

## DSN028/029/030/032-WWT-1 (KC) or MEBI-Cons Hanford-Lander-King-Kingdome-KC-WWTF (New Conveyance)

Alternative DSN028/029/030/032-WWT-1 (KC) controls King County's King St, Kingdome, Lander St, and Hanford #2 CSOs by building an equalization basin and wet-weather treatment facility (WWTF) to store and treat CSOs prior to discharge into the East Waterway (Duwamish River). The WWTF would be located near the Hanford 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.

This alternative includes new conveyance to convey flows from the King St, Kingdome, Lander St, and Hanford St Regulator Stations to the WWTF.

### Design Criteria

- Conveyance from King St, Kingdome, Lander St, and Hanford St Regulator Stations to WWTF (Common to Both CSO Treatment Processes)
  - CSO Peak Flow Rate for Sizing Conveyance from King St Regulator Station to Kingdome Regulator Station: 29.6 MGD (King St CSOs)
  - CSO Peak Flow Rate for Sizing Conveyance from Kingdome Regulator Station to Lander St Connection at East Marginal Way South: 116.6 MGD (King St and Kingdome CSOs)
  - CSO Peak Flow Rate for Sizing Conveyance from Lander St Regulator Station to Lander St Connection at East Marginal Way South: 47.9 MGD (Lander St CSOs)
  - CSO Peak Flow Rate for Sizing Conveyance from Lander St Connection at East Marginal Way South to Influent Pump Station, Equalization Basin, and WWTF: 164.5 MGD (King St, Kingdome, and Lander St CSOs)
  - CSO Peak Flow Rate for Sizing Conveyance from Hanford St Regulator Station to Influent Pump Station, Equalization Basin, and WWTF: 94.9 MGD (Hanford #2 CSOs)
- Ballasted Sedimentation
  - WWTF and Influent Pump Station Peak Design Flow Rate: 151.0 MGD
  - Equalization Basin Volume: 1.71 MG
  - CSO Peak Flow Rate for Sizing Effluent Conveyance from WWTF to Hanford St Regulator Station: 151.0 MGD
  - CSO Peak Flow Rate for Sizing New Outfall<sup>1</sup>: 151.0 MGD
- Chemically Enhanced Primary Treatment with Lamella Plates
  - WWTF and Influent Pump Station Peak Design Flow Rate: 155.0 MGD
  - Equalization Basin Volume: 1.43 MG

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<sup>1</sup> Untreated CSOs will discharge to existing CSO outfalls (King St, Kingdome, Lander St, and Hanford #2 CSO Outfalls).

- CSO Peak Flow Rate for Sizing Effluent Conveyance from WWTF to Hanford St Regulator Station: 155.0 MGD
- CSO Peak Flow Rate for Sizing New Outfall<sup>1</sup>: 155.0 MGD

#### Description

Alternative DSN028/029/030/032-WWT-1 (KC) consists of a WWTF to treat King St, Kingdome, Lander St, and Hanford #2 CSOs, which discharge into the East Waterway. The WWTF includes an influent pump station, equalization basin, screening facility, CSO treatment process, and disinfection. Modifications to the King St, Kingdome, Lander St, and Hanford St Regulator Stations 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.

This alternative assumes that the WWTF would be located within or adjacent to the approximate solid boundary shown in Figure G.3.8-1. The WWTF could be located anywhere between the King St Regulator Station and Hanford St Regulator Station (indicated as dashed boundary in Figure G.3.8-1); however, conveyance would need to be re-evaluated if WWTF moves from the assumed location (solid boundary). See Section 6.1 Planning-Level Sizing Assumptions for criteria and assumptions used in establishing the approximate boundaries.

The main components of this alternative would include:

- Conveyance from King St, Kingdome, Lander St, and Hanford St Regulator Stations to WWTF (Common to Both CSO Treatment Processes)
  - Modifications to the King St, Kingdome, Lander St, and Hanford St Regulator Stations.
  - Approximately 2,400 ft of 48-inch-diameter gravity sewer to convey King St CSOs from the King St Regulator Station to the Kingdome Regulator Station.
  - Approximately 4,800 ft of 72-inch-diameter gravity sewer to convey King St and Kingdome CSOs from the Kingdome Regulator Station to the Lander St Connection at East Marginal Way South.
  - Approximately 900 ft of 42-inch-diameter gravity sewer to convey Lander St CSOs from the Lander St Regulator Station to the Lander St Connection at East Marginal Way South.
  - Approximately 1,500 ft of 84-inch-diameter influent gravity sewer to convey King St, Kingdome, and Lander St CSOs from the Lander St Connection at East Marginal Way South to the WWTF. The length depends on the location selected for the WWTF within or adjacent to the approximate solid boundary shown in Figure G.3.8-1.
  - Up to approximately 1,890 ft of 60-inch-diameter influent gravity sewer to convey Hanford #2 CSOs from the Hanford St Regulator Station to the WWTF. The length depends on the location selected for the WWTF within or adjacent to the approximate solid boundary shown in Figure G.3.8-1.

