DSN041-WWT-1 (KC) or SEBI-Brandon-KC-WWTF

Alternative DSN041-WWT-1 (KC) controls King County's Brandon St CSOs by building an equalization basin and wet-weather treatment facility (WWTF) to store and treat CSOs prior to discharge into the Lower Duwamish Waterway. The WWTF would be located near the Brandon St Regulator Station and designed to meet NPDES effluent water quality limits. This alternative is an independent alternative which would store or treat King County CSOs.

Design Criteria

- Conveyance from Brandon St Regulator Station to WWTF (Common to Both CSO Treatment Processes)
    - CSO Peak Flow Rate for Sizing Conveyance to Influent Pump Station, Equalization Basin, and WWTF: 35.2 MGD
- Ballasted Sedimentation
    - WWTF and Influent Pump Station Peak Design Flow Rate: 24.0 MGD
    - Equalization Basin Volume: 0.41 MG
    - CSO Peak Flow Rate for Sizing Effluent Conveyance from WWTF to Brandon St Regulator Station: 24.0 MGD
    - CSO Peak Flow Rate for Sizing Outfall: Capacity of Existing Brandon St CSO Outfall
- Chemically Enhanced Primary Treatment with Lamella Plates
    - WWTF and Influent Pump Station Peak Design Flow Rate: 25.0 MGD
    - Equalization Basin Volume: 0.33 MG
    - CSO Peak Flow Rate for Sizing Effluent Conveyance from WWTF to Brandon St Regulator Station: 25.0 MGD
    - CSO Peak Flow Rate for Sizing Outfall: Capacity of Existing Brandon St CSO Outfall

Description

Alternative DSN041-WWT-1 (KC) consists of a WWTF to treat Brandon CSOs, which discharge into the Lower Duwamish Waterway. The WWTF includes an influent pump station, equalization basin, screening facility, CSO treatment process, and disinfection. Modifications to the Brandon St Regulator Station would be required for diversion of flows to the WWTF. Ancillary facilities include an odor control facility, electrical/controls building, and emergency generator. The CSO treatment process could be either a) Ballasted Sedimentation or b) Chemically Enhanced Primary Treatment (CEPT) with Lamella Plates. See Section 6.1 and Appendix F.3 for more details about the treatment facilities and CSO treatment processes.

The WWTF could be located within or adjacent to the approximate boundary shown in Figure G.5.2-1. See Section 6.1 Planning-Level Sizing Assumptions for criteria and assumptions used in establishing the approximate boundary.

The main components of this alternative would include:

- Conveyance from Brandon St Regulator Station to WWTF (Common to Both CSO Treatment Processes)
    - Modifications to the Brandon St Regulator Station.
    - Up to approximately 1,130 ft of 42-inch-diameter influent gravity sewer to convey Brandon St CSOs from the Brandon St Regulator Station to the WWTF. The length depends on the location selected for the WWTF within or adjacent to the approximate boundary shown in Figure G.5.2-1.
- CSO Treatment Processes (One of the Following)
    - Ballasted Sedimentation
        - 24.0-MGD WWTF.
        - 0.41-MG equalization basin.
        - 24.0-MGD influent pump station.
        - Up to approximately 1,130 ft of 36-inch-diameter effluent gravity sewer from the WWTF to the Brandon St Regulator Station. The length depends on the location selected for the WWTF within or adjacent to the approximate boundary shown in Figure G.5.2-1.
        - Approximately 500 ft of 72-inch-diameter pipe for the extension of the existing CSO outfall. The alternative assumes that the outfall will be submerged and extended from the Brandon St Outfall Station to the center of the Lower Duwamish Waterway[1].
    - Chemically Enhanced Primary Treatment with Lamella Plates
        - 25.0-MGD WWTF.
        - 0.33-MG equalization basin.
        - 25.0-MGD influent pump station.
        - Up to approximately 1,130 ft of 36-inch diameter effluent gravity sewer from the WWTF to the Brandon St Regulator Station. The length depends on the location selected for the WWTF within or adjacent to the approximate boundary shown in Figure G.5.2-1.
        - Approximately 500 ft of 72-inch-diameter pipe for the extension of the existing CSO outfall. The alternative assumes a new CSO outfall will be submerged and extended from the Brandon St Outfall Station to the center of the Lower Duwamish Waterway[1].

