

2024 Tier III Corrective Action Report

Belvoir Pump Station Overflow

DSN# 012 – Belvoir Pump Station Overflow

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King County

Department of
Natural Resources and Parks
Wastewater Treatment Division

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Contents

1.0 Introduction	5
2.0 Description of the Belvoir Pump Station and Vicinity	5
3.0 Belvoir Pump Station Performance and Corrective Actions Completed	8
4.0 Proposed Corrective Actions and Schedule	10

Table of Figures

Figure 1. Belvoir Pump Station Vicinity	6
Figure 2. SPU and King County Basins in the Belvoir Pump Station Vicinity	7

Tables

Table 1. Untreated Combined Sewer Overflow Discharge Events at Belvoir PS	9
Table 2. Belvoir PS CSO Events	9
Table 3. Summary of Completed Corrective Actions and Schedule	10
Table 4. Summary of Proposed Corrective Actions and Schedule	11

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1.0 Introduction

As of 2016, the Belvoir Pump Station (PS) Emergency Overflow (Belvoir PS) (DSN 012) does not meet the combined sewer overflow (CSO) control performance standard of no more than one untreated discharge per year on a 20-year moving average as specified in:

- Condition S11.C.b in the NPDES permit for the West Point Wastewater Treatment Plant (WWTP) (Permit No. WA0029181)
- The general requirement to comply with the NPDES permit in Section V.B (paragraph 19) of the Consent Decree (CD), Civil Action No. 2: 13-cv-677.

King County Wastewater Treatment Division (WTD) is submitting this Tier III Corrective Action Report in accordance with the NPDES permit Section S11.C.d to provide information on actions it will take for Belvoir PS Overflow (DSN 012) into consistency with the performance standard.

This report also meets Supplemental Compliance Plan requirements per Section V of the CD and supersedes the Corrective Action Compliance Letter Submitted December 19, 2017, for the Belvoir PS Overflow.

2.0 Description of the Belvoir Pump Station and Vicinity

The Belvoir PS is located in the University CSO Basin (University Basin). The University Basin is the largest basin area-wise (7,350 acres) that contributes flows to WTD's North Interceptor which conveys flow to West Point WWTP. The University Basin contains approximately 58,130 linear feet of pipes owned by King County, ranging from 20 to 138 inches in diameter. Flow from the University Basin is mainly controlled by the University Regulator Station (RS) which receives flow from the Laurelhurst and Green Lake Trunks, along with the North Interceptor between the vicinity of Ravenna Park and the University RS, as shown in Figure 1. The University Basin contributes flows to three King County CSO locations including University RS Overflow, 30th Avenue Northeast (30th Ave NE) PS Overflow, and Belvoir PS Overflow. The trunks and major infrastructure in the University Basin are illustrated in Figure 1.

The Laurelhurst Trunk conveys flow from Seattle Public Utility's (SPU) Windermere basins 12, 13, 14, and 15 near 51st Avenue NE and NE Laurelcrest Lane (shown in Figure 2) to the upstream end of the North Interceptor, near Ravenna Park. SPU's Windermere area includes several CSO storage tanks owned by SPU. Coordination between WTD and SPU staff is critical in this area to manage both King County and SPU overflows.