- CSO Treatment Process (One of the Following)
  - Ballasted Sedimentation
    - 151.0-MGD WWTF.
    - 1.71-MG equalization basin.
    - 151.0-MGD influent pump station.
    - Up to approximately 1,890 ft of 72-inch-diameter effluent gravity sewer from the WWTF to the Hanford St Regulator Station. The length depends on the location selected for the WWTF within or adjacent to the approximate solid boundary shown in Figure G.3.8-1.
    - Approximately 1,500 ft of 72-inch-diameter pipe for the CSO outfall. The alternative assumes a new CSO outfall would convey treated CSOs from the Hanford St Regulator Station to the center of the East Waterway<sup>2</sup>.
  - Chemically Enhanced Primary Treatment with Lamella Plates
    - 155.0-MGD WWTF.
    - 1.43-MG equalization basin.
    - 155.0-MGD influent pump station.
    - Up to approximately 1,890 ft of 72-inch-diameter effluent gravity sewer from the WWTF to the Hanford St Regulator Station. The length depends on the location selected for the WWTF within or adjacent to the approximate solid boundary shown in Figure G.3.8-1.
    - Approximately 1,500 ft of 72-inch-diameter pipe for the CSO outfall. The alternative assumes a new CSO outfall would convey treated CSOs from the Hanford St Regulator Station to the center of the East Waterway<sup>2</sup>.

#### 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**

<b>Ballasted Sedimentation</b>	<b>CEPT with Lamella Plates</b>
<ul style="list-style-type: none"> <li>• Influent Pump Station,</li> <li>• Fine Screening,</li> </ul>	<ul style="list-style-type: none"> <li>• Influent Pump Station,</li> <li>• Coarse Screening,</li> </ul>

<sup>2</sup> 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*.

Ballasted Sedimentation	CEPT with Lamella Plates
<ul style="list-style-type: none"> <li>• Grit Removal,</li> <li>• Ballasted Sedimentation System (including Chemical Feed System),</li> <li>• Solids Handling Facility,</li> <li>• Disinfection System, and</li> <li>• Facilities Building (odor control, electrical controls, standby generator).</li> </ul>	<ul style="list-style-type: none"> <li>• CEPT System (including Chemical Feed System and Additional Depth for Solids Handling),</li> <li>• Solids Handling Facility,</li> <li>• Disinfection System, and</li> <li>• Facilities Building (odor control, electrical controls, standby generator).</li> </ul>

### 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 near the Hanford St Regulator Station and would store or treat King County CSOs diverted from the King St, Kingdome, Lander St, and Hanford St Regulator Stations.

One regulator station will be required to divert King County flows (Hanford #2 CSOs) from the Hanford St Regulator Station to the WWTF and equalization basin. For this planning phase, it is assumed that the diversion would occur at the Hanford 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 60-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 1,890 feet long based on the criteria and assumptions listed in Section 6.1.

Three additional regulator stations will be required to divert King County flows from the King St, Kingdome, and Lander St Regulator Stations to the WWTF. For this planning phase, it is assumed that the diversions would occur at the existing regulator stations. Flows would be conveyed to the WWTF via approximately 900 ft of 42-inch-diameter gravity sewer, 2,400 ft of 48-inch-diameter gravity sewer, 4,800 ft of 72-inch-diameter gravity sewer, and 1,500 ft of 84-inch-diameter gravity sewer. The total length of the gravity sewers will vary depending on the selected location of the WWTF, which will be evaluated during preferred alternative development.

Treated CSOs would be conveyed to the Hanford St Regulator Station via a 72-inch-diameter effluent gravity sewer<sup>3</sup>, up to approximately 1,890 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. The treated CSOs would then be conveyed by the new CSO outfall (approximately 1,500 feet of 72-inch-diameter pipe) from the Hanford St Regulator Station to the center of the East Waterway<sup>4</sup>. The length of the CSO outfall will be modified depending on the selected location of the discharge, which will be evaluated during preferred alternative development.

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<sup>3</sup> The 72-inch-diameter effluent pipe would operate as a gravity sewer for the Ballasted Sedimentation alternative, but it would operate as a pressure sewer for the CEPT with Lamella Plates alternative at peak flow rates.

<sup>4</sup> 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*.