[1] Preliminary outfall assumptions (see Appendix F.3 for WWTF design criteria) were used during the alternatives development and evaluation process. Refined outfall design concepts and cost estimates were prepared separately from this technical memorandum and are included in *Technical Memorandum 954.03, Preliminary CSO Outfall Concepts Analysis*.

Wet-Weather Treatment Facility

Two treatment technologies have been developed for use in the CSO treatment processes for this alternative based on the findings of the *Technical Memorandum 700, Treatment Technology Selection.* Table 1 summarizes the unit processes of the WWTF that are included for each CSO treatment process evaluated. See Section 6.1 and Appendix F.3 for more details about the treatment facilities and CSO treatment processes.

Table 1. Unit Process for CSO Treatment Processes

Ballasted Sedimentation	CEPT with Lamella Plates
• Influent Pump Station, • Fine Screening, • Grit Removal, • Ballasted Sedimentation System, (including Chemical Feed System), • Solids Handling Facility, • Disinfection System, and • Facilities Building (odor control, electrical controls, standby generator).	• Influent Pump Station, • Coarse Screening, • CEPT System, (including Chemical Feed System and Additional Depth for Solids Handling), • Solids Handling Facility, • Disinfection System, and • Facilities Building (odor control, electrical controls, standby generator).

Equalization Basin

The equalization basin allows for shaving peak flows to the WWTF. The shaving of peak flows results in a reduced design capacity requirement for the WWTF. In this alternative, CSOs would be pumped to the WWTF, and flows in excess of the hydraulic capacity of the WWTF would be diverted to the equalization basin prior to the WWTF. This operational mode ensures that CSOs are being treated, and the equalization basin is used only during peak wet-weather events that exceed the WWTF design capacity.

An alternate operational mode includes routing all flows to the equalization basin prior to sending flows to the WWTF to minimize operational costs associated with the WWTF. However, the capacity of the WWTF would need to increase to handle higher peak wet-weather events.

Flow Diversion and Discharge

The WWTF and equalization basin is located upstream of the Brandon St Regulator Station and would store or treat King County CSOs diverted from the Brandon St Regulator Station.

One regulator station will be required to divert King County flows from the Brandon St Regulator Station to the WWTF and equalization basin. For this planning phase, it is assumed that the diversion would occur at the Brandon St Regulator Station. Evaluation of whether flows can be diverted upstream of the regulator will be completed during preferred alternative development. Diverted King County flow would discharge to the location of the WWTF and equalization basin via a 42-inch-diameter influent gravity sewer. The length of the gravity sewer will vary depending on the selected location of the WWTF, which will be evaluated during

preferred alternative development. The gravity sewer can be up to 1,130 feet long based on the criteria and assumptions listed in Section 6.1.

Treated CSOs would be conveyed to the Brandon St Regulator Station via a 36-inch-diameter effluent gravity sewer, up to approximately 1,130 feet in length. The length of the gravity sewer will vary depending on the selected location of the WWTF, which will be evaluated during preferred alternative development.

Treated and untreated CSOs would be conveyed via the existing CSO outfall from the Brandon St Regulator Station to the Brandon St Outfall Station. The flows would then be conveyed via the new extension of the CSO outfall from the Brandon St Outfall Station to the Lower Duwamish Waterway. The outfall extension is approximately 500 feet long assuming the discharge is located at the center of the Lower Duwamish Waterway[2]. For planning purposes, the new outfall extension will be 72 inches in diameter to match the existing CSO outfall capacity. The length of the CSO outfall extension will be modified depending on the selected location of the discharge, which will be evaluated during preferred alternative development.

[2] Preliminary outfall assumptions (see Appendix F.3 for WWTF design criteria) were used during the alternatives development and evaluation process. Refined outfall design concepts and cost estimates were prepared separately from this technical memorandum and are included in *Technical Memorandum 954.03, Preliminary CSO Outfall Concepts Analysis*.