | | Structural Failure-gravity | |
| 22 | 673083 | 5/9/17 | 2104 E Highland Dr | Unknown | | | Roots | |
| 23 | 673079 | 5/9/17 | 10528 Evanston Ave N | 1 | | | Pressure Release | |
| 24 | 673157 | 5/18/17 | 11910 Lakeside Pl NE (revised from ERTS report) | 100 | 100 | Lake Washington | Private Side Sewer Issue | |
| 25 | 673182 | 5/19/17 | 2349 33rd Ave S | 1 | | | Structural Failure-gravity | |
| 26 | 673462 | 5/30/17 | 218 NW 56th St | 100 | Unknown | Salmon Bay | Structural Failure-gravity | |
| 27 | 674261 | 7/11/17 | 404 Cedar St | 10 | | | FOG | |
| 28 | 674325 | 7/13/17 | 3643 Courtland Pl S | 25 | | | Debris | |
| 29 | 674532 | 7/22/17 | 9059 6th Ave NW | 1 | | | Structural Failure-gravity | |
| 30 | 674833 | 8/4/17 | Martin Luther King Jr Way S & S Trenton St (revised from ERTS report) | 20 | | | FOG | |
| 31 | 675314 | 8/24/17 | 2620 SW Dakota St | 3 | | | Debris | |
| 32 | 675461 | 8/31/17 | 1428 Woodlawn Ave N (revised from ERTS report) | 40 | | | Roots | |
| 33 | 675516 | 9/3/17 | 1925 SW Brandon St | 20 | | | Roots | FOG |
| 34 | 675734 | 9/11/17 | 5635 Seaview Ave N | 87,984 | 87,984 | Salmon Bay | Structural Failure-force main | |
| 35 | 676244 | 10/2/17 | 7756 and 7760 57th Ave NE (revised from ERTS report) | 10 | | | Structural Failure-gravity | |
| 36 | 676368 | 10/4/17 | 3505 W Elmore St (revised from ERTS report) | 12 | 12 | Salmon Bay | Structural Failure-gravity | |
| 37 | 676532 | 10/13/17 | 5816 15th Ave NW | 750 | | | Roots | |
| 38 | 676759 | 10/24/17 | 2345 NW 97th St | 1800 | | | Structural Failure-gravity | |
| 39 | 677737 | 11/23/17 | 6052 33rd Ave NE | Unknown | | | Structural Failure-gravity | |

| 2017 SSO Number | ERTS Number | Date | Address | SSO Volume (gallons) | Volume to Surface Water (gallons) | Surface Water | Primary Cause | Secondary Cause, if Any |
|---|---|---|---|---|---|---|---|---|
| 40 | 678000 | 12/19/17 | 53rd Ave S & Lake Washington Blvd S | 23,000 | 23,000 | Lake Washington | Operator Error | |
| 41 | 678054 | 12/21/17 | 2820 Elliott Ave | 625 | | | City Construction | |
| 42 | 678089 | 12/19/17 | 4005 SW Othello St (revised from ERTS report) | 2 | | | Structural Failure-gravity | |