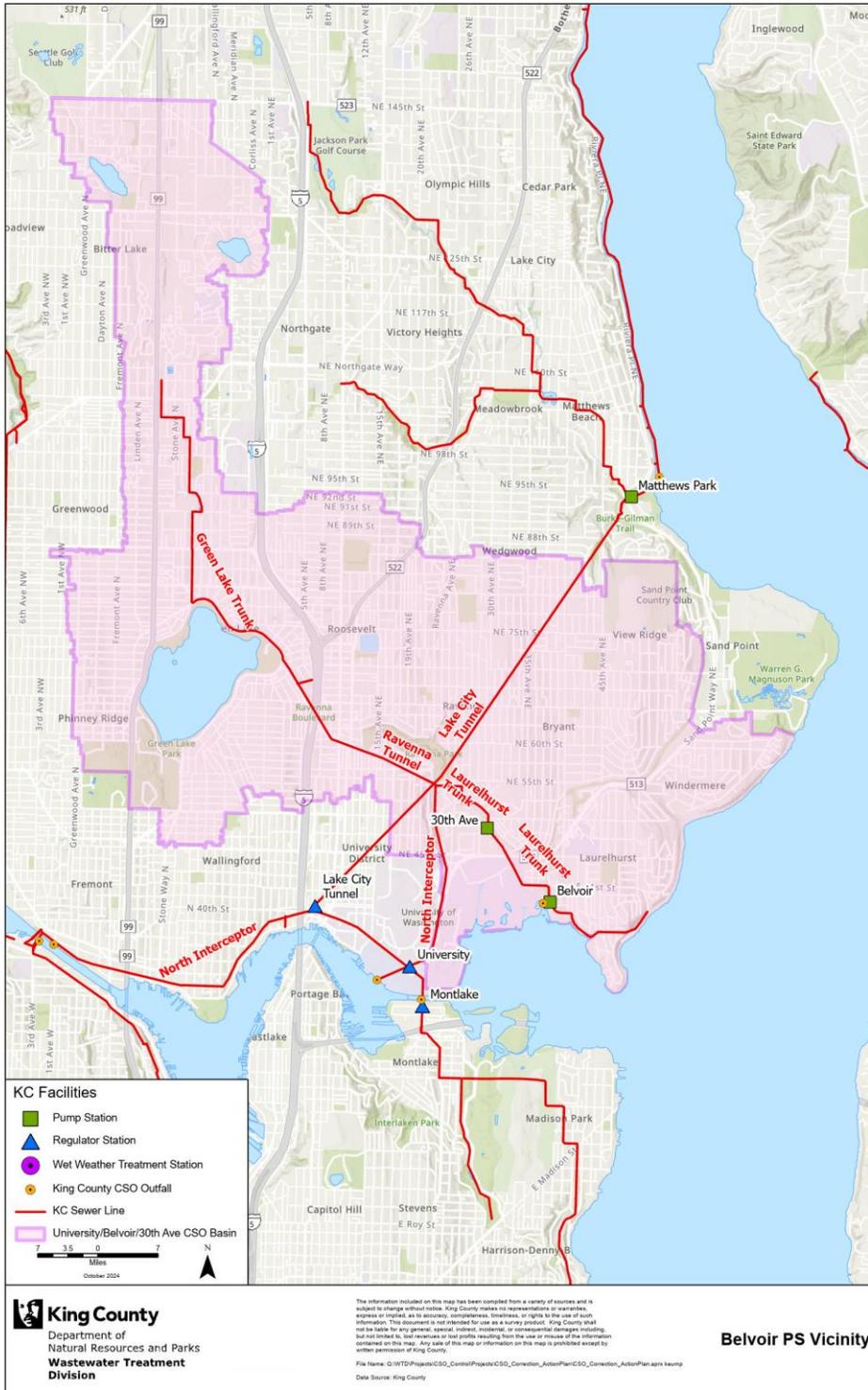


Figure 1. Belvoir Pump Station Vicinity

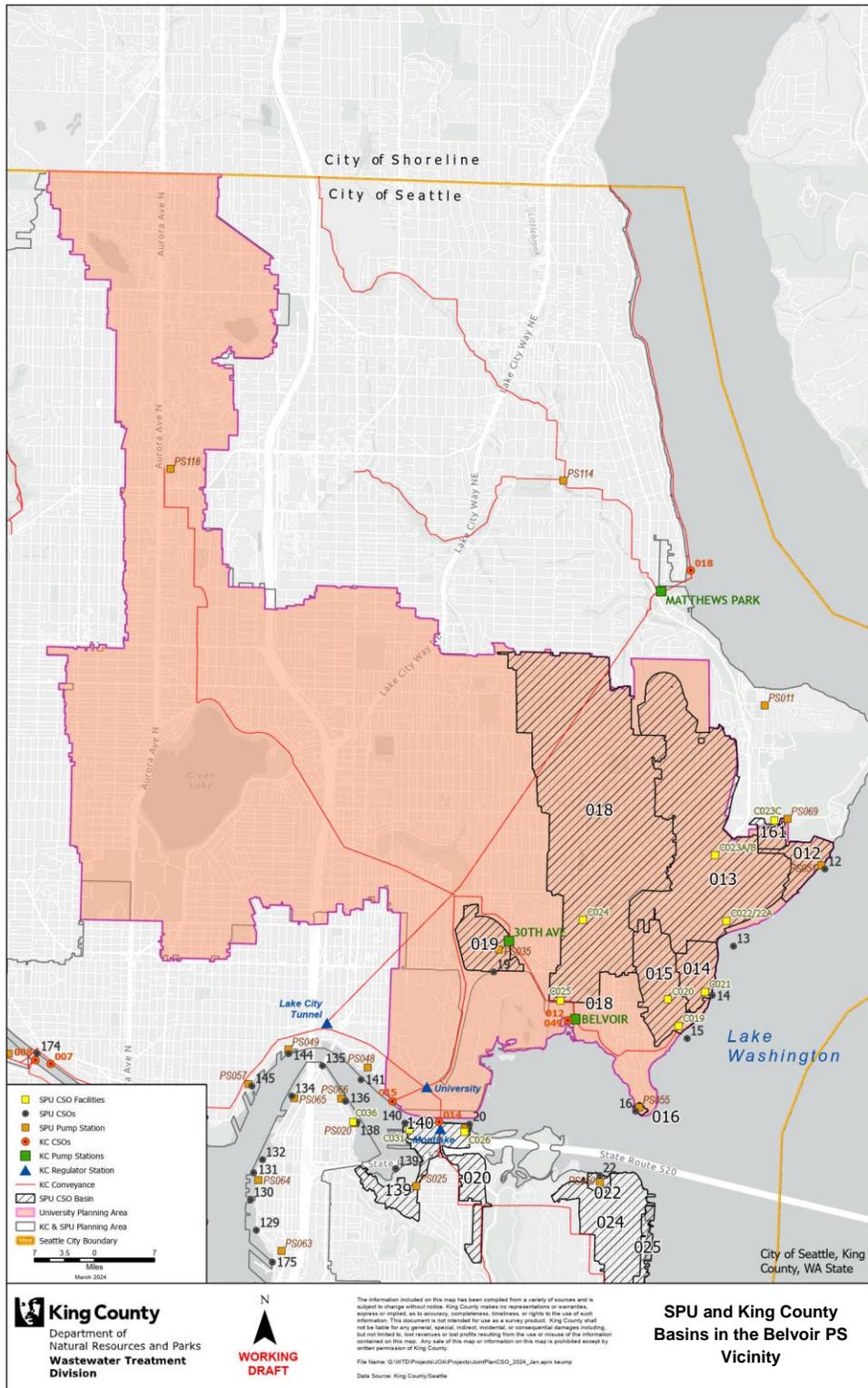


Figure 2. SPU and King County Basins in the Belvoir Pump Station Vicinity

The Belvoir PS has a capacity of 15 MGD, but Supervisory Control and Data Acquisition (SCADA) data shows that the pumping capacity has historically been 12.5 MGD due to downstream pipe capacity. Wastewater enters the Belvoir PS through the Laurelhurst Trunk downstream of the SPU North Union Bay basin 18. Flow is then pumped from the Belvoir PS to the 30th Ave NE PS. Overflow structures upstream and downstream of the Belvoir PS discharge to Union Bay through a 36-inch-diameter pipeline. The Belvoir PS downstream overflow structure also serves as the influent overflow structure for the 30th Ave NE PS, which has three pumps and is set to pump up to 18 MGD. The overflow weir for 30th Ave NE PS is located just downstream of the Belvoir PS.

The University Regulator regulates flow from the University Basin into the downstream North Interceptor. During dry weather flow conditions, wastewater flows directly through the station from the influent channel (from the Laurelhurst and Green Lake and Ravenna Trunks) to the downstream North Interceptor. During high flow conditions, the regulator gate partially or fully closes to prevent North Interceptor overloading. If influent levels become too high, the overflow gate opens to divert part of the flow to the University RS Overflow, which discharges to Portage Bay through an 84-inch-diameter overflow pipe.

3.0 Belvoir Pump Station Performance and Corrective Actions Completed