| Table A-2. Pump Station Location and Capacity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Number** | **Name** | **Address** | **Type [1]** | **Basin Area (acres)** | **Average Inflow (gpm)** | **Number of Pumps and Rating** | **Static Head (feet)** | **Storage Time (hours)** |
| 1 | Lawton Wood | 5645 45th Ave West | WW/DW | 31.8 | 36 | 2 at 350 gpm each | 60.5 | 9.4 |
| 2 | Charles Street | 901 Lakeside Dr | WW/DW | 108.1 | 262 | 2 at 450 gpm each | 20 | 4+ |
| 4 | South Director Street | 5135 South Director St | Air Lift | 3.1 | 4 | 2 at 150 gpm each | 28.5 | 10.7 |
| 5 | 46th Avenue South | 3800 Lake Washington Blvd | WW/DW | 198.2 | 1147 | 2 at 1000 gpm each | 13.9 | 4+ |
| 6 | South Alaska Street | 4645 Lake Washington Blvd | WW/DW | 10.2 | 439 | 2 at 300 gpm each | 14 | 4+ |
| 7 | East Lee Street | 4214 East Lee St | WW/DW | 227 | 209 | 2 at 2800 gpm each | 50 | 5.75 |
| 9 | South Grattan Street | 8400 55th Ave South | WW/DW | 422.2 | 1293 | 2 at 2700 gpm each | 13.9 | 2 |
| 10 | South Holly Street | 5711 South Holly St | WW/DW | 188.4 | 1064 | 2 at 1000 gpm each | 13.5 | 2 |
| 11 | North Sand Point | 63rd Ave NE and NE 78th St | Submersible | | 10 | 2 at 800 gpm each | 23 | 1 |
| 13 | Montlake | 2160 East Shelby St | WW/DW | 64.9 | | 2 at 600 gpm each | 29.7 | 4+ |
| 15 | West Park Drive East | West Park Dr East and East Shelby St | Submersible | | 10 | 2 at 800 gpm each | 12 | 1 |
| 17 | Empire Way | 42nd Ave South and South Norfolk St | WW/DW | 395 | 1341 | 2 at 2000 gpm each | 27.7 | 5 |
| 18 | South 116th Place | 6700 South 116th Pl | Submersible | | 18 | 2 at 800 gpm each | 45 | 12+ |
| 19 | Leroy Place South | 9400 Leroy Pl South | Submersible | | 22 | 2 at 800 gpm each | 45 | 12+ |
| 20 | East Shelby Street | 1205 East Shelby St | WW/DW | 48.6 | 541 | 2 at 600 gpm each | 45 | 4+ |
| 21 | 21st Avenue West | 2557 21st Ave West | Submersible | | 19 | 2 at 800 gpm each | 45 | 12+ |
| 22 | West Cramer Street | 5400 38th Ave West | WW/DW | 26.9 | 444 | 2 at 750 gpm each | 62 | 6.64 |
| 25 | Calhoun Street | 1812 East Calhoun St | WW/DW | 52.2 | 371 | 2 at 850 gpm each | 36 | 3.63 |
| 28 | North Beach | 9001 View Ave NW | Submersible | 4.8 | 7 | 2 at 800 gpm each | 40.7 | 4 |
| 30 | Esplanade | 3206 NW Esplanade St | Submersible | 5.7 | 9 | 2 at 800 gpm each | 63 | 11.88 |
| 31 | 11th Avenue NW | 12007 11th Ave NW | Submersible | 2 | 10 | 2 at 800 gpm each | 20 | 12+ |
| 35 | 25th Avenue NE | 2734 NE 45th St | WW/DW | 71 | 436 | 3 at 850 gpm each | 39.8 | 1 |
| 36 | Maryland | 1122 Harbor Ave SW | Air Lift | 12.2 | 18 | 2 at 150 gpm each | 10 | 10.25 |
| 37 | Fairmont | 1751 Harbor Ave SW | WW/DW | 281.5 | 1491 | 2 at 3500 gpm each | 12.8 | 2 |
| 38 | Arkansas | 1411 Alki Ave SW | Air Lift | 46.5 | 188 | 2 at 150 gpm each | 10 | 13.15 |