In December 2017, King County submitted a CSO corrective action letter to Ecology acknowledging that the Belvoir PS Overflow did not meet the CSO control performance standard of no more than one untreated discharge per year on a 20-year moving average. The Belvoir PS Overflow has historically been reported as controlled in Annual Reports prior to 2016. However, updated modeling indicated that the CSO frequency increased due to hydraulic and hydrologic changes upstream of the pump station. As of the 2016 Annual CSO and CD Report (submitted in 2017 for the calendar year 2016 data and activities), Belvoir PS Overflow (DSN 012) has not met the CSO control performance standard.

Table 1 shows the overflows from 2019 through 2023. A total of eleven overflows have occurred, with one overflow per year in 2019 and 2020, two overflows in 2021, five overflows in 2022 and two overflows in 2023. Operational improvements made to date have not brought the CSO into control to meet the CSO performance standard.

Table 1. Untreated Combined Sewer Overflow Discharge Events at Belvoir PS

Event Starting Date/Time	Event Ending Date/Time	Duration (hours)	Volume (gallons)	Precipitation (inches)	Storm Duration (hours)
12/20/19 9:49 AM	12/20/19 7:02 PM	9.22	996,394	3.78	48.25
12/21/20 2:52 PM	12/21/20 7:12 PM	4.33	769,951	2.38	18.5
1/2/21 10:01 PM	1/3/21 12:17 AM	2.27	185,553	2.19	102.35
1/12/21 2:29 AM	1/12/21 5:03 AM	2.57	191,252	1.48	51.53
1/2/22 9:25 PM	1/3/22 2:04 AM	4.65	517,278	2.13	15.38
1/7/22 12:54 PM	1/7/22 1:40 PM	0.77	16,996	4.06	122.77
2/28/22 7:52 AM	2/28/22 8:51 AM	0.98	28,764	2.43	45.33
12/24/22 10:14 AM	12/24/22 11:36 AM	1.37	94,628	1.39	19.23
12/25/22 11:59 PM	12/26/22 12:47 AM	0.80	21,218	2.66	56.43
11/4/23 11:22 AM	11/4/23 11:28 AM	0.10	214	0.78	13.22
12/4/23 11:42PM	12/5/23 12:23PM	12.68	582,959	2.77	47.03

The Belvoir PS Overflow frequency currently averages 1.5 events per year based on the last 20 years of monitored data, as can be seen below in Table 2.

Table 2. Belvoir PS CSO Events

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	20-year Average
CSO Events	2	0	1	1	0	0	2	0	1	1	1	5	2	2	1	1	1	2	5	2	1.5

After the Belvoir PS fell out of control, WTD initiated an investigation of the system. This system is complex in nature and changes at the Belvoir PS can have negative impacts to downstream facilities including the 30th Ave NE PS and University RS Overflow, both of which also do not meet the CSO control performance standard. WTD has completed several actions prior to

submittal of this Corrective Action Report to better inform the downstream impacts of making changes at the Belvoir PS. The actions completed to date are in Table 3 below.

Table 3. Summary of Completed Corrective Actions and Schedule

Action	Schedule
Evaluated operational adjustments to the weir at Belvoir PS and investigated pumping capacity limitations	Completed July 2021
Launched Coordination Optimization Evaluation	2024
Reported Compliance in Annual Reports	Completed July 2019, 2020, 2021, 2022, 2023, 2024

To increase the flow through the Belvoir PS, WTD investigated raising the weir downstream of the PS. Raising the downstream weir would allow flow through Belvoir PS to increase; however, flow would exceed the capacity of the downstream pipe to 30th Ave NE PS and cause increased overflows at 30th Ave NE PS. The pumps at Belvoir PS are designed for 15 MGD but can only pump 12.5 MGD due to the downstream pipe capacity between Belvoir PS and 30th Ave NE PS.

Additionally, beginning in 2024, WTD and SPU launched a Coordinated Optimization Evaluation to explore optimization opportunities in three priority planning areas (Montlake, University, and Henderson) in advance of upcoming planning efforts relating to CSO control. Belvoir PS is included as part of the University planning area. The goal is to develop a potential optimization strategies by coordinating closely between SPU and WTD to assess available nearby capacity or control strategies that could improve shared objectives of CSO control by optimizing the existing infrastructure in both systems. WTD is working closely with SPU to bring The Belvoir PS Overflow into compliance.

4.0 Proposed Corrective Actions and Schedule

In WTD’s approved CSO long Term Control Plan and CSO consent decree, WTD is obligated and committed to controlling the University and Montlake overflows. Since the Belvoir PS is part of the University basin, WTD will complete a planning-level study to identify a solution to control the Belvoir PS as part of the University and Montlake CSO planning effort.

The planning effort for Belvoir will evaluate optimization concepts from the Coordinated Optimization Evaluation, independent storage for Belvoir, and measures to remove flow from the combined sewer system, along with control options for University and Montlake RS overflows. Close alignment with Tier 1 Corrective Action activities and tracking of 30th Ave NE outfall status will also be coordinated.

The schedule for delivery proposed below is informed by WTD’s capital project planning and delivery processes. The schedule factors in time to complete necessary steps in the capital

process that include but are not limited to: planning-level options analysis, property acquisition, community engagement, permit approvals, design, and construction. The schedule notes the annual budgeting schedule to ensure any necessary capital solutions are funded and seeks to expedite project delivery by advancing the project for budget authorization as early as possible based on planning-level analysis.

Belvoir PS Corrective Actions in Table 4 are consistent with University and Montlake milestones in the proposed 2024 modification to the King County CSO Consent Decree to reflect shared planning opportunities and in order to allow for the Coordinated Optimization Evaluation recommendations to be included in option recommendations.

WTD will provide updates on this project to Ecology and EPA during quarterly regulatory meetings and as part of the CSO/CD Annual Report.

Table 4. Summary of Proposed Corrective Actions and Schedule

Action	Schedule
Complete a planning-level options analysis to develop and evaluate capital projects to control Belvoir PS in combination with activities taking place for University and Montlake CSO Control, to be presented on during a quarterly regulatory briefing	December 31, 2026
Develop and submit an engineering report for the Belvoir PS capital project in combination with University and Montlake CSO Control Project	December 31, 2029
Completion of bidding for the Belvoir PS capital project in combination with University and Montlake CSO Control Project.	December 31, 2032
Achieve construction substantial completion of the Belvoir CSO capital project in combination with University and Montlake CSO Control Project	December 31, 2037
Monitor and report compliance in future CSO/CD annual reports	Annually by July 31