| Number | Name | Address | Type [1] | Basin Area (acres) | Average Inflow (gpm) | Number of Pumps and Rating | Static Head (feet) | Storage Time (hours) |
|---|---|---|---|---|---|---|---|---|
| 39 | Dawson | 5080 Beach Dr SW | WW/DW | 55 | 622 | 2 at 1100 gpm each | 36.7 | 4.6 |
| 42 | Lincoln Park | 8617 Fauntleroy Way SW | WW/DW | 6.5 | 64 | 2 at 200 gpm each | 55.5 | 12.4 |
| 43 | Seaview No. 1 | 5635 Seaview Ave NW | WW/DW | 177.4 | 1693 | 2 at 1500 gpm each | 40.4 | 4.85 |
| 44 | Boeing No. 1 | 6820 Perimeter Rd S | WW/DW | 168.5 | 334 | 2 at 600 gpm each | 19 | 1.68 |
| 45 | Boeing No. 2 | 7609 Perimeter Rd S | WW/DW | 133.5 | 293 | 2 at 300 gpm each | 16.5 | 2.91 |
| 46 | Seaview No. 2 | 6541 Seaview Ave NW | Air Lift | 52.6 | 68 | 2 at 150 gpm each | 14.6 | 2.45 |
| 47 | Seaview No. 3 | 7242 Seaview Ave NW | Air Lift | 11 | 14 | 2 at 150 gpm each | 9.5 | 5.87 |
| 48 | Brooklyn | 3701 Brooklyn Ave NE | WW/DW | 31.4 | 156 | 2 at 1000 gpm each | 53.3 | 4.01 |
| 49 | Latona | 3750 Latona Ave NE | WW/DW | 22.4 | 257 | 2 at 250 gpm each | 33.3 | 4+ |
| 50 | 39th Avenue East | 2534 39th Ave East | Submersible | 10.6 | 14 | 2 at 100 gpm each | 17 | 6 |
| 51 | NE 60th Street | 6670 NE 60th St | WW/DW | 44.5 | 59 | 2 at 325 gpm each | 126.3 | 1.71 |
| 53 | SW Hinds Street | 4951 SW Hinds St | WW/DW | 10.6 | 41 | 2 at 150 gpm each | 66 | 2 |
| 54 | NW 41st Street | 647 NW 41st St | WW/DW | 24.5 | 169 | 2 at 350 gpm each | 27 | 1.52 |
| 55 | Webster Street | 3021 West Laurelhurst NE | Air Lift | 2.4 | 5 | 2 at 150 gpm each | 31 | 2.15 |
| 56 | Bedford Court | 10334 Bedford Ct NW | Air Lift | 1.6 | 3 | 2 at 150 gpm each | 30.3 | 0.75 |
| 57 | Sunnyside | 3600 Sunnyside Ave North | WW/DW | 16.3 | 57 | 2 at 300 gpm each | 31.5 | 2.66 |
| 58 | Woodlawn | 1350 North Northlake Way | WW/DW | 33.4 | 290 | 2 at 600 gpm each | 30 | 3.5 |
| 59 | Halliday | 2590 Westlake Ave North | WW/DW | 21.2 | 53 | 2 at 325 gpm each | 17.7 | 9.7 |
| 60 | Newton | 2010 Westlake Ave North | WW/DW | 57.6 | 77 | 2 at 250 gpm each | 67.4 | 4.38 |
| 61 | Aloha | 912 Westlake Ave North | WW/DW | 26.3 | 59 | 2 at 450 gpm each | 19.1 | 4.9 |
| 62 | Yale | 1103 Fairview Ave North | WW/DW | 12.2 | 211 | 2 at 350 gpm each | 18.4 | 4.63 |
| 63 | East Blaine | 140 East Blaine St | WW/DW | 33.1 | 251 | 2 at 600 gpm each | 31 | 2.43 |
| 64 | East Lynn Street No. 2 | 2390 Fairview Ave East | WW/DW | 9.4 | 253 | 2 at 300 gpm each | 16.2 | 7.05 |
| 65 | East Allison Street | 2955 Fairview Ave East | WW/DW | 19.2 | 111 | 2 at 300 gpm each | 47.2 | 3.96 |
| 66 | Portage Bay No. 1 | 3190 Portage Bay Pl East | WW/DW | 6.5 | 200 | 2 at 200 gpm each | 12.2 | 18.6 |
| 67 | Portage Bay No. 2 | 1209 East Shelby St | WW/DW | 14.7 | 176 | 2 at 250 gpm each | 17 | 9.08 |

| Number | Name | Address | Type [1] | Basin Area (acres) | Average Inflow (gpm) | Number of Pumps and Rating | Static Head (feet) | Storage Time (hours) |
|---|---|---|---|---|---|---|---|---|
| 69 | Sand Point | 6451 65th Ave NE | WW/DW | 15.5 | 124 | 2 at 300 gpm each | 79 | 2.03 |
| 70 | Barton No. 2 | 4890 SW Barton St | WW/DW | 73 | 136 | 2 at 290 gpm each | 29 | 0.4 |
| 71 | SW 98th Street | 5190 SW 98th St | WW/DW | 36.3 | 155 | 2 at 450 gpm each | 16 | 6.79 |
| 72 | SW Lander Street | 2600 13th Ave SW | WW/DW | 203.5 | 428 | 3 at 2000 gpm each | 22.8 | 4+ |
| 73 | SW Spokane St | 1190 SW Spokane St | WW/DW | 336.5 | 45 | 3 at 2500 gpm each | 16.3 | 4+ |
| 74 | 26th Avenue SW | 2799 26th Ave SW | Submersible | 144 | | 2 at 800 gpm each | 30 | 3.21 |
| 75 | Point Place SW | 3200 Point Pl SW | Air Lift | 4.9 | 9 | 2 at 150 gpm each | 12.2 | 10 |
| 76 | Lowman Park | 7025 Beach Dr SW | WW/DW | 20.4 | 27 | 2 at 100 gpm each | 34 | 17.8 |
| 77 | 32nd Avenue West | 1499 32nd Ave West | WW/DW | 206.5 | 601 | 2 at 1400 gpm each | 48 | 5.17 |
| 78 | Airport Way South | 8415 Airport Way South | Air Lift | 18.4 | 41 | 2 at 150 gpm each | 14.5 | 5.5 |
| 80 | South Perry Street | 9724 Rainier Ave South | Air Lift | 4.6 | 5 | 2 at 150 gpm each | 22 | 10 |
| 81 | 72nd Avenue South | 10199 Rainier Avenue South | WW/DW | 11 | 60 | 2 at 200 gpm each | 53.3 | 24.3 |
| 82 | Arroyo Beach Place | 11013 Arroyo Beach Pl SW | Air Lift | 6 | 8 | 2 at 150 gpm each | 19.8 | 10 |
| 83 | West Ewing Street | 390 West Ewing St | Air Lift | 6.1 | 39 | 2 at 150 gpm each | 19 | 4.24 |
| 84 | 28th Avenue NW | 5390 28th Ave NW | WW/DW | 691.4 | 128 | 2 at 500 gpm each | 24.4 | 3.43 |
| 114 | 35th Avenue NE | 10701 36th Ave NE | Submersible | 3.2 | 47 | 2 at 800 gpm each | 5.6 | 2 |
| 118 | Midvale Avenue North | 1200 North 107th St | WW/DW | 22.4 | 103 | 2 at 300 gpm each | 11.5 | 3.5 |

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

| Table A-3. 2017 Pump Station Work Order Summary | | | |
|---|---|---|---|
| **WWPS Number** | **Inspection** | **Maintenance** | **Total Work Orders** |
| WWPS001 | 14 | 2 | 16 |
| WWPS002 | 24 | 1 | 25 |
| WWPS004 | 23 | 0 | 23 |
| WWPS005 | 21 | 1 | 22 |
| WWPS006 | 13 | 1 | 14 |
| WWPS007 | 14 | 3 | 17 |
| WWPS009 | 12 | 1 | 13 |
| WWPS010 | 12 | 1 | 13 |
| WWPS011 | 24 | 3 | 27 |
| WWPS013 | 12 | 2 | 14 |
| WWPS017 | 23 | 3 | 26 |
| WWPS018 | 13 | 3 | 16 |
| WWPS019 | 13 | 5 | 18 |
| WWPS020 | 14 | 3 | 17 |
| WWPS021 | 13 | 12 | 25 |
| WWPS022 | 14 | 1 | 15 |
| WWPS025 | 16 | 1 | 17 |
| WWPS028 | 13 | 4 | 17 |
| WWPS030 | 24 | 13 | 37 |
| WWPS031 | 13 | 4 | 17 |
| WWPS035 | 12 | 1 | 13 |
| WWPS036 | 21 | 0 | 21 |
| WWPS037 | 13 | 2 | 15 |
| WWPS038 | 22 | 1 | 23 |
| WWPS039 | 13 | 1 | 14 |
| WWPS042 | 14 | 1 | 15 |
| WWPS043 | 14 | 1 | 15 |
| WWPS044 | 13 | 1 | 14 |
| WWPS045 | 12 | 1 | 13 |
| WWPS046 | 22 | 2 | 24 |
| WWPS047 | 22 | 0 | 22 |
| WWPS048 | 11 | 1 | 12 |
| WWPS049 | 13 | 1 | 14 |
| WWPS050 | 11 | 3 | 14 |
| WWPS051 | 14 | 1 | 15 |
| WWPS053 | 13 | 2 | 15 |
| WWPS054 | 13 | 1 | 14 |
| WWPS055 | 22 | 0 | 22 |
| WWPS056 | 22 | 0 | 22 |

| WWPS Number | Inspection | Maintenance | Total Work Orders |
|---|---|---|---|
| WWPS057 | 12 | 0 | 12 |
| WWPS058 | 12 | 1 | 13 |
| WWPS059 | 12 | 1 | 13 |
| WWPS060 | 13 | 2 | 15 |
| WWPS061 | 13 | 0 | 13 |
| WWPS062 | 13 | 0 | 13 |
| WWPS063 | 12 | 0 | 12 |
| WWPS064 | 12 | 0 | 12 |
| WWPS065 | 12 | 0 | 12 |
| WWPS066 | 12 | 0 | 12 |
| WWPS067 | 18 | 1 | 19 |
| WWPS069 | 13 | 2 | 15 |
| WWPS070 | 12 | 0 | 12 |
| WWPS071 | 14 | 1 | 15 |
| WWPS072 | 14 | 3 | 17 |
| WWPS073 | 13 | 1 | 14 |
| WWPS074 | 24 | 11 | 35 |
| WWPS075 | 22 | 0 | 22 |
| WWPS076 | 14 | 1 | 15 |
| WWPS077 | 12 | 2 | 14 |
| WWPS078 | 22 | 0 | 22 |
| WWPS080 | 21 | 0 | 21 |
| WWPS081 | 13 | 1 | 14 |
| WWPS082 | 22 | 0 | 22 |
| WWPS083 | 21 | 0 | 21 |
| WWPS084 | 16 | 2 | 18 |
| WWPS114 | 22 | 12 | 34 |
| WWPS118 | 13 | 1 | 14 |
| **Grand Total** | **1,051** | **136** | **1,177